11. Livestock

11.1 Overview

South Sudan has a substantial livestock resource, a legacy of a historical endowment, that was well documented in the seminal pre-independence, pre-civil war 1954 British colonial assessment of the natural resources and development potential of the then Southern Provinces of the Sudan.[294] The assessment found that in 1954 southern Sudan had a considerable livestock resource recognized as a great asset that would be of significance for sustainably increasing the financial self-sufficiency of the region. There was widespread ownership of livestock across the region except for parts where trypanosomiasis (sleeping sickness in human beings) was prevalent. Animal production was based on traditional migratory systems (pastoral systems) but in most areas, mixed economies (agro-pastoral), in which cattle were an essential part, were evident. Today, South Sudan's ruminant livestock wealth is still largely in the hands of traditional agro-pastoralist and pastoralist systems that hold 47% and 43% of South Sudan's livestock wealth; the remaining 10% being in the hands of smallholder livestock keepers mainly in urban and peri-urban areas. The strengths of the traditional systems must be acknowledged in a situation where due to protracted civil war and marginalization livelihoods were decimated, input systems, animal health services and marketing were underdeveloped, never developed or greatly eroded effectively undermining productive and profitable economic activity. South Sudan also has a legacy of honey gathering and traditional beekeeping with honey playing an important role in supplementing diets, providing income and an important commodity in socio-cultural exchanges.[295]

A definitive estimate of the size of the livestock subsector is lacking, but a revised data based FAO estimates used officially by the national ministry, and considered conservative by some key stakeholders, put the national herd in 2013 at 11.7 million head of cattle, 12.5 million goats and 12.1 million sheep[296]. This would place the South Sudan national herd as the seventh[297] largest in Africa (Table 11-1), worth an estimated 7 billion South Sudanese Pounds (SSP), approximately 15% of the GDP[298]. This asset has tremendous potential; even within the current constraints and challenges, it is estimated that only 35% of the available supply base can meet the current domestic demand and social needs.[299] Given the relatively low human population of 8.26 million, South Sudan has the highest per capita holding of livestock in Africa, and a large land area of 648,000 sq. km, much of which is suitable for livestock production. The livestock subsector has great potential for meeting domestic demands and generating a surplus of livestock for export.[299] The large subsector base, with 72–85%[300] of households having at least one animal, offers a significant

[294]Sudan Government. 1955. *Natural Resources and Development Potential in the Southern Provinces of the Sudan. A Preliminary Report by the Southern Development Investigation Team 1954.* London.
[295]The Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA). 2012. *A Study on Traditional Beekeeping and its Contribution to Food Security and Poverty Alleviation*. Information for South Sudan Food Security and Policy Intervention. European Union.
[296]FAO/WFP.2013. Crop and Food Security Assessment Mission to South Sudan. 22 February 2013.
[297]South Sudan national herd is ranked as the 6th largest on the African continent ahead of Kenya. Data for the two countries would rank South Sudan 7th on the basis of both numbers and tropical livestock units. Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.
[298]Government of Southern Sudan. 2010. GOSS Growth Strategy 2010-2012
[299]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.
[300]The NBHS found that 72% of all South Sudan households own one or more livestock. Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF. The study cited a figure of 85% households owning at least one type of

opportunity for addressing food security, income generation, poverty reduction, employment, trade and broadening the economic base of South Sudan. Similarly, the findings of a study by the South Sudan Food Security and Policy Intervention (SIFSIA) indicate a huge potential for production of honey and related products based on the gathering of wild honey and traditional beekeeping, even before taking into account the potential from modern beekeeping.[301] A report asserts that over 60% of the honey on the Uganda market in the early 2000's came from South Sudan: Uganda is an exporter of honey to the European Union.[302]

Table 11-1 Livestock population in selected African countries in 2011[303]

Country	Rank in Livestock Holding in Africa	Cattle	Goats	Sheep
Ethiopia	1	53382194	22786946	25509004
Sudan	2	29618000	30649000	39296000
Tanzania	3	21300000	15200000	6400000
Nigeria	4	18871399	57300000	38000000
Kenya	5	18173500	28860700	17821600
South Africa	6	13688328	6165051	24302776
South Sudan[304]	7	11749245	12449624	12087020
Uganda	8	11408750	12449670	3410370
Madagascar	9	10000000	1300000	735000
Niger	10	9552611	13231429	10018857
Chad	13	7650000	6750000	3100000
Somalia	15	4850000	11500000	12250000
Egypt	17	4803000	4207400	5488000
Eritrea	26	2065000	1750000	2281000
Rwanda	33	1143231	2970780	829000
Burundi	37	653580	2285693	332463
Djibouti	45	296000	512000	468000
Total Africa		291,422,407	334,503,748	318,203,963

Sources: FAOStat 2011. FAO/WFP 2013. FAO/WFP Crop and Food Security Assessment Mission (CFSAM) to South Sudan for South Sudan data. Republic of Uganda. 2009. The National Livestock Census. *A Summary Report of the National Livestock Census, 2008.* Ministry of Agriculture, Animal Industry and Fisheries and Uganda Bureau of Statistics, for Uganda data.

The high potential of South Sudan's livestock subsector is similar to, and in some cases surpasses, that of other countries in the Horn of Africa, where livestock contribute significantly to livelihoods, national and regional economies. The region collectively has the highest concentration of livestock in Africa and the highest concentration of pastoralists and agro-pastoralists globally. Although there have been concerted efforts to improve the quality

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

[301]An assessment of three states i.e., Lakes, Western Bahr el Ghazal and Western Equatoria revealed that from traditional beekeeping and honey gathering alone the potential annual earnings from sale of honey could reach a minimum of SSP 31 million (USD 9.85). European Union. Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA). 2012. *A Study on Traditional Beekeeping and its Contribution to Food Security and Poverty Alleviation*. Information for South Sudan Food Security and Policy Intervention.

[302]Maku, J. 2004. *Honey Market in Uganda.* APIACTA, Vol 38 (2004), pp.302–306.

[303]Note: 2011 data used as 2012 data not yet available from FAOStat

[304]Calculated based on the conservative growth rates of 0.06 for cattle and 0.1 for goats and sheep suggested in the CFSAM 2013 Mission Report. 2013 data is an estimated

of its herd, sector development in the region is still largely based on indigenous stock.[305] Within East Africa alone, the livestock sector amounts to a multi-billion dollar industry estimated at $5 billion annually, representing over 14% of the total GDP of the East Africa region.[306] In neighbouring Ethiopia, with the largest livestock population on the continent, livestock exports are only second to coffee in generating foreign exchange. According to the National Bank of Ethiopia, formal trade of livestock and livestock products out of Ethiopia in 2006 generated US $121 million. However, there is an even larger informal (unregistered) trade of live animals out of Ethiopia into Kenya, Somalia and Djibouti which is estimated to generate between US $250 and US $300 million, annually.[307] South Sudan has historically been part of this regional trade and is still involved, even though at limited levels.[308] In Kenya, 70% of the national herd is in the arid and semi-arid lands held predominantly by pastoral and agro-pastoral groups[309]. Livestock in Kenya contribute 320 billion Kenya shillings to the agricultural GDP, only slightly below the contribution of crops and horticulture[310]. The Greater Horn of Africa region produces 42% of Africa's milk, with Kenya being the highest milk producer continentally. However, most of Kenya's milk is produced from high grade cattle, unlike Uganda's dairy industry that is largely based on indigenous cattle kept by pastoral, agro-pastoral and small holders, making it one of the few low cost milk industries globally. Uganda's milk production increased from 365 million litres in 1991 to an estimated 1.526 billion litres in 2012 and has over the last decade maintained a positive growth rate of 3% per annum compared to the declining growth rates in the food and cash crop subsectors in Uganda. The country, which was an importer of milk in the 1980s, now earns revenues from exporting to the region that have risen from $3.4 million in 2011 to an expected $12.1 million in 2013.

South Sudan's livestock subsector potential is untapped and underdeveloped for food security, livelihoods, income generation, industrial growth and export. The subsector potential is poorly conceptualized and articulated, which is a result of, among other things, the lack of reliable data especially on livestock population and the dynamics within the subsector. This lack of reliable data has impeded strategy development, planning, investment and coordination at all levels and across stakeholders. The subsector lacks a comprehensive policy, legislative and regulatory framework to guide and regulate subsector actors and to create an enabling environment for sustained increased investment. Areas of comparative advantage, within both the national and regional livelihood zones and economies, have not been clearly identified or exploited. Mutually beneficial linkages to the wider national economy, especially the crop sector, are not harnessed.

Major advantages/opportunities are: large livestock population; favourable livelihood zones; large base of producers, with many experienced livestock keepers; large production and productivity gap, where low level technologies already in existence and better organization of the actors can achieve substantive initial gains; livestock concentration areas that can be production cluster regions; high demand in urban and peri-urban centres; opportunities to

[305]Humanitarian Policy Group. 2009. *Getting it Right: Understanding Livelihoods to Reduce the Vulnerability of Pastoral Communities.* ODI Synthesis Paper.
[306]Kilimo Trust 2009. *Livestock Product Value Chains in East Africa: Scoping and Preliminary Mapping Study.* Final Report, Kampala, Uganda March 2009.
[307]COMESA. 2009. *Policy Framework for Food Security in Pastoral Areas. Comprehensive African Agriculture Development Programme,* Pillar III Consultative Draft. COMESA, December 2009.
[308]CAMP Livestock subsector team, March to July 2013, CAMP Situation Analysis., Sudan Government. 1955. *Natural Resources and Development Potential in the Southern Provinces of the Sudan. A Preliminary Report by the Southern Development Investigation Team 1954.* London
[309]Republic of Kenya. 2012. Sessional Paper No. 8 of 2012 on National Policy for the Sustainable Development of Northern Kenya and Other Arid Lands. Releasing Our Full Potential. Ministry of State for Development of Northern Kenya and Other Arid Lands. Office of the Prime Minister. October 2012
[310]Republic of Kenya. 2012. Sessional Paper No. 8 of 2012 on National Policy for the Sustainable Development of Northern Kenya and Other Arid Lands. Releasing Our Full Potential. Ministry of State for Development of Northern Kenya and Other Arid Lands. Office of the Prime Minister. October 2012

exploit a diversity of production systems and emerging species; untapped linkages with the crop sector that can produce critical inputs for commercialization. Additionally, there are regional opportunities including: access to existing technologies and innovations; resources to support and strengthen both domestic and transboundary animal health services; compare and learn from the strategies and paths of development of the livestock sectors of other countries in the region; existence of vibrant live animal trade; linkage into input production and distribution systems, sector investors and financing; research and training facilities in the region. All these advantages/opportunities could help 'jump start' production and productivity, commercialisation, industrialisation and trade.

11.2 Key issues and challenges

(1) An inadequate formulation and articulation of the potential and opportunities within the livestock subsector:

- Lack of authoritative data on the size of the subsector: fundamental to shaping strategies and undergirding arguments for increased and substantial investment in the subsector is a need for definitive estimates of its size and structure. Reliable data is needed to emphasise the importance and potential of the subsector for food security, improvement of livelihoods and incomes, and for increasing the economic base and export revenues. Lack of reliable data has undermined planning, coordination, delivery of services and investment at all levels of government and between sector actors.

- Lack of appreciation of the value, rationale and opportunities of the subsistence traditional livestock keeping systems that are the foundation of the South Sudan livestock sub-sector: this is a pervading narrative that is evident in policy, at the political level, among some implementers and within communities at the grassroots[311]. This narrative has not factored in the innovativeness and resilience of pastoral and agro-pastoral livestock keepers that utilise marginal resources and that have maintained a large livestock resource despite the challenges during the protracted period of conflict and marginalization. The potential of the livestock sub-sector, which is comparable to that of other countries in the region can only be realized through institution of policies and strategies that are aligned to the existing livestock sector resource

- Poor integration of the subsector within the broader national, transboundary and regional economies: the linkages between the livestock and crops subsector are not noted leading to missed opportunities for integrated approaches, such as using: draught power to increase crop production; livestock assets for cash to fund inputs for cropping; and, crop residues, milling by products, and forages and fodder for feed. There is a weak response by the subsector to the growing domestic demand within urban and peri-urban centres, a gap being filled by imports. There are also poor linkages to existing regional opportunities, including

[311] A nominal view is taken of pastoral and agro-pastoral systems i.e., as conservative, focused on social goals of increasing herds sizes for purposes of prestige and marriage, adverse to change and market integration without an interrogation of the underlying issues. The core strategies of pastoralists such as mobility and migration are viewed as irrational and the cause of conflict. This narrative has not factored in the fact that due to protracted conflict and marginalization, pastoralists face a number of challenges; due to inadequate services production and productivity are low, and losses to drought and disease high. Poor road infrastructure, long distances to markets, multiple formal and informal taxation, insecurity all increase transaction costs negating potential benefits of market integration. The tendency is to focus on re-stocking in an attempt to ensure the survival of a breeding herd in the face of the multiple challenges. Social networks including kinship relations, marriage and dowry payment are important institutional arrangements for distribution of livestock, ensuring food security and reducing risk.

access to and utilisation of technologies, innovative financing, capacity building facilities and trade opportunities.

(2) Structural constraints that are impeding the growth of the livestock subsector, which include:

- Inadequate road infrastructure and means of transportation that are not aligned to the needs of the subsector, increasing transaction costs and vulnerability to insecurity, raiding, disease and to multiple and informal taxation, plus impeding market integration and trade.

- Unclear and incomplete constitutional, legal, policy and regulatory framework for land tenure that has resulted in inconsistencies and conflicts in the interpretation and implementation of land tenure. This has adversely affected availability of land for livestock production, mobility and migration, marketing and processing in both rural and urban areas.

- Conflict and insecurity including cattle raiding/rustling have disrupted livestock activities, resulting in: loss of human life and livestock; displacement of communities; disrupting of access to and utilisation of key grazing and water resources; and, reduced access to stock routes for production, marketing and trade. Insecurity has negatively impacted livestock populations and dynamics. In some counties this has affected livelihoods, and increased food insecurity and poverty.

- Inappropriate taxation: livestock and livestock products suffer multiple taxation (formal and informal/unreceipted) due to the lack of an integrated taxation framework. This leaves livestock producers and traders liable for taxes from multiple government agencies and other stakeholders. Inputs for production, such as day old chicks and feeds, attract high taxes unlike foodstuffs, which has been a deterrent to the growth of businesses that import and distribute such imports. Individual farmers and projects are left to import such inputs on an ad hoc basis. Exports such as hides and skins also attract high taxes.

- Inadequate Information and Communications Technology (ICT) and mobile telephony connectivity: given the size of the country and the poor road network and means of transport, ICT and mobile telephony are critical for coordinating both public and private sector activities and for securing and reducing the cost of financial transactions based on the models of mobile money within the Horn of Africa region.

(3) Incomplete policy, legal and regulatory frameworks: There is a lack of a comprehensive policy framework, policies and lead institutions/authorities to allow the development of the subsector and its components such as the dairy, meat, poultry, honey and hides and skins industries. A comprehensive legal and regulatory framework that is tailored for South Sudan is lacking; there is a need to review and update the existing acts/bills for relevance and to institute mechanisms for their enforcement.

(4) A poorly resourced, top heavy, poorly coordinated public sector unable to deliver services: the national, state and county public sector structures lack adequate staff (numbers and capacity) to properly carry out their mandated roles and responsibilities; the most serious gaps are within the technical ranks and at the implementation levels in states and counties. Coordination including separation of duties, mechanisms for collaboration, facilitation and communication are lacking or

poorly resourced, with conflicts of interest evident in some cases. There is poor coordination between the government and other actors.

(5) Low production and productivity, and evidence of seasonality of production: the subsector is dominated by subsistence producers who rely on indigenous breeds, knowledge and technologies, weak animal health services and resource management approaches; they are vulnerable to droughts and floods. There is scope for making initial substantial gains in filling the large production and productivity gaps through improved animal health services and by using low-level technologies already in existence in the region and by organization of producers. There is also scope for diversifying both the species and production systems to utilise a broader range of resources and strategies.

(6) Low processing and value addition, poor commodity development and high wastage: production for subsistence means that there is low integration into value chains, with as much as 60% of production being consumed directly by households. Only minimal processing and value addition is undertaken, with low recognition and development of potential commodities (such as hides and skins and bees wax) which leads to high waste of existing resources. The capacity to enforce sanitary, and food hygiene standards is limited. There is poor coordination between subsector value chain actors which allows middle men to increase costs to consumers. There is poor capacity to run enterprises as businesses, and an inability to respond to market opportunities.

(7) Low market integration and trade: Inadequate market infrastructure with long distances to markets result in high transport costs and increased vulnerability to: insecurity; inadequate facilities for meeting livestock (grazing/feeding, watering, holding ground) and human needs; and market structures (such as middlemen, long turnaround time etc.) that reduce profits for upstream actors. There is strong competition in some states from cheaper products from regional and global actors. Raw commodities are exported to neighbouring countries which are used in their processing industries, and often re-exported for higher profits to more lucrative markets.

(8) Low and poorly structured investment in the livestock subsector: generally there is low investment in the subsector by the government (both budget expenditure, and for service delivery). There are limited national institutional financial services targeting the subsector even for commercial actors, who mostly finance their own enterprises, or receive grants, in-kind resources/subsidies from government and NGO projects. These subsidies have in some cases led to dependency, a lack of ownership by the beneficiaries and unsustainability of initiatives. Similarly, there are limited mechanisms for accessing financial opportunities available within the region. However foreign (non-South Sudanese) businesses can access credit elsewhere, which places South Sudanese businesses at a disadvantage.

(9) Inadequate attention to appropriate natural resource management: institutional arrangements and coordination mechanisms to address natural resource issues are lacking. These issues include: water for production; rangeland development; droughts and flooding; drought and conflict early warning; natural resource based conflicts over land and other resources; protection of key production and trade migration routes; and, shared transboundary resources.

(10) Inadequate and uneven non-standardized university training in animal production and animal health/veterinary sciences: There is significant variation among the four public universities offering courses. Other than the Juba University and John Garang Memorial University of Science and Technology, there is limited capacity

for practical training (laboratory and field), field placements and thesis writing. There is low funding from the government, including research funding, and limited teaching staff. There is limited collaboration with regional universities and consortiums, and no linkages to existing technologies, information and resources for research. Only one public training centre exists (Marial Lou) for technical skills development where technicians, animal health and animal production auxiliaries can be trained; these people are critical in the delivery of front line services at the county level.

(11) Limited research and development and extension: There are no dedicated public livestock research facilities and only limited research being conducted by the universities. Consequently, there are no well tested and adapted technological packages specific to South Sudan. There are very limited extension services that are uncoordinated. Farmers and other stakeholders rely on NGO's, limited radio broadcasts, farmer to farmer information, and the Internet for information. Often the information is not appropriate or is incomplete.

11.3 Policy framework

11.3.1 Policy review: broader policy context

The livestock resources subsector sits within the Natural Resources Sector, one of the three sectors constituting the Economic Development Pillar of the South Sudan Development Plan (SSDP),[312] which gives direction for broader economic development. The Natural Resources Sector Working Group [313] is a group that seeks to coordinate the efforts of interlinked sectors. The main sources of policy, which provide relevant guidance to the development of livestock resources, are listed in Box 11-1. However, no single document collates and harmonizes the various policies into a single consolidated reference for the whole livestock subsector. The Ministry of Animal Resources and Fisheries (MARF) Policy Framework and Strategic Plans (PFSP) 2012–2016, the key subsector document, provides only limited subsector policy guidelines upon which it is intended that policies will be further reviewed and developed. This has left room for varied policy interpretation and collusion, resulting in fragmented efforts and poor regulation of the different subsector actors.

Box 11-1: Key policy and strategy documents that contain policy for the sector

Broad Policy Context

- The Transitional Constitution of the Republic of South Sudan 2011
- The Government of South Sudan Growth Strategy
- South Sudan Development Plan 2011 – 2013
- Millennium Development Goals

Technical

- MARF Policy Framework and Strategic Plans (PFSP) 2012 – 2016
- Animal Resources Sector Policy and Strategic Plan (ARSP) 2006 – 2011
- National Agriculture and Livestock Extension Policy
- Trade and Investment Policy for South Sudan 2011
- Wildlife Policy
- National Strategy for Cooperative Development 2012 – 2015

[312] The objective of the Economic Development Pillar is diversified private sector-led economic growth and sustainable development that improves livelihoods and reduces poverty. GRSS. August 2011. *South Sudan Development Plan 2011 – 2013: Realizing Freedom, Equality, Justice, Peace and Prosperity for All.* Juba.

[313] The Natural Resource Sector is mandated to ensure food security and improve livelihoods and income generation for the people of South Sudan, through sustainable use of natural resources and land management. The sectors includes the Agriculture, Forestry, Cooperatives and Rural Development sector, the Animal Resources and Fisheries sector, the Land Commission, the Environment sector and the Agricultural Bank. GRSS. August 2011. *South Sudan Development Plan 2011 – 2013: Realizing Freedom, Equality, Justice, Peace and Prosperity for All.* Juba.

- Draft Water Policy, GoSS, 2007
- Ministry of Agriculture and Forestry Training and Capacity Development Policy 2011
- South Sudan Agricultural Research Policy
- IGAD Animal Health Policy
- OIE standards and guidelines

There is need for a review to ensure compliance of the PFSP to the Transitional Constitution of the Republic of South Sudan which sets out the overriding legal framework and mandate for the development of the country's livestock resources. Some important provisions in the Constitution that should be considered in a review of the livestock subsector policy, legal and regulatory frameworks and enforcement mechanisms include clauses on: inclusivity in formulation and implementation of development plans and programmes; regional equity in development; expediting rural development as a strategy for averting urban biased development. There are other constitutional provisions of relevance including: affirmative action to redress imbalances created by history, customs and traditions; freedom of children from exploitation and the right to education; principles of devolution and decentralisation; recognition and integration of traditional authorities and systems; regional integration and cooperation; human rights; communal land tenure; protection of seasonal access rights; land for investment; interstate trade and commerce, etc.

There is also need for a multi-sectoral review and integration of policies, as well as for a review of the impact of the current macro-economic climate on the desired development of the subsector. For example, in the liberalized South Sudan economy, trade tariffs are an important source of non-resource revenue, with imports presenting an easily taxable base. However, the current high tax regime on importation of production inputs reduces incentives for promoting increased production and productivity, commercialization and industrialization; and, undermines the capacity of South Sudanese producers to compete with regional and global actors. Uganda, for example, has priority investment areas that attract specific benefits, and a range of incentives under the Uganda Income Tax Act 1997 including: capital allowances on plant and machinery, start-up costs over four years, scientific research and training expenditure; tax deductible annual allowances on depreciable assets; annual depreciation allowances for farm works; import duty exemptions on plant and machinery for industry; duty drawback facilities that allow businesses to reclaim taxes on inputs used to manufacture exportable products; and measures for investment protection[314]. There is a need to clarify the land management framework critical to the livestock subsector development and investment; and to provide an implementable policy, legal and regulatory framework to resolve natural resource based conflict, a key constraint to sustainable subsector growth and investment.

11.3.2 Livestock subsector policy context

Following the Comprehensive Peace Agreement (CPA) in 2005 and subsequent creation of the Ministry of Animal Resources and Fisheries (MARF) by the Government of Southern Sudan (GoSS), the ministry developed the Animal Resources Sector Policy and Strategic Plan (ARSP) 2006-2011 to establish itself and guide its operations in the coming years. In tandem, MARF developed a 5 year budgeted Strategic Plan mainly targeting issues of post war recovery. After independence on 9 July 2011, MARF was instituted as a national ministry for the new nation through a Presidential Decree. This effectively meant that the policies and set-up of the Ministry needed to be reviewed and re-designed to meet with the national, regional and international responsibilities expected of a national Ministry. The MARF Policy Framework and Strategic Plans (PFSP) 2012-2016 was presented to the Economic Cluster, the Council of Ministers and subsequently the National Legislature of the Republic of South Sudan (RSS), where it is awaiting approval after having been scrutinized by the Natural Resources Specialized Committee. The Sector Policy document is divided

[314]DANIDA 2002. *Investing in Uganda's Dairy Industry*.

into two main parts: the Policy Framework, and the Strategic Planning and Implementation Matrix organized by Directorate. The key facets of the MARF Policy Framework are presented in Table 11-2.

Table 11-2: MARF Policy Framework 2012- 2016

Vision	Productive livestock and fisheries sectors contributing 5% annually to improvements in food security, household income, job creation and the national Gross Domestic Product.
Mission	To accelerate socio-economic development of the South Sudanese and enhance the livelihoods and food security of livestock and fisheries producers through improving livestock and fisheries production and productivity.
Strategic goals	• Key national data, legislation, regulations, policies, strategic plans and standards in support of the sustainable development and commercialization of the animal and fisheries resources of the Republic of South Sudan, researched, formulated, endorsed and operational. • Service-oriented, professional and accountable Ministry of Animal Resources and Fisheries developed, integrated and effectively collaborating with and building capacity of State MARF's, and providing quality and cost-effective services to the livestock and fishery sectors • Investment opportunities identified and private investment expertise and capital realized for the sustainable development of private and public-private commercial enterprises in the livestock and fishery sectors • An effective national livestock epidemio-surveillance and control system operational and meeting the requirements of the OIE and potential livestock and livestock product export markets • Significant and documented improvements in consumer protection achieved through improvements in the quality of marketed livestock and fisheries products resulting from improved processing infrastructure, hygiene, handling, processing and inspection
Some Key Targets	• 5% annual improvement in food security, household income, job creation and the national Gross Domestic Product • 10% of the national budget allocated to agricultural development – 3% to animal resources as stipulated in the Maputo declaration, 2003 • Increase milk production by 25% by end of 2015 • Increase the supply of poultry meat and eggs by 30% at the end of 2016 • Improve the quality of hides and skins for local and international markets • Increase honey and bee wax production
Direction of the Policy Framework	• Transform the livestock sector into vibrant productive and commercialized sectors making substantial contributions to the national economy (through increased production and productivity, increased commercialization, improved quality and value addition, facilitating access to credit, local and international markets) • Harnessing vast wealth for improved food security, poverty alleviation, sustenance of rural livelihoods, job creation, socio-economic development and contribution to the GDP • Develop the institutional capacity of MARF (infrastructural, managerial, research, diagnostic, diseases control and operational capability) • Restructuring to improve functionality at national MARF and SMARF • Alignment of state policies and strategies to the national policies and strategies • Policy framework for guidance in development of policies, legislation and regulations • Policy framework for guidance in the development of sectoral thematic policies • Collaborative research linkages to national universities and higher institutions
Guiding Principles	• Harnessing the high potential for sustainable increases in production and productivity • Increased commercialization • Promote increased investment • Delivery of basic services • Promotion of private sector-led growth/ private enterprise to reduce poverty

	• Improved quality and value addition • Improved access to credit and financial services • Development of markets and market infrastructures and Improved access to local and international markets • Maintaining peace and security foundational to development and progress • Improved government capacity to manage natural resources, public revenues and deliver public goods • Strong, transparent and accountable institutions • Institutionalization, development and empowerment of producer, trader and professional associations • Government model farms • Coordinated reporting and knowledge management • Improvement of animal genetic resources
Subsector Policy Guidelines	• Role of national ministry is to guide, regulate, promote, facilitate and document • Privatized delivery of veterinary services and supplies alongside public sector delivery • Public-private partnerships • Alignment of development aid to government priorities and pooling/ mainstreaming of development partner resources to implement the strategic plan, and mutual accountability • Transformation of traditional production practices into modern market-oriented systems • Increased commercialization • Community based extension programmes to change attitudes • Sustainable exploitation and management of emerging livestock resources • Guidelines on animal welfare and protection • At state level, fully fledged state ministries and not Directorates • Livelihood zoning as basis for improved production • Trypanosome infested belt to focus on pigs, poultry, trypano-tolerant ruminants and utilisation of crop residues and fodder crops • Routine/ annual vaccination target priority and economically important diseases • OIE guidelines for control of transboundary diseases in conjunction with regional and international partners • Intensive production in urban and peri-urban areas • Guidelines for recruitment, deployment and registration of professional and technical staff • Livestock population census • Indigenise leather industries and manufacture of finished products • Investment in model farms for demonstration • Drought monitoring, early warning and contingency planning • Development of a livestock breeding policy and strategy • Gender analysis and mainstreaming and gender disaggregated information; gender equity policy • Guidelines for cost recovery in routine vaccination and during emergencies • Penal code to criminalize cattle rustling • Develop information policy • Policies, laws guidelines on public and private sector livestock investment and marketing • Legislation and regulation of inputs

Source: GRSS, MARF. 2012. *The MARF Policy Framework and Strategic Plans (PFSP) 2012-2016.* Juba: GRSS

The process of formulation of the PFSP was not adequately consultative. The result is that the outlook and content of the document is focused on MARF, at the expense of the wider animal resources sector in South Sudan. The PFSP indirectly acknowledged the strengths of the ARSP, and the fact that ARSP approved plans were not implemented, mainly due to poor human resource capacity, both technical and managerial, poor allocation of funds and mediocre budget execution. However, many good elements of the ARSP were not reflected

in the PFSP. Indeed the ARSP is a document that still has relevance for the sector today.

Table 11-3: A comparison of the focus, outlook and strategies of the PFSP 2012-2017 and the ARSP 2006-2011

Document	PFSP 2012-2017	ARSP 2006-2011
Overall focus	Development and economic growth	Post conflict recovery Humanitarian/ emergency response
General outlook	MARF	Sector wide
Structure of the document	Overview of MARF/ institutional review MARF policy framework and strategic plans and budgets by Directorate	Situation analysis Animal resources sector policy MARF Strategic Plan Resource mobilization framework Monitoring and evaluation framework
Expected outcome	Transformation of the livestock sector into a vibrant productive and commercialised sector making a substantial contribution to the national economy	Actualize desired development of the vast untapped potential of animal resources Rural development: infrastructure and employment/ improved livelihoods Increased value addition and growth of agro-business
Investment focus	Commercialisation Private sector led growth	Equitable growth across states and livestock producers Both rural development and growth of agro-business
Technological scope	Modernization and social transformation	Growth that is sustainable socially, technologically, environmentally and economically

Source: GRSS. MARF. 2012. *The MARF Policy Framework and Strategic Plans (PFSP) 2012-2016.* GRSS. GoSS, MARF. 2006. *Animal Resources Sector Policy and Strategic Plan (ARSP) 2006-2011*. Juba: GoSS

As yet no subsectoral or supporting policy has been developed although the process of developing the dairy sector policy has commenced. The only subsector policy in existence is the National Agriculture and Livestock Extension Policy.

11.3.3 Legal Frameworks: Legislative and regulatory contexts

Activities related to animal health, production, welfare, food safety and trade certification require appropriate legislation for effective delivery of services, including but not limited to: early detection, transparency and notification and rapid response to outbreaks of animal diseases. It is understood that MARF has developed the following 13 draft bills that are now pending legislation:

- Animal Diseases and Pests Control Bill 2013
- Animal Production Bill 2013
- Cattle Cleansing Bill 2013
- Fertilizers and Animal Food Stuffs of Animal Origin Bill 2013
- Hides, Skins and Leather Processing Bill 2013
- Meat and Slaughterhouse Inspection Board Bill, 2013
- Range Management and Grass Fires Bill 2013
- Rustling and Livestock Theft Bill 2013
- Veterinary Drug Control Board Bill, 2013
- Veterinary Surgeons and Para-Veterinary Practitioners Bill 2013
- Meat Commission Bill, 2013
- Dairy Development Bill, 2013
- Animal Welfare Bill, 2013.

11.4 Institutions

11.4.1 Public Sector Institutions

11.4.1.1 National Ministry

Previously, the main public institution in the livestock subsector was the national Ministry of Animal Resources and Fisheries (hereafter referred to as MARF) which was mandated to guide, promote, regulate and facilitate the animal resources sector. In mid-2013 there was a re-organization of the GRSS ministries; MARF was merged with the Ministry of Agriculture, Forestry, Cooperatives and Rural Development and the Ministry of Tourism. This review is based on the old structure, since restructuring is on-going and it is still unclear how the livestock subsector will be accommodated. The national ministry provides guidance and leadership in formulating policies, legislation and regulations, and in strategy development. MARF is complemented at the state level by the respective state ministries. The structure of MARF is comprised of nine Directorates with 27 Departments (see Table 11-4).

Table 11-4: National MARF structure (Fisheries Directorate excluded)

Directorate	Department
Planning, Statistics and Documentation	• Planning and Policy Analysis • Statistics and Documentation • Gender Analysis and Mainstreaming
States and Special Projects Coordination	• State Affairs • Special Projects
Administration, Finance and Human Resources Development	• Finance • Procurement • Human Resource Development
Investment, Marketing and Supplies	• Investment • Marketing • Supplies
Animal Production and Range Management	• Animal Production • Range Management
Veterinary Services	• Veterinary Public Health and Food Safety • Disease and Vector Control • Epidemiology and Disease Information Systems • Diagnostic Laboratories • Wildlife and Aquatic Diseases
Extension and Pastoralist Development	• Livestock Production and Range Management Extension • Veterinary Extension • Fisheries and Aquaculture Extension • Pastoralist Development
Animal and Fisheries Research and Development	• Central Research Laboratory • Livestock Research Centre/Station • Fisheries Research Centre/Station • Satellite Laboratories

Source: GRSS, MARF. 2012. *MARF Policy and Strategic Plans 2012 -2016.* Juba: GRSS.

Most of the currently occupied positions are in the higher ranks, i.e., at Director General, Director and Assistant Director level, related to leadership and top management. The middle tier professional positions related to management, coordination of technical work such as drafting policies and strategies, and collaboration with states and other stakeholders, are inadequately manned making review and formulation of policies and implementation of strategic plans difficult. There is an overlap of functions between the Directorates of Veterinary Services and Investment, Marketing and Supplies, which does not augur well for

the structure and organization of a veterinary service vis-à-vis international certification.[315] The Ministry intends to delegate the registration and licensing of veterinarians and veterinary para-professionals, veterinary medicines and drugs, the inspection and licensing of and slaughter facilities statutory boards as stated in the respective bills.

11.4.1.2 State Ministries

All the states, with the exception of Western Equatoria, have state ministries in charge of livestock development generally known as the State Ministry of Animal Resources and Fisheries (SMARFs); however Jonglei State has a Ministry of Livestock and Fisheries. Western Equatoria has a Directorate of Animal Resources and Fisheries under the state Ministry of Agriculture, Cooperatives and Environment (SMACE). A resolution was passed that the Directorate of Animal Resources and Fisheries in Western Equatoria be upgraded to a fully-fledged state Ministry of Animal Resources and Fisheries.[316] Across the states, the separation from parent ministries of agriculture was received as a positive move for the livestock subsector, attracting stronger political will and support, increasing the visibility and presence of the sector, providing a more focused context for planning and implementing activities. In some states, expenditure and disbursement of funds improved although gains were eroded by the recent austerity measures. State ministries implement national policies and make rules and regulations to fit their respective situations as guided by the national law and state by-laws. The states also coordinate with local government at the county level to deliver public services.

The states developed strategic plans in alignment with the national ministry Policy and Strategic Plans 2012–2016, which are summarised in Table 11-5. These were the first such strategies, and many states received support from development partners and NGOs. Key themes in the state visions include aspirations for food security, economic development, increased production, increased incomes and increased employment opportunities. However, all the Greater Bahr el Ghazal states i.e., Western Bahr el Ghazal, Northern Bahr el Ghazal, Lakes and Warrap States have the same visions and the same strategic objectives. While these states have commonalities including large cattle populations, there are major differences and unique situations in each state that should inform their individual visions and strategies. This also points to the likelihood of inadequate consultation. Other than Jonglei, which has a well elaborated strategic plan, all the plans are more focused on the state ministry rather than having a sectoral approach that recognizes and covers all actors. The strategic plans also exhibit the lack of critical data and information for decision making and planning. The strategic plans, other than that of Jonglei, fail to clearly articulate strategies for realising the potential of their resources, being activity based, instead of being based on results linked to their strategic objectives.

The state ministry structures are presented in Table 11-6 and technical personnel in Table 11-7. All the states have very basic structures reflecting the fact that they are young establishments. Core directorates that exist are Animal Production, Veterinary Services, and Administration, Finance and Human Resources, under a Director General who provides both technical and administrative leadership. A few states have extension departments which are made up of both extension, and research and development.

Of the technical human resources involved in the provision of veterinary services at the national and state levels (presented in Table 11-7), there is 1 veterinarian for every 2 counties (a total of 76 counties in South Sudan). This assumes that at least 38 out of the 44 veterinarians at the state level are available for deployment at the county level. The ratio is more or less the same for the lower cadres, thus depicting a linear structure. The

[315] World Organisation for Animal Health (OIE). 2012. *Terrestrial Animal Health Code*. OIE.

[316] GRSS, MARF. 2012. *The Ministry of Animal Resources and Fisheries Policy Framework and Strategic Plans 2012 – 2016*. Juba: GRSS.

implementation level, i.e., counties and payams, is under-resourced with: little or no staffing; limited operating budgets for communication, mobility, service delivery, regulation and enforcement; and, with little capacity for policy engagement let alone interpretation of national and state policies as provided under the devolution of powers by the Constitution.

Collaborating ministries and departments at both national and state levels include the Ministries in charge of Health, Wildlife Conservation and Tourism, Environment, Water, Trade and Commerce, Agriculture, Lands and Internal Security and the Department of Customs. SMARFs also collaborate with NGOs and private sector actors to deliver services.

Table 11-5: Key facets of the state strategic plans

State, Plan Period and Support for Development of the Plan	Vision and Goal	Strategic Issues/ Specific Objectives
Central Equatoria 2012-2014 State staff and UNDP	Vision: Improved healthy and active life for all citizens in the state by providing affordable animal and fish protein. Goal: Increase production and productivity for sustainable livelihood.	• Poverty reduction (improve the social status of rural communities) • Ensure food security in productivity of livestock products • Render veterinary services • Render extension services to pastoralists , agro-pastoralist
Eastern Equatoria Policy Statement 2012-2013 Staff	Vision: Efficient and effective livestock and fisheries delivery for sustainable development of the state Goal: Sustainably contribute towards food security and employment creation by facilitating and supporting public and private sector in the animal resources sector	• Provide institutional capacity to guide, supervise and coordinate all activities in the livestock and fisheries sectors. • Develop animal health and protect humans against Zoonosis. • Promote sustainable management of fishery resources • Enhance and improve livestock production and productivity through technology transfer and sustainable use of natural resources. • Promote the integration of livestock and fish market chain actors into domestic and regional
Western Equatoria 2011-2013 State Ministry of Agriculture		• Construction and equipping of offices • Provision of water along livestock routes and grazing areas • Promote and improve livestock feeding (from traditional free range to a semi-intensive production system by 2013) • Improve livestock production and productivity (introduction of new improved breeds by 2013) • Improve delivery of key support services to 60% of the livestock keepers by 2013 • Recruitment of professional and technical staff and training
Jonglei 2012–2017 Staff of Ministry of Livestock and Fisheries, SNV, John Garang University	Vision: A state in which hunger is no longer a threat as a result of improved and sustainable livestock and fisheries production	• Strengthen institutional capacity to guide, supervise, coordinate and monitor all activities in the livestock and fisheries sectors • Improve livestock production and productivity through improved technologies and sustainable use of natural resources • Promote the integration of livestock chain actors into the domestic and regional markets
Unity State 2012-2014 State and VSF-Swiss	Vision: to be the leading state in the management of animal resources and fisheries in the Republic of South Sudan	

State, Plan Period and Support for Development of the Plan	Vision and Goal	Strategic Issues/ Specific Objectives
Upper Nile	Vision: Achievement of sustainable livestock and fisheries production level (quantity and quality) that reaps and maintains benefits to producers while contributing to poverty eradication and economic growth in the State	• Capacity building of staff working in animal production and range management, veterinary services and fisheries • Provision of inputs for animal resources production, fisheries, pastures and fodder • Strengthening of performance to increase animal, fisheries and veterinary services production
Northern Bahr el Ghazal National Ministry, FAO and EU		• Huge livestock resources and potential that need to be exploited for the benefit of the people of WBGS • Prevalence of livestock diseases and outbreaks • Cultural barriers and norms that hinder the uptake of new technologies by farmers • Low level of stakeholder empowerment, low level of awareness and skills necessary for full exploitation of the potential in livestock • Institutional challenges • Policy, legal and regulatory framework • Inadequate infrastructure, facilities and equipment • Weak planning, budgeting and resource mobilization • Gender issues not appropriately mainstreamed/ low empowerment and participation of women • Increasing threat of HIV/AIDS
Western Bahr el Ghazal 2012–2016 FAO and EU	Vision: Aspire to see a sustainable wealth and job creation, improved household incomes, food security and the economy of WBG State through the development of livestock and fisheries resources	• Huge livestock resources and potential that need to be exploited for the benefit of the people of WBGS • Prevalence of livestock diseases and outbreaks • Cultural barriers and norms that hinder the uptake of new technologies by farmers • Low level of stakeholder empowerment, low level of awareness and skills necessary for full exploitation of the potential in livestock • Institutional challenges • Policy, legal and regulatory framework • Inadequate infrastructure, facilities and equipment • Weak planning, budgeting and resource mobilization • Gender issues not appropriately mainstreamed/ low empowerment and participation of women • Increasing threat of HIV/AIDS

State, Plan Period and Support for Development of the Plan	Vision and Goal	Strategic Issues/ Specific Objectives
Lakes 2012-2016 National ministry, FAO and EU	Vision: Aspire to see a sustainable wealth and job creation, improved household incomes, food security and the economy of Lakes State through the development of livestock and fisheries resources	• Huge livestock resources and potential that need to be exploited for the benefit of the people of WBGS • Prevalence of livestock diseases and outbreaks • Cultural barriers and norms that hinder the uptake of new technologies by farmers • Low level of stakeholder empowerment, low level of awareness and skills necessary for full exploitation of the potential in livestock • Institutional challenges • Policy, legal and regulatory framework • Inadequate infrastructure, facilities and equipment • Weak planning, budgeting and resource mobilization • Gender issues not appropriately mainstreamed/ low empowerment and participation of women • Increasing threat of HIV/AIDS
Warrap 2012–2016 FAO and EU	Vision: aspire to see a sustainable wealth and job creation, improved household incomes, food security and the economy of Warrap State through the development of livestock and fisheries resources	• Huge livestock and fisheries resources and potential but low production, productivity and commercialization • Prevalence of livestock disease and outbreaks • Low level of stakeholder empowerment • Institutional challenges • Policy, legal and regulatory frameworks do not exist • Inadequate infrastructure, facilities and equipment • Weak capacity for planning, budgeting and resource mobilization • Gender issues are not appropriately mainstreamed in the Ministry • HIV/AIDS is a growing major threat

Source: CAMP Task Team, March-July 2013, CAMP Situation Analysis

Table 11-6: Directorates of the national and state ministries

	National	CES	EES	WES	Jonglei	UNS	Lakes	Unity	Warrap	WBG	NBG
Director General		✔	✔		✔	✔				✔	✔
Planning, Statistics & Documentation	✔						✔			✔	
Admin, Finance & HR	✔	✔	✔			✔		✔	✔		✔
Investment, Marketing & Supplies	✔	Livestock Development	✔			✔					
Animal Production & Range Management	✔		Animal Production and Veterinary Services	Directorate of Animal Resources and Fisheries	✔		Livestock Development	✔	Livestock Development	Livestock Development	✔
Veterinary Services	✔	✔			✔			✔			✔
Livestock & Fisheries Extension	✔					✔	Extension	✔	Extension	Extension	
Animal & Fisheries Research & Dev	✔										
States & Special Projects	✔										
Any other								Information, Communication, & Technology Public Relations			

Source: CAMP Task Team, March-July 2013, CAMP Situation Analysis

Table 11-7: MARF and SMARF technical personnel as of December 2012

MARF/ State	Veterinarian	Technician	Lab technician	Veterinary assistant	Stock person	Veterinary auxiliary	Total
MARF[a]	13(+2[b])		8 (+4[b])				21 (+6)
CE	8	1	1	8	12	2	32
EE	5	0	1	8	12	13	39
Jonglei	4	1	1	7	8	18	39
Lakes	2	4	1	3	14	21	45
NBG	1	2	0	2	11	18	34
Unity	4	0	0	2	8	6	20
Upper Nile	6	22	0	3	18	32	81
Warrap	4	0	0	0	8	17	29

MARF/ State	Veterinarian	Technician	Lab technician	Veterinary assistant	Stock person	Veterinary auxiliary	Total
WBG	6	1	3	22	27	15	74
WE	4	0	0	4	8	12	28
Total	57(+2)	31	15	59	126	154	442(+6)

Source: MARF, Directorate of Veterinary Services. 2012.
Notes: [a] Staff here is limited to the Directorate of Veterinary Services and does not include others with a role in animal production such as investment, marketing and supplies and extension.
[b] These are staff seconded through the IGAD Initiative.

11.4.1.3 Model/demonstration farms

South Sudan has a long history of public sector model farms, with some of the existing model farms started in the 1970s in the former Sudan. Key objectives of the model farms were to combine demonstration and multiplication of improved livestock supported by limited research on breed improvement. In the pre-independence period, the public sector was heavily involved in direct production with models farms supplying livestock and livestock products. The model farms from that period included Marial Bai Dairy Farm, Jur River County, Western Bahr el Ghazal; MAFAO[317] Dairy and Poultry Demonstration Farm, Central Equatoria; Rumbek Ranch, Lakes State; Kapoeta Sheep Ranch, Eastern Equatoria; and Ezo Goat Centre, Yambio, Western Equatoria which was later moved to Maridi. The model farms were once all well stocked, vibrant institutions, but were badly affected by the protracted civil war. Infrastructure and facilities were destroyed, livestock was transferred elsewhere or stolen, key personnel left due to insecurity, and important research records were lost.

After the CPA, the GOSS Animal Resources Sector Policy and Strategic Plan 2006-2011 aimed to increase the number of model farms so that each state would have one. The process commenced with a bid to renovate the existing farms, but was marred by procurement irregularities especially for Ezo Goat Centre and Kapoeta Sheep Ranch. The subsequent MARF Policy Framework and Strategic Plan 2012-2016 (PFSP) has put even greater emphasis on model farms, which were envisioned as the main strategy for achieving the key targets of increasing milk production by 25% by the end of 2015, increasing the supply of poultry meat and eggs by 30% by the end of 2016, and improving the quality of hides and skins for both local and international markets. The model farms are therefore allocated 31% of the total MARF PFSP budget over 2012-2016, equivalent to 82% of the Directorate of Animal Production and Range Management, which has the largest share of the PFSP budget, i.e., 39% (Table 11-8). The PFSP pursues a regional approach, shifting away from the earlier plans to establish a model farm in each state: Marial Bai Dairy Farm and Wau Poultry Farm for the Greater Bahr el Ghazal region; Malakal Poultry Farm and Malakal Dairy Farm for the Greater Upper Nile region, and Central Equatoria Dairy Farm and Central Equatoria Poultry Farm.

[317] MAFAO was collaboration between the Ministry of Agriculture and Food and Agricultural Organization of the United Nations (FAO).

Table 11-8: Budget allocation of the Animal Production and Range Management Directorate to model farms

	Directorate of Animal Production and Range Management (Percentage)						
Budget	**2012**	**2013**	**2014**	**2015**	**2016**	**Total Directorate Budget**	**Total MARF Budget**
Staffing Budget	58	72	79	79	79	76	
Operations Budget	77	89	92	92	92	90	
Capital Investment Budget	69	83	81	74	45	75	39%
Total Directorate Budget	70	84	85	84	80	82	
Total MARF Budget							31%

Source: GRSS, MARF. 2012. *MARF Policy Framework and Strategic Plans 2012-2016*. Juba: MARF.

Despite the large planned investment, there is no strategic plan to guide the development of the model farms. Key mandates of the model farms and the extent of public sector involvement are not clearly defined. The constitution divests government from direct involvement in production, but it appears that the model farms will have some production activities. Programming and implementation strategies for harnessing the model farms to achieve the key PFSP targets, and for renovation and re-establishing facilities, human resources and operations are lacking. However, the model farms take 75%, 79% and 90% of the Directorate of Animal Production and Range Management capital investment, staffing and operations budgets in the PFSP plan period (Table 11-8). No exit strategy or divestiture plan for the remaining model farms is outlined. The renovation of Marial Bai, which is spread along a 20 km stretch on the north bank of the Jur River, has focused on infrastructure, but the design updates are poorly aligned with the needs of the livestock subsector, and there are no staff or on-going programmes. Work on MAFAO farm, which stands on over 500 hectares, commenced with the installation of facilities such as a 26,600 capacity hatchery, a feed mill, introduction of dairy goat breeds, and a programme for improvement of pastures. The facility has 10 graduates and support staff. However due to operational challenges these facilities have fallen into disuse despite the huge capital investment. There is tension between the state and national MARFs related to management and operational budgets on both model farms, even though there is a memorandum of understanding between the national MARF and the Central Equatoria SMARF. There are also outstanding land issues with communities related to boundaries and access to grazing land and water. The Malakal model farms have not been established.

A concept note for the rehabilitation of MAFAO into a model dairy farm was developed, but a more strategic approach is needed that reviews the purpose of the model farms which were meant to feature modern technologies and approaches best suited to commercial enterprises. The proposals are technological leaps for most of South Sudan's livestock keepers who are pastoralist, agro-pastoralist or urban and peri-urban smallholder farmers and a commercial sector is still emerging. There are also practical issues related to access to the regional model farms as there is no clear outreach plan. The World Bank has identified that resources invested in generation of appropriate agricultural technologies has far higher rates of return than investment in infrastructure, health and education.[318] South Sudan has no livestock research institutes: the existing model farms which are spread over most of the livelihood zones would provide an opportunity to develop a network of livestock research and technology outreach institutions. There were recommendations to expand the mandate of MAFAO to include dairy research and multiplication of dairy animals in addition

[318]World Bank. 2007. *World Development Report 2008: Agriculture for Development*. Washington, DC: World Bank.

to demonstration.[319] Both MAFAO and Marial Bai had breeding programmes where indigenous breeds were crossed with Boran, Friesian and Sahiwal breeds with some success in improving livestock for meat and milk.[320] There is potential for public-private partnerships in developing these facilities through collaboration for investment in facilities and in research, and to invest in production of key inputs like day old chicks.

11.4.2 Private sector

The main private sector actors are the producers themselves, i.e., 943,297 households involved in the different livestock enterprises from raising cattle and small ruminants to beekeeping, poultry, pig farming and production of other livestock. Of these 903,993 are cattle or small ruminant producers, with about 324,437 herders. Of the livestock producers, 746,777 are poultry producers and 238,112 are honey producers. There are approximately 4,500 live animal traders a group that includes animal trekkers, brokers/middlemen, rural traders, auctioneers, and importers, among others.[321] There are about 500 providers of market based kraals, community members assigned to key markets to ensure stolen animals are not sold, 1,500-2,000 personnel at slaughter facilities[322] and about 20 personnel at hides and skins facilities. Other important private sector actors include transporters, input suppliers and veterinary pharmacies. Community Animal Health Workers (CAHWs) are important private sector actors whose numbers peaked during the civil war when they were instrumental in providing primary animal health care and participating in control and eradication activities (vaccination, surveillance and disease reporting) of rinderpest in South Sudan.[323] As of December 2012, there were 2245 CAHWs in the whole country (Upper Nile 320, Unity 119, NBG 196, WBG 107, Lakes 330, EE 271, WE 240, CE 240, Jonglei 189 and Warrap 233).[324]

Informal actors make up the bulk of private sector actors, although there are a few formal sector actors, especially input suppliers. Traditional institutions such as cattle camps provide some level of organization of ruminant actors, as do traders, butchers, poultry and beekeeper associations. However the associations focus on solving problems rather than on growing the livestock value chain. There is a low degree of coordination among private sector actors necessitating middlemen and brokers. Ownership of key livestock infrastructure such as slaughter facilities, markets, and butchery stalls remain with government, while these functions could be better played by the private sector.[325] An enabling policy and regulatory environment for the growth of the private sector is lacking, and together with the unclear land tenure system, is a key constraint on the growth of the private sector.

---

[319]Muriuki, H. 2010. *Rehabilitation of MAFAO to a Model Dairy Farm.* Report for MARF, Republic of South Sudan. Unpublished.

[320]Jada, A. W and D. L. Lual. 2010. *MARF Report on the Assessment of Pastures in Marial Bai Dairy Centre.* Directorate of Animal Production and Range Management, MARF, Government of South Sudan.
Muriuki, H. 2010. *Rehabilitation of MAFAO to a Model Dairy Farm.* Report for MARF, Republic of South Sudan. Unpublished

[321]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Secto in Southern Sudan; Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat.* Draft Report, SNV and MARF.

[322]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Secto in Southern Sudan; Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat.* Draft Report, SNV and MARF.

[323]Sudan was accredited rinderpest free status by the World Organization for Animal Health (OIE) in 2008

[324]MARF, Directorate of Veterinary Services, 2012

[325]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat.* Draft Report, SNV and MARF.

11.4.3 Educational and training institutions

There are four universities that offer degrees directly relevant to the livestock subsector, one institution that offers diploma and certificate courses for technicians, and one institution that provides technical training.

University of Bahr el Ghazal: Offers a degree in veterinary science run as a five year course on a two semester basis leading to the award of Bachelor of Veterinary Science degree (BVSc). The university has very low student enrolment and a shortage of staff, a result of the secession of South Sudan from Sudan. It lacks laboratory facilities and relies on regional/satellite laboratories in Wau for student practical training; unfortunately these laboratories offer very basic services. Similarly, although students do a field placement, the university is not able to carry out a rigorous field follow-up. The main employers of the universities' graduates are the university itself as it seeks to boost staffing levels, governments (national and state) and NGOs, while a few go into the running of veterinary pharmacies and agro-veterinary shops.

University of Upper Nile: Created in 1993, the University of Upper Nile was envisioned to serve the Greater Upper Nile region. The College of Natural Resources, which included Animal Production, Agriculture, Forestry and Range Management, was one of the founding colleges of the university, with the College of Veterinary Medicine added later along with other colleges. The university, like many other learning institutions, suffered from insecurity during the civil war which led to its relocation to Khartoum where there were better facilities and equipment. At the signing of the Comprehensive Peace Agreement in 2005, it was again relocated back to Upper Nile, a move which resulted in the loss of most of the teaching staff and equipment and other teaching facilities. Students continued to go to Khartoum for practical and field training, but even this access was stopped when South Sudan gained independence from the Sudan.

The College of Animal Production has two specializations: General Animal Production which attracts 90% of the students and Fisheries that takes the remaining 10%, with a total enrolment of 250–300 students in the 2012/13 academic year. The two specialisations share courses in the first two years but specialise from the third year onwards. The college curriculum was revised in 2010, but needs updating to increase relevance for the new country, to introduce different technologies already within the region, and to offer both graduate degrees and diplomas. The university is yet to make thesis writing mandatory, to develop and implement a research policy, and diversify its funding strategy away from dependence on public funding. Farm facilities for teaching and experimental work with livestock exist, but are not stocked.

Enrolment in the College of Veterinary Medicine is low, with a marked imbalance between male and female students (Table 11-9). The university lacks laboratory facilities, and students have to rely on a regional/satellite laboratory in Malakal for practical training, a facility which only offers very basic services. Students do field placements but the quality of the experience is not assured as there is limited follow-up by the university. Graduates are employed by the university itself, both national and state governments, and NGOs. Very few enter into private practice, running veterinary pharmacies and agro-veterinary shops. The university is yet to establish external linkages on matters pertaining to research and training.

Table 11-9: Statistics of enrolment and graduation from the Faculty of Veterinary Medicine, Upper Nile University for Academic Year 2012/2013

Class	Male	Percent Male	Female	Percent Female	Year Totals
First Year	24	83	5	17	29
Second Year	40	80	10	20	30

Third Year	21	88	3	13	24
Fourth Year	15	75	5	25	30
Fifth Year	12	75	4	25	16
Total	112	81	27	19	139
2011 Graduates	14	82	3	18	17
2012 Graduates	4	44	5	56	9

Source: Data from Upper Nile University, prepared by CAMP Livestock subsector team, April 2013, CAMP Situation Analysis.

John Garang Memorial University of Science and Technology: Founded in 2006 as a technical institute in Bor, Jonglei State, and upgraded to a university in 2008. The Faculties of Agriculture and Forestry and of Environmental Studies are of direct relevance to the livestock sector. Within the Faculty of Agriculture and Forestry is the Department of Animal Science and Production, which houses four units: Animal Health, Dairy Production, Animal Nutrition and Poultry Production. With a teaching staff of only 11 staff: 3 Associate Professors, 2 Assistant Professors, 4 lecturers and 2 Teaching Assistants, the Department relies heavily on part time lecturers from within the State Ministry and volunteers from the UNMISS Indian Battalion and NGOs based in Bor. Both diplomas and degrees are awarded: the first batch of degree awards will be in 2013. USAID has funded a collaborative project with Texas A&M University College of Agriculture and Life Sciences led by the Borlaug Institute which is working to improve the agricultural research, teaching and extension curriculum, and to enhance capacity in the areas of rangeland and livestock management, and ecosystem conservation and management. The Faculty has strong linkages to the State Ministry, being involved in the Ministry strategic planning and training of ministry staff.

Juba University: Established in 1977, has a College of Natural Resources and Environmental Studies which houses the Department of Animal Production that offers both undergraduate and graduate programmes. The five year degree programme in Animal Production offers basic science and animal science and natural resource courses in the early years, with production courses in the fourth year, and the fifth year devoted to research projects for the mandatory dissertations and advanced courses and seminars. The university also offers one year diplomas in Dairy Production and Technology, Meat Production and Technology and Poultry and Production.

The Department is understaffed with only 1 Professor out of 11 possible positions, no Associate Professor out of 13 positions, 4 Assistant Professors out of 18 positions, 2 lecturers out of 19 positions, and 3 Teaching Assistants out of 17 positions. Technical positions important to laboratory and fieldwork are also grossly understaffed. The university has laboratories, an experimental farm for demonstration and research, a library with audio-visual and electronic facilities and a computer laboratory.

Marial Lou Livestock Training Centre: The Marial Lou Livestock Training Centre (MLLTC) in Tonj North County, Warrap State, founded in 1996 by VSF-Belgium, is the only public sector Livestock Training Institute in South Sudan. The centre offers certificate courses targeting Animal Health Auxiliaries and stock persons; and short courses/outreach programmes related to agribusiness and enterprise development, animal production and livestock enterprise, animal health and livestock products and processing. The centre also operates a veterinary pharmacy jointly with VSF-Belgium.

Plans are underway with support from the Dutch government to expand and improve the courses on offer with a focus on certificate and diploma courses in animal production and on upgrading skills of extension workers. The aim is to impart knowledge and skills and to change attitudes while making graduates more relevant and business oriented for the changing and dynamic labour market. The target groups are those who hold a South Sudan School Certificate and graduate stock persons with at least one year of work experience.

The new curriculum has been developed, but the lack of teaching staff, accommodation and sponsorship is a challenge especially since the establishment of the new courses coincided with the austerity measures in the government. A six month course costs USD2,450 (approx. SSP9,980), which is well beyond most individuals;, MLLTC is competing against cheaper, more competitive costs in the region. The goal is to eventually reduce costs as the infrastructure is established. There are plans to open three branches across the country to make the course more accessible, to improve the demonstration farm and make it pay some of the costs, and to include internships with attachments within the industry. These are areas where there are financial and technical gaps. MLLTC is accredited by the government of South Sudan, and collaborates with IGAD and African Union Inter-African Bureau Animal Resources (AU-IBAR). Staff are sent to train in Ethiopia on hides and skins and in Bukalasa University in Uganda on poultry.

Yei Agricultural Training Centre: Located in Yei River County, Central Equatoria State, Yei Agricultural Training Centre (YATC), established by the Norwegian Peoples Aid (NPA) in 1991, has the goal to build the capacity of community based extension workers. It has demonstration facilities for dairy, apiary, goat, poultry, draught power and pasture and fodder production and improvement. Courses are hands on and meant to instil a business attitude and to enable graduates to help farmers establish and grow profitable and sustainable, and gender sensitive enterprises. There are a number of challenges including: low staffing levels with only 7 staff; inadequate space, with only 9 feddans for the dairy unit, resulting in challenges with feed for the cross breeds; technical challenges related to technologies being promoted, a reflection of the lack of livestock research and functional public sector extension services in South Sudan.

11.4.4 Civil Society and Non-Governmental Organizations

International and local non-governmental organizations (NGOs) and civil society had a strong presence and role in the livestock subsector in South Sudan throughout the period of civil war filling the gap created by the absence of or inadequate provision by government. In animal health, NGOs were particularly active in the late 1990s and 2000s when together with FAO they offered most of the animal health services; they were the main implementers of rinderpest eradication activities (vaccination campaigns and disease surveillance and reporting). NGOs were also important in the training and equipping of CAHWs who have since become the main primary animal health care service providers.

Table 11-10 is a list of some of the NGOs currently operating in the livestock sector in South Sudan. WBG and NBG have the most NGOs related to livestock i.e., 7 NGOs each; Unity State on the other hand has only one NGO, the rest of the states have between 2 and 4 NGOs. Coverage by NGOs is low, each being present on average in only one or two states, and covering only one or two counties per state.

Table 11-10: NGOs operating in Animal Production and Animal Health in South Sudan

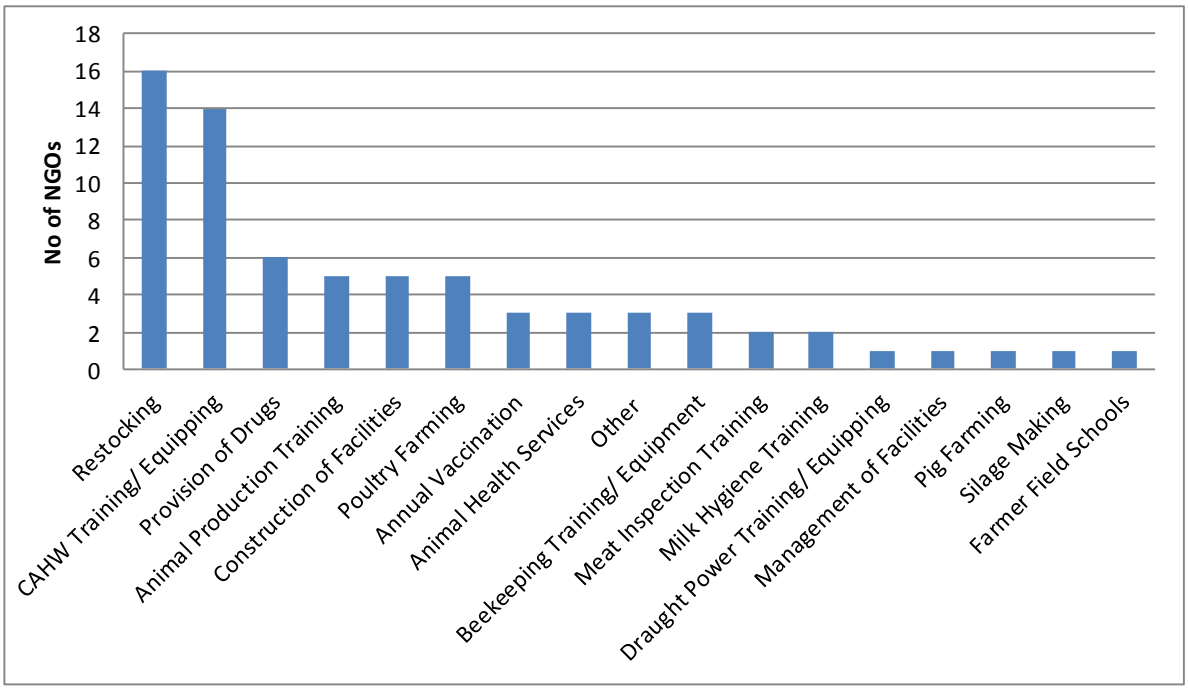
NGO	State it operates in	County	Main involvement
ADESO	NBG	Aweil West, Aweil North and Aweil Central	Training and equipping CAHWs and restocking
AECOM	Unity	Rubkona	Vaccination, community awareness on animal health
BRAC	WE	Yambio	Provision of oxen and ox ploughs and attachements, poultry farming
Catholic Relief Services (CRS)	EE	All counties except Pidi and Pochalla	Training and support to CAHWs and stockpersons; Provision of veterinary drugs; extension services and restocking
	WE		Provision of beekeeping and honey processing equipment and training
Concern	NBG	Aweil West and Aweil North	Training and equipping CAHWs, provision of transport and awareness creation
	Warrap		Silage making
Diocese of Torit (DOT)	EE	Greater Kapoeta	Provision of animal health services Capacity building of CAHWs, Farm field schools
DORCOS	WBG	Wau	Restocking goats and poultry and training women on animal husbandry
FARM Africa	EE	Kapoeta South	Training and capacity building Provision of drugs
GIZ	NBG	Aweil West and Aweil North	Training in management of livestock auctions, building of butcheries, establishment of a slaughter house
HARD	WBG	Wau	Restocking goats, poultry and pig farming
Tearfund	NBG	Aweil Central	Training and equipping CAHWs and restocking
OXFAM	WBG	Wau	Restocking goats and poultry and training women on animal husbandry
	Lakes		Training and equipping CAHWs and restocking
Norwegian People's Aid (NPA)	Lakes		Training of CAHWs, vet drugs on a cost recovery basis, food security programs
	WE	Movolo	Goat restocking
	CE	Kajo-Keji, Terekeka, Juba, Lainya	Training of CAHWs Provision of veterinary equipment
NICCODO (local NGO)	CE	Juba	Treatment and vaccination Training on milk hygiene
Oxfam Intermon	WBG	Wau	Restocking goats and poultry and training women on animal husbandry
Oxfam GB	Lakes	Rumbek North, Rumbek Centre, Cueibet County	Animal health services, animal production training, food security and livelihoods programs, training of CAHWs
Save the Children	Jonglei	Bor	Training in poultry keeping Capacity building and support to CAHWs
SNV, Netherlands	EE	Torit	Capacity building of CAHWs Establishment of a holding ground Fencing materials for cattle keepers
Tearfund	NBG	Aweil central	Technical advice, goat restocking program
UMCOR	NBG	Aweil West and Aweil	Goat restocking programme, especially

NGO	State it operates in	County	Main involvement
		North	for returnees
UN Indian Battalion	Jonglei, UN	Bor, Makal	Veterinary clinical services Laboratory services
VSF-Belgium	CE	Terekeka, Juba	Meat hygiene and provision of drugs
	Lakes		Strengthening public sector institutional capacity; Food security and livelihoods recovery programme; Training and equipping CAHWs and construction of slaughter house and provision of cold chain
	Jonglei	State wide	Annual vaccination, regular treatment, training of CAHWs and stockpersons Poultry and goat restocking
	Warrap	Marial Lou	Restocking programme for the vulnerable
VSF-Germany	Jonglei	State wide	Annual vaccination, regular treatment, training of CAHWs and stockpersons Poultry and goat restocking
VSF-Suisse	NBG	Aweil East, Aweil West	Training and equipping CAHWs, supply of drugs, restocking programme
	Unity	All nine counties	Capacity building of CAHWs and meat inspectors; vaccination and treatment, provision of cold chain facilities, restocking targeting returnees, construction of slaughter facilities, milk collection centres and butcheries, supply of vet drugs
Vet Work trust	CE	Terekeka, Juba, Lainya, Kajo-Keji	
WATAP	WBG	Wau	Restocking goats and poultry and training women on animal husbandry
WDG	WBG	Wau	Restocking goats and poultry and training women on animal husbandry
World Vision	WE	Yambio and Tambura	Construction of slaughter facilities, goat demonstration farm and hides and skins store, training of CAHWs, farmers and beekeepers, provision of beekeeping equipment, restocking of goats to vulnerable groups,

Source: Elaborated by CAMP Livestock subsector team. CAMP Situation Analysis . 2013.

NGOs are involved in a number of activities, with the two dominant activities being restocking of small ruminants, particularly goats, and poultry; and training and equipping of CAHWs, followed by provision of drugs (Figure 11-1). There is no restocking of cattle going on, and only limited involvement in extension on cattle husbandry. There are also almost no activities related to improving the natural resource and feed base, producing surplus for market and export, processing and value addition, milk and meat handling, marketing, support to strengthening organizational capacity of livestock subsector actors, natural resource based conflict resolution and management, and finance and credit. Many NGOs activities take an emergency/ humanitarian approach, addressing survival and food security, not unexpected in the post-conflict/recovery situation with limited resources. There is a need to empower livestock keepers to move beyond survival and subsistence to income generation and production for market and export as a means of ensuring resilient livelihoods, and for better integrating livestock into the wider economy. Civil society important for elevating the issues and advocating for the rights and support that the livestock subsector is lacking.

Figure 11-1: Key areas of intervention of NGOs working in the livestock subsector



Source: CAMP field data collected between April 2013 and July 2013

NGOs continue to play an important role in animal health services supporting CAHWs and with a combined force of 23 veterinarians distributed in all states except Western Bahr el Ghazal and Western Equatoria: Upper Nile 4; Unity 3; Northern Bahr el Ghazal 2; Lakes 2; Eastern Equatoria 3; Central Equatoria 5; Jonglei 4; and Warrap 4.[326]

The efforts of NGOs and community based organizations are limited in relation to the magnitude of needs, their resource constraints, the short term nature of their presence, and the fragmented approach with each organization focusing on its own priorities. While NGOs have had mostly positive impacts on extension services, CAMP field visits showed that many of the technologies being advocated and utilised are inappropriate. A key critique of NGO activity is the inconsistency with cost recovery. While some NGOs have instituted cost recovery mechanisms, others provide free or heavily subsidized services, creating a dependency syndrome among communities and undermining the growth of the private sector.[327] A policy, legal and regulatory framework is needed to provide clear guidance on the roles and responsibilities of NGOs, coordination between the government and NGOs and for balancing cost recovery against the current needs of livestock keepers and supporting the growth of private sector, and for regulation of training.[328] Mechanisms for instituting strategic partnerships between the government and NGOs are needed.

11.4.5 Development partners

During the civil war and post-conflict period Development Partners (DPs) were critical actors in the livestock subsector involved in emergency interventions and humanitarian assistance, especially in response to disease outbreaks and surveillance, and drought and conflict response. Since the CPA, similar interventions have prevailed alongside food security and

[326] GRSS MARF, Directorate of Veterinary Services 2012

[327] GoSS, MARF. 2006. *Animal Resources Sector Policy and Strategic Plan (ARSP) 2006-2011*. Juba: GoSS.

[328] GoSS, MARF. 2006. *Animal Resources Sector Policy and Strategic Plan (ARSP) 2006-2011*. Juba: GoSS.

livelihoods support. The main bilateral development partners that have been involved in the livestock subsector are Germany, Japan, USAID, CIDA, UK and the Netherlands. Multi-lateral partners are EU, FAO, UNDP, UNICEF, the Indian Battalion of UNMISS (INDBATT) and the World Bank. Key regional partners are the African Union Inter-African Bureau Animal Resources (AU-IBAR) and Inter-Governmental Authority on Development (IGAD).

DP support for the livestock sector has been in decline with very few DP supported interventions since the CPA due to poor returns for investment because of low capacity for implementation and problems with procurement. However, most aid has been short term with two thirds of the funding being for less than one or two years, which is a mismatch with the medium to long term funding needed for positive results based on the 3 year production cycle for indigenous breeds. Most DP-supported projects are not managed directly by the government, a situation that requires review and alignment to the Accra Agenda for Action 2008 and the Paris Declaration on Aid Effectiveness 2005 which requires associated capacity building.

11.4.6 Community and Traditional Institutions

Within South Sudanese societies, there are a diversity of tribal chiefs, elders and opinion leaders: the Transitional Constitution of the Republic of South Sudan vests power in the institutions, status and role of these traditional authorities. They are recognised as integral institutions of local government with jurisdiction over matters affecting local communities. While the structures of integration appear to remain informal, traditional authorities wield great influence on local communities and act as intermediaries between communities and local governments.[329]

These hierarchies are particularly important among pastoral and agro-pastoral communities where traditional institutions such as cattle camps, kinship relations and dowry, important to sustainable livestock production and livelihoods, are overseen by traditional authorities. Migrations were only executed after consultation with chiefs, who together with cattle camp leaders were key decision makers in migration and camp management, and conflict and disease management. Cattle camp leaders have intimate knowledge of the situation in the camps: numbers of livestock, households involved, migration routes and areas, challenges (especially diseases), and conflicts, and are therefore important linkages for any interventions.

Customary law is also recognised and given equal weighting within statute law and there are some explicit provisions of the constitution that recognise customary law such as the protection of customary seasonal access rights to land. This is the main cause of much of the resource based conflict related to access to land that has customarily been dry season grazing for livestock keeping communities, but whose access and usage are now challenged by other competing users. The understanding of land holding under customary law has also presented challenges for the development of livestock subsector infrastructure. Often chiefs are not consulted or sidestepped in the siting of infrastructure, a situation that has resulted in conflict and, many times, closure of such infrastructure[330].

Fragmentation of communities during the protracted conflict led to erosion of traditional authority as well as the establishment of alternative community structures among internally displaced, refugee and returnee communities. New values emerged among communities that were forced to weave together diverse backgrounds. Many of these groups challenge traditional authority and claim it is incompatible with social rights, especially the rights of

[329]Wassara, S.S. 2007. *Traditional Mechanisms of Conflict Resolution in Southern Sudan.* Berghof Foundation of Peace Support. March 2007.
[330]CAMP 2013. CAMP field visits from April 2013 to July 2013.

women, enshrined in the Transitional Constitution.[331] These contradicting sources of community authority have contributed to the disruption of social order since the signing of the CPA.[332]

11.4.7 Stakeholder Coordination

At the national level, MARF coordinates with other ministries and departments through inter-ministerial meetings. Internally, the national Directorate of States Coordination and Special Programmes is responsible for coordination with SMARFs and development partners, as well as ensuring horizontal communication and coordination among the 9 directorates on policy and development matters. For example, through the Sudan Productive Capacity Recovery Program (SPCRP) and Multi-Donor Trust Fund (MDTF) Southern Sudan Livestock and Fisheries Development projects, this directorate assisted some states, for example Northern Bahr el Ghazal, in preparing its SMARF policies and strategic plans while aligning them to the MARF PFSP 2012-2016.

In the specific case of animal health, further coordination with the states is enabled through annual MARF coordination meetings that bring together national and state Directorates of Veterinary Services. The national Directorate of Veterinary Services (DVS) participates in bilateral (cross-border), regional, continental and international meetings for the purposes of trans-boundary disease control (TAD) and standard setting. At the same time, DVS collaborates with the Ministry of Health (MoH) on public health matters, particularly in the control of zoonoses (diseases that can be transmitted from animals to humans). There is far less coordination within the Directorates of Animal Production and Range Management.

At the state level, the SMARFs coordinate with other state government ministries and departments, international organizations, NGOs and training institutions (as in the case of Western Bahr el Ghazal and Upper Nile States that are working very closely with the faculties of veterinary science at the University of Bahr el Ghazal and Upper Nile University). The state veterinary services convene annual animal health coordination meetings. Recently, the state veterinary service of Western Bahr el Ghazal State collaborated with the Ministry of Health and veterinary services in all the neighbouring states, on the subject of control of zoonoses and TADs.

11.5 Production Systems and Performance of the Livestock Subsector

11.5.1 Structure of the Livestock Subsector

11.5.1.1 Challenges with availability of reliable estimates of the size of the livestock subsector

The official livestock population data currently used at the policy level by the national Ministry is an estimate by FAO, extracted from data generated for the whole of South Sudan in 2009 (see Table 11-11). The 2009 FAO estimate put the South Sudan herd at 11,735,159 head of cattle, 12,424,760 goats and 12,062,883 sheep[333]. While the FAO estimates are considered conservative, this would place the South Sudan national herd as the seventh[334]

[331]Wassara.S.S. 2007. *Traditional Mechanisms of Conflict Resolution in Southern Sudan*. Berghof Foundation for Peace Support.

[332]Wassara, S. S. 2007. *Traditional Mechanisms of Conflict Resolution in Southern Sudan*. Berghof Foundation for Peace Support.

[333]The Republic of South Sudan. 2012. *The Ministry of Animal Resources and Fisheries Policy Framework and Strategic Plans 2012-2016.*

[334]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF. In their report, Musinga et al. 2010. rank the South Sudan national herd as the 6th largest on the African continent ahead of Kenya. However a comparison of data for the two countries would rank South Sudan 7th on the basis of both numbers and livestock units

largest in Africa. This large livestock holding is in keeping with other neighbouring countries in the Horn of Africa region, which collectively has the highest concentration of livestock in Africa, and the highest concentration of pastoralists in the world. Based on estimated growth rates of 0.06% for cattle, and between 0.1 and 0.4 for goats and sheep, also considered conservative, the revised estimated livestock populations for 2013 are 11,763,349 cattle, 12,549,421 goats and 12,111,207 sheep (Table 11-11).[335] Given the low human population, South Sudan has the highest per capita Tropical Livestock Units (TLUs), a national average of 1.5 animals compared to a continental average of 0.66. [336] The highest per capita TLUs are in Western Bahr el Ghazal (3.3), Unity (2.0) and Northern Bahr el Ghazal (1.9).

An attempt was made to generate a national livestock population estimate during the 2008 Sudan Population and Housing Census by the Southern Sudan Centre for Census Statistics (SSCCSE). The SSCCSE data estimates 35.5 million cattle, 20.8 million goats, and 27.3 million sheep. According to this data set, South Sudan would have the second largest national herd in Africa, second only to Ethiopia. However, the livestock questionnaire was administered to only 500 households bringing into question the credibility of the data. The National Baseline Household Survey gave an estimate of 17.9 million cattle, 13.3 million goats, 8.5 million sheep and 3.8 million poultry based on a questionnaire that was administered to all households in the survey. However, there is a very large skew, with 60% (11.3 million) of the cattle, 55% of the goats (7.3 million) and 68% of the sheep (5.8 million) in just one state i.e., Eastern Equatoria. The Rinderpest Dossier 2007 data generated during the eradication of rinderpest, is perhaps the closest to the FAO estimates. There is even less information concerning minor and emerging livestock species, which are known to be of value for the improvement of food security, employment and incomes for both urban and rural smallholder households. They could be of particular value for vulnerable groups including women, female-headed households, youth, returnees and internally displaced persons (IDP's). Data from the states is incomplete.

At the implementation level (state and county), the data challenges and inconsistencies are more challenging. There is no agreed approach for working with the limited reliable data. In their Policy and Strategic Plans, the state Ministries are using livestock population estimates from different sources, including estimates made within the state from vaccination programs, estimates from FAO and other agencies, etc. Some states are using outdated data sources such as the 1997 Rinderpest vaccination data or do not cite their data sources. The formats for presenting data also vary from

[335]FAO/WFP 2013. *Special Report: FAO/WFP Crop and Food Security Assessment Mission to South Sudan.* 22 February 2013.
[336]FAO website. Module 1: An Overview of Cattle Production Systems in Sub-Saharan Africa.

Table 11-11: Livestock population in South Sudan: a comparison of data sets used by different stakeholders

State	Official MARF Data 2009			Per Capita Total TLU	Data in the State Strategic Plans				Data given to CAMP			
	Cattle	Goats	Sheep		Cattle	Goats	Sheep	Poultry	Cattle	Goats	Sheep	Poultry
Central Equatoria	880,544	1,157,903	1,271,049	0.8	Incomplete	N/A	N/A	N/A				
Eastern Equatoria	890,412	1,137,078	1,029,404	0.9	N/A (was livestock units)	11,453,163 livestock units for all livestock	N/A	N/A	2,500,000	5,200,000	2,400,000	1,500,000
Western Equatoria	676,713	1,157,903	1,174,391	1.1					500,000	1,200,000	700,000-800,000	1,500,000
Jonglei	1,468,189	1,212,050	1,406,369	0.9	2,674,555	1,718,328	349,860		2,674,555	1,718,328	349,860	
Upper Nile	985,388	4,415,026	642,774	0.8					2,400,000	2,000,000	1,800,000	200,000
Lakes	1,313,852	1,470,287	1,237,219	1.7	900,000	60,000	40,000		3,000,000	1,500,000	1,500,000	68,000
Unity	1,183,258	1,761,849	1,493,361	2.0	2,500,000-3,000,000	N/A	N/A					
Warrap	1,531,507	1,374,489	1,295,213	1.4	2,910,000	N/A	263,000		3,000,000	Shoats 2,000,000		N/A
Western Bahr el Ghazal	1,250,533	1,124,582	1,271,049	3.3	1,200,000	750,000	980,000		1,200,000	750,000	980,000	800,000
Northern Bahr el Ghazal	1,582,953	1,636,892	1,290,380	1.9	1,500,000	1,800,000	1,300,000	2,500,000	1,800,00	Shoats 1,200,000		N/A
Total	11,763,349	12,549,421	12,111,207	1.3								

Sources: Official MARF Data estimates for 2009: based on FAO Livestock Population Estimates, Oct 2009; FAOStat: http://faostat.fao.org/ (accessed in Aug 2010); Respective state strategic plans and data collected during the CAMP Situation Analysis to each state between March and July 2013.

one state to another making it difficult to coherently compile and compare data from different states. For some states there was a marked inconsistency between the data provided during the CAMP field data collection exercise and that in the current state strategic plans (Table 11-11). This situation presents challenges for planning, investment and coordination of activities at all levels. For example, in the case of vaccination, the data inconsistencies could be partly responsible for the lower vaccination coverage[337]. A systematic approach for capturing and updating livestock population figures is important for understanding changes in the livestock subsector. At the policy level, there is an urgent need for an authoritative livestock population database. Without accurate data, the potential of the livestock subsector cannot be realised. Estimating livestock numbers, especially among mobile pastoral populations, remains a major challenge for governments. More reliable census data is costly to generate and there are significant methodological challenges. However, experience from other African countries has shown the benefit of investment in a census. In Niger, an FAO facilitated census uncovered the fact that Niger had 30% more livestock than previously assumed and the biggest stock in West Africa[338]. This finding was the basis for increasing Niger's GDP by 2%. It also meant that Niger had the capacity to grow its dairy sector to meet domestic demands and to become an exporter of meat. This justified a substantive increase in public sector investment in the livestock subsector. There are similar findings for Ethiopia, where the livestock subsector was found to contribute 45% of the agricultural GDP, up from a previous estimate of 25%[339]. The last livestock census covering South Sudan was conducted in 1976[340]. A discussion paper to initiate a stakeholder dialogue and feasibility study on a livestock census was prepared and submitted by the EU funded Livestock Epidemo-Surveillance Project (LESP) in 2011[341].

There are direct implications concerning the lack of authoritative livestock numbers for the CAMP situation analysis, and for the development of CAMP strategy and investment plans. It is beyond the scope and capacity of CAMP to generate the necessary primary data or to validate the available estimates. There is a need for South Sudan to prioritise investment in a livestock census to generate credible figures to realise the full potential of the subsector. For purposes of the development of the Comprehensive Agricultural Master Plan therefore a caveat is necessary. The FAO estimates which are what the national Ministry is using officially will be used as the base population figures. Where there are discrepancies between the FAO estimates and data and findings collected during CAMP field work, or with other existing data that is important for this report, this will be highlighted.

11.5.1.2 Cattle population, trends and areas of concentration

According to the National Baseline Household Study, 63% of all households in South Sudan (825,500 households) own cattle. By 1954, southern Sudan had an estimated 2,400,000 head of cattle, recognized as a great asset for sustainably increasing the financial self-sufficiency of the region[342]. The distribution in 1954 was such that the Bahr el Ghazal Province had the most cattle with 1,256,000 head, followed by Upper Nile Province with 1,149,000 head and the Equatoria Province with 291,000 head. It was reported that the cattle growth rate was greater than what was required for the domestic market. At that point

[337]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

[338]Food and Agriculture Organization. 2007. *First Ever Agricultural and Livestock Census Uncovers Niger's Hidden Wealth.* FAONewsroom. http://www.fao.org/newsroom/en/field/2007/1000727/

[339]IGAD LPI. 2010. *The Emergency Industry and the Shaping of Innovative Response Capacity*. IGAD Livestock Policy Initiative Brief No. 9.

[340] MARF/Livestock Epidemo-Surveillance Project 2011. *Discussion Paper: Republic of South Sudan First National Livestock Census.* Livestock Epidemo-Surveillance Project, MARF, EU and VSF Belgium.

[341] MARF/Livestock Epidemo-Surveillance Project 2011. *Discussion Paper: Republic of South Sudan First National Livestock Census*. Livestock Epidemo-Surveillance Project, MARF, EU and VSF Belgium

[342]Sudan Government. 1955. *Natural Resources and Development Potential in the Southern Sudan Provides of the Sudan.* A Preliminary Report by the Southern Development Investigation team. London, 1954.

only 10% of the surplus was being exported and it was recommended that the extraction rate be raised through increased trade into urban markets in northern Sudan and expansion into new markets in Uganda. Construction of a meat-packing plant was also recommended. Over the next half century, which coincided with protracted periods of civil war (1955-1972 and 1983-2005), cattle populations were affected by conflict and marginalization, with only minimal support to the subsector. Disease also had a negative impact such as rinderpest that decimated livestock populations in the then southern Sudan in the early 1990s[343]. By 2001, reports show that estimates of the cattle population ranged from 5-7.8 million for the whole of southern Sudan[344].

Based on revision of 2009 FAO estimates and a low annual growth rate of 0.06% over the five years since 2009, it is estimated that the cattle population of South Sudan in 2013 stands at 11,763,349[345]. This data strongly suggests stagnation in cattle populations over the past four to five years. There is a pronounced regional distribution of cattle with the same pattern as was in the 1950s. The Greater Bahr el Ghazal region - Northern Bahr el Ghazal (NBG), Western Bahr el Ghazal (WBG), Lakes and Warrap - has the largest cattle population (48%) (see Figure 11-2). The Greater Upper Nile region (Upper Nile, Jonglei and Unity) has 31% of the cattle, while the Greater Equatoria region (Western Equatoria, Central Equatoria and Eastern Equatoria) has 20% of the cattle. Within the Greater Bahr el Ghazal region, NBG has the highest cattle population with 1,582,953 head, followed by Warrap, Lakes and WBG. NBG has the highest number despite the fact that the 1983-2005 civil had a devastating impact on livestock in the state, with over 40% of households losing all their livestock, a factor that contributed to the severe famine that ravaged the state in 1998 [346]. During that period, due to the internal conflict in the whole of Greater Bahr el Ghazal, dependence on livestock rearing and cultivation was significantly reduced, and households turned to gathering of wild foods as a key coping strategy[347]. Given the low growth rate in the post war period since 2005, herds have not fully recovered to pre-1983 levels[348]. Many households are still restocking[349].

In the Greater Upper Nile region, Jonglei has the highest livestock population of 1,468,189 head, followed by Unity and Upper Nile. In the Greater Equatoria region, Eastern Equatoria has the largest cattle population with 888,278 head, followed closely by Central Equatoria, with Western Equatoria having the least cattle. Parts of both the Greater Upper Nile and Greater Equatoria regions have experienced increased insecurity, natural resource based and inter-ethnic conflicts and cattle raiding which have affected cattle populations negatively.

The most affected areas include Jonglei state, Eastern Equatoria and Central Equatoria. For example, in Central Equatoria CAMP field data collection interviews show that there has been a significant decrease in cattle numbers in Juba County, falling sharply from an estimated 700,000 before 2008 to around 100,000 in 2013 due to an increase in cattle

[343]Catley, A., T. Leyland and S. Bishop. 2005. *Policies, Practice and Participation in Complex Emergencies: The Case of Livestock Interventions in South Sudan.* A Case Study for the Agriculture and Development Economics Division of the Food and Agriculture Organization. March 2005.

[344]Jones, B. 2001. Review of Rinderpest Control in southern Sudan, 1989-2000. African Union-Interafrican Bureau for Animal Resources. Quoted by Catley, A., T. Leyland and S. Bishop. 2005. *Policies, Practice and Participation in Complex Emergencies: The Case of Livestock Interventions in South Sudan.* A Case Study for the Agriculture and Development Economics Division of the Food and Agriculture Organization. March 2005.

[345]FAO/WFP 2013. *Special Report: FAO/WFP Crop and Food Security Assessment Mission to South Sudan.* 22 February 2013.

[346]Biong Deng, L. 2013. *Changing livelihoods in South Sudan.* Humanitarian Exchange Magazine. Issue 57, May 2013.

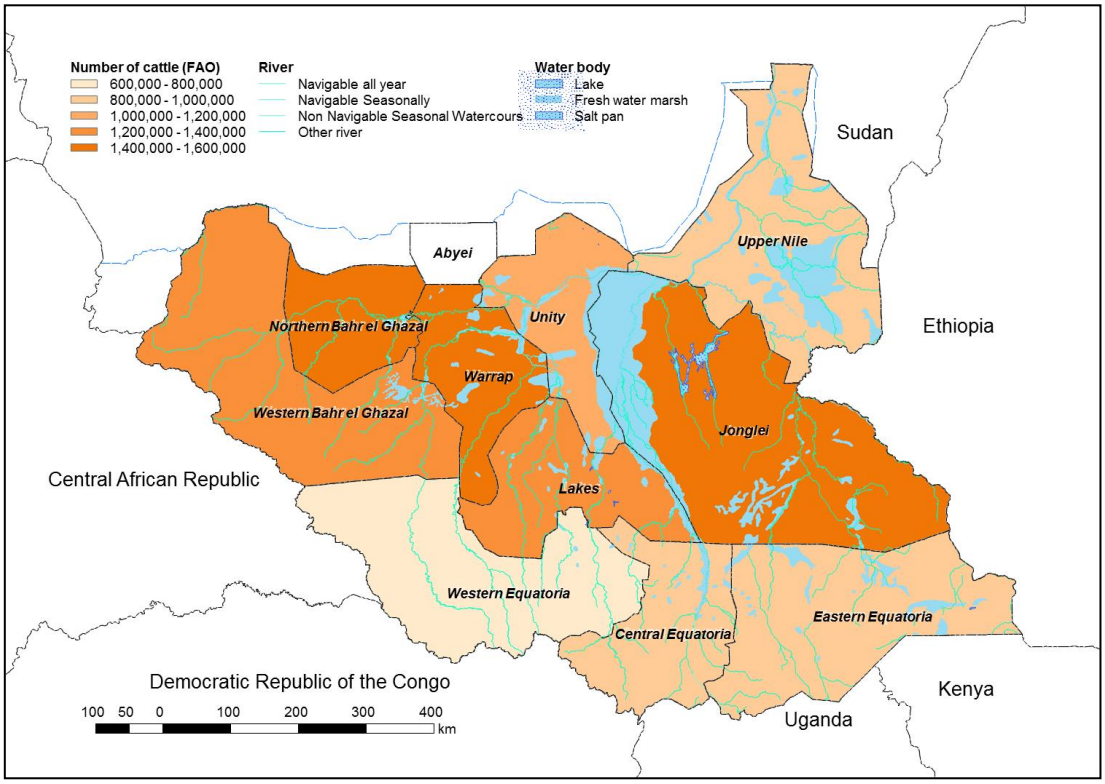
[347]Biong Deng. L. 2013. *Changing livelihoods in South Sudan.* Humanitarian Exchange Magazine. Issue 57, May 2013.

[348]Biong Deng. L. 2013. *Changing livelihoods in South Sudan.* Humanitarian Exchange Magazine. Issue 57, May 2013.

[349]State Ministry of Animal Resources Northern Bahr el Ghazal. 2012. Ministry of Animal Resources and Fisheries Strategic Plan 2012. Northern Bahr el Ghazal. December 2012

rustling and insecurity. Numbers of cattle in cattle camps has drastically fallen and many households now prefer to tether or zero graze (cut and carry) the few cattle that remain.

Figure 11-2: Cattle populations at state level in South Sudan



Source: FAO/WFP 2013. *Special Report: FAO/WFP Crop and Food Security Assessment Mission to South Sudan*. 22 February 2013 based on 2009 FAO estimates for the whole of Sudan

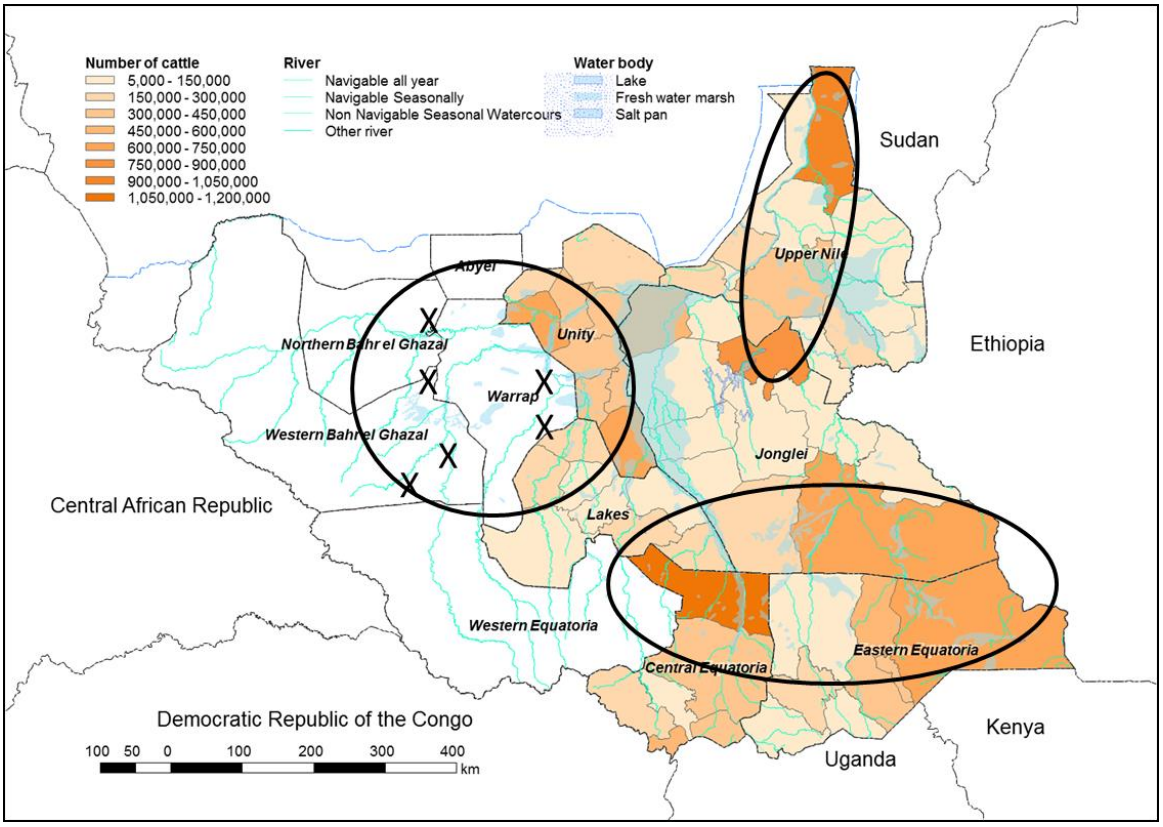
However, cattle populations in neighbouring Terekeka County have grown from 1.2 million before 2008 to an estimated 1.75 million in 2013. This is partly due to decisions within the state to have all livestock that were moved away during the civil war, returned to their original administrative locations. These movements inadvertently caused a need for increased disease control, as incoming livestock spread East Coast Fever from Western Equatoria, as well as increased pressure on feed resources in Terekeka County. In both Yei County, CES and the Greater Mundri region changes in marriage culture, introduced through intermarriages, have made cattle rearing more important, thus increasing community interest in raising cattle.

Areas of concentration: There are areas where cattle are concentrated (Figure 11-3) including: the Greater Kapoeta region in Eastern Equatoria; Nyirol and Pibor Counties in Jonglei; Nasir, Baliet and Renk in Upper Nile; Panyinjar, Mayom and Leer in Unity; Terekeka in Central Equatoria[350]; Aweil East and Aweil South in Northern Bahr el Ghazal, Tonj North and Tonj East in Warrap, Jur River and Wau in Western Bahr el Ghazal[351]. Terekeka, the Greater Kapoeta area and Pibor already supply Juba and would therefore be of strategic importance in meeting the demands of the fast growing urban population. There is also great potential for expanding trade into Uganda, Kenya and Ethiopia, which is currently very limited or has ceased. A second identifiable cluster is within the Greater Bahr el Ghazal area and Unity which would be strategic for supplying this area with the highest human population

[350]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.
[351]CAMP field data. 2013.

density, and meeting the demand in Western Equatoria. A third cluster encompassing Nyirol in Eastern Equatoria and Nasir, Baliet and Renk in Upper Nile are strategic for supplying markets in Malakal and for trade with Sudan and Ethiopia. The clusters are particularly important for the development of a dairy industry.

Figure 11-3: Areas of concentration of cattle in South Sudan



Source: Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF and CAMP data.

The areas that have least concentration of cattle are those that have historically been infested with tsetse flies and therefore trypanosomiasis has been a major deterrent to livestock keeping. These include Western Equatoria and Raga County of Western Bahr el Ghazal. However, a recent assessment conducted by the national MARF indicates that tsetse infestation is now more wide spread; it is only Lakes, Unity and parts of Central Equatoria where the presence of the vector is yet to be confirmed[352].

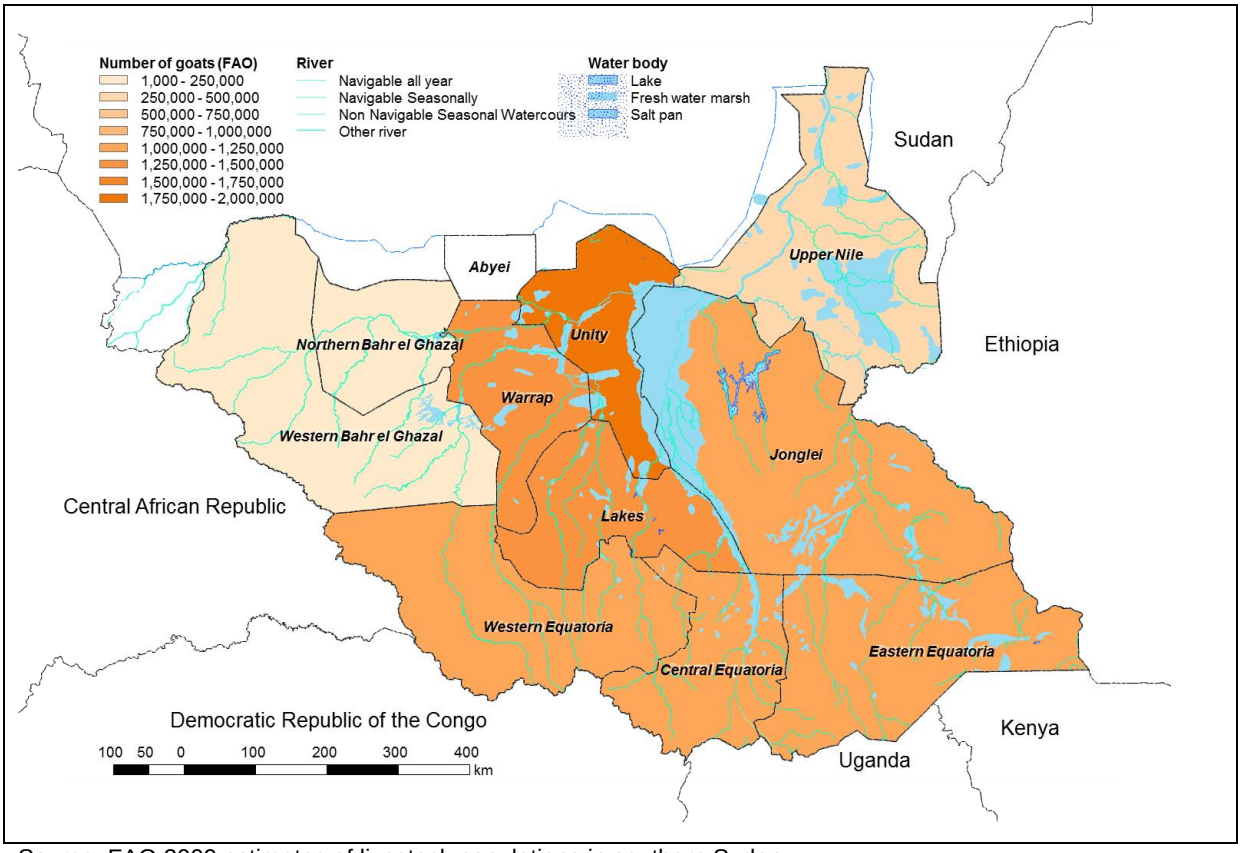
11.5.1.3 Goat population, trends and areas of concentration

In 1954, South Sudan had 2,400,000 goats and sheep, with the largest population of 1,144,100 head in the Flood Region (parts of Upper Nile, eastern and north-eastern parts of Bahr el Ghazal and parts of north-eastern Equatoria), followed by the Equatorial Region with 1,338,000 sheep and goats (south-western and western parts of Equatoria province)[353]. The Central Rainlands (part of Upper Nile Province) had the lowest population with 80,000 head. Currently, goats are the most widely kept ruminant livestock with 69% of all households owning goats, i.e., 904,120 households[354].

[352]MARF 2013. Unpublished Report on Tsetse Fly Distribution and Trypanosomiasis Incidence in the Republic of South Sudan.
[353]National Bureau of Statistics. 2012. *National Baseline Household Survey 2009.*
[354]National Bureau of Statistics. 2012. *National Baseline Household Survey 2009.*

Revised figures for 2013 based on FAO 2009 livestock estimates show that there are an estimated 12,549,421 goats in South Sudan[355]. Like cattle, goat populations are highest in the Greater Northern Bahr el Ghazal region which has 45% of the goats (see Figure 11-4) with NBG and Unity having the highest number of goats. The Greater Upper Nile and Greater Equatoria regions have equal numbers of goats i.e., 27% each, emphasizing the universal presence of goats in the country. Goats are an important asset at household level where they serve as savings and insurance that can be quickly mobilized to solve household problems. Goats are particularly important in Western Equatoria and parts of Central Equatoria where they are the main ruminant livestock kept under small holder/ household systems. A large percentage of goats are kept as part of mixed herds with cattle, and therefore the same factors that have affected cattle populations like drought, disease, conflicts and insecurity have affected goat populations.

Figure 11-4: Goat population across South Sudan states

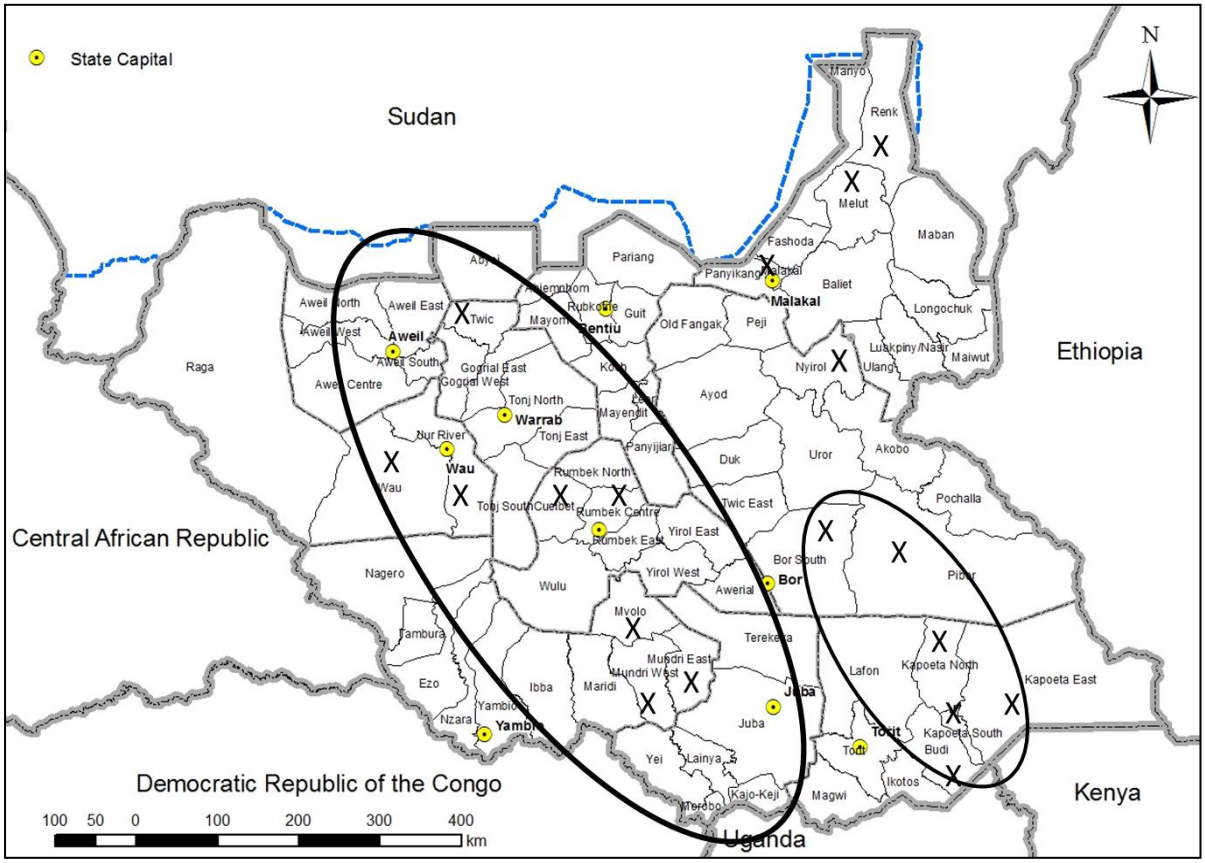


Source: FAO 2009 estimates of livestock populations in southern Sudan

Areas of concentration of goats: Unlike cattle, goats are more evenly distributed reflecting their versatility and adaptability to a range of livelihood zones and production systems. Over the last few years goat restocking has been an important component of interventions focused on improving livelihoods and food security. This has resulted in an increase in the number of households owning goats and the number of goats held per household. Nonetheless there is a belt of concentration of goat populations running diagonally from the north-west through the centre of the country to the south-eastern region (see Figure 11-5). A second area of concentration is in the southern parts of Jonglei State and the Greater Kapoeta area of Eastern Equatoria. Goats are also concentrated in the western parts of Upper Nile state.

[355]FAO/WFP 2013. *Special Report: FAO/WFP Crop and Food Security Assessment Mission to South Sudan*. 22 February 2013.

Figure 11-5: Goat concentration



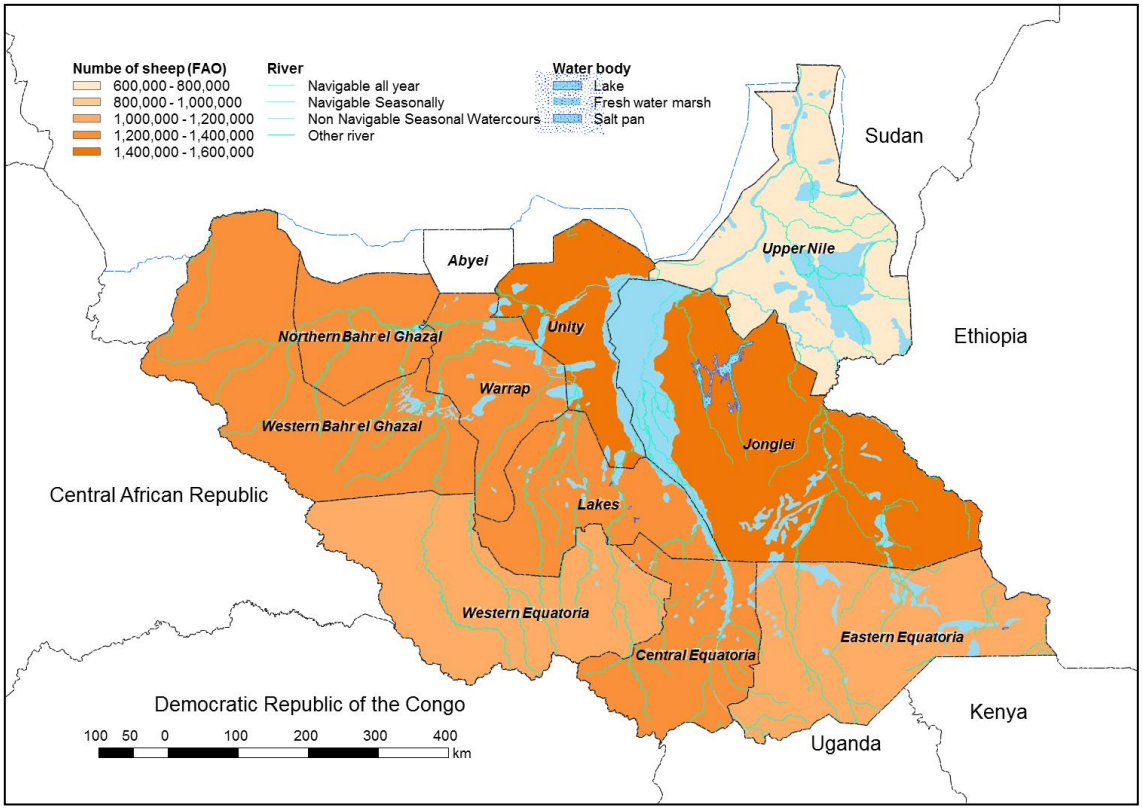
Source: CAMP data 2013

11.5.1.4 Sheep population, trends and areas of concentration

Although there are almost equal numbers of sheep as goats in South Sudan, i.e., 12,111,207 head, only 38% of households own sheep indicating concentration of sheep among a few households i.e., 497,800 households. Many indigenous communities have taboos and/or cultural practices related to both the keeping of sheep and consumption of its products. Like the other ruminant species, sheep are most concentrated in the Greater Northern Bahr el Ghazal region which has 42% of the sheep, with the largest populations in NBG and Unity States (Figure 11-6). The other two regions i.e., Greater Upper Nile and Greater Equatoria have equal numbers of sheep i.e., 29% each.

Areas of concentration of sheep production: The concentration of sheep production to some extent mirrors that of goat production (Figure 11-5). Concentration areas include the Greater Kapoeta area in Eastern Equatoria, the Greater Mundri area and Mvolo in Western Equatoria, a corridor through Greater Bahr el Ghazal including Cueibet and Wulu in Lakes, Wau and Raga in WBG, and Aweil South and Aweil East in NBG. There is a concentration of sheep production in western parts of Upper Nile including Melut, Fashoda and Panyikang and the neighbouring county of Pariang in Unity State.

Figure 11-6: Sheep population across South Sudan states



Source: FAO 2009 livestock estimates

11.5.1.5 Poultry population, trends and areas of concentration

The official estimate for poultry was 5.6 million birds in 2006[356]. The National Baseline Household Survey 2009 estimated that the national flock was 3,871,693 birds. However this data is skewed with Eastern Equatoria having the highest number of poultry i.e., 796,441 (21%) which is not corroborated by information from the ground. From data gathered from the current State Strategic Plans and CAMP field interviews in the states, the total poultry flock size for six states excluding Warrap, Unity, Jonglei and Central Equatoria is 6,568,000 birds (see Table 11-11). According to this data, Northern Bahr el Ghazal has the highest number of poultry with 2,500,000, followed by both Eastern Equatoria and Western Equatoria with 1,500,000 birds each. Western Bahr el Ghazal has an estimated 800,000, Upper Nile 200,000 and Lakes State 68,000. The data is however not broken down by species, but from CAMP field visits, local chicken followed by ducks make up the majority of poultry. Rearing of exotic chicken, both broilers and layers, is still falteringly emerging and the growth rate can be expected to be very low or even negative. For example, out of the forty-two poultry farms established with the support of the Central Equatoria SMARF and NGOs, less than five were operational in 2013. There is no data on other poultry species that include ducks, turkeys and guinea fowl.

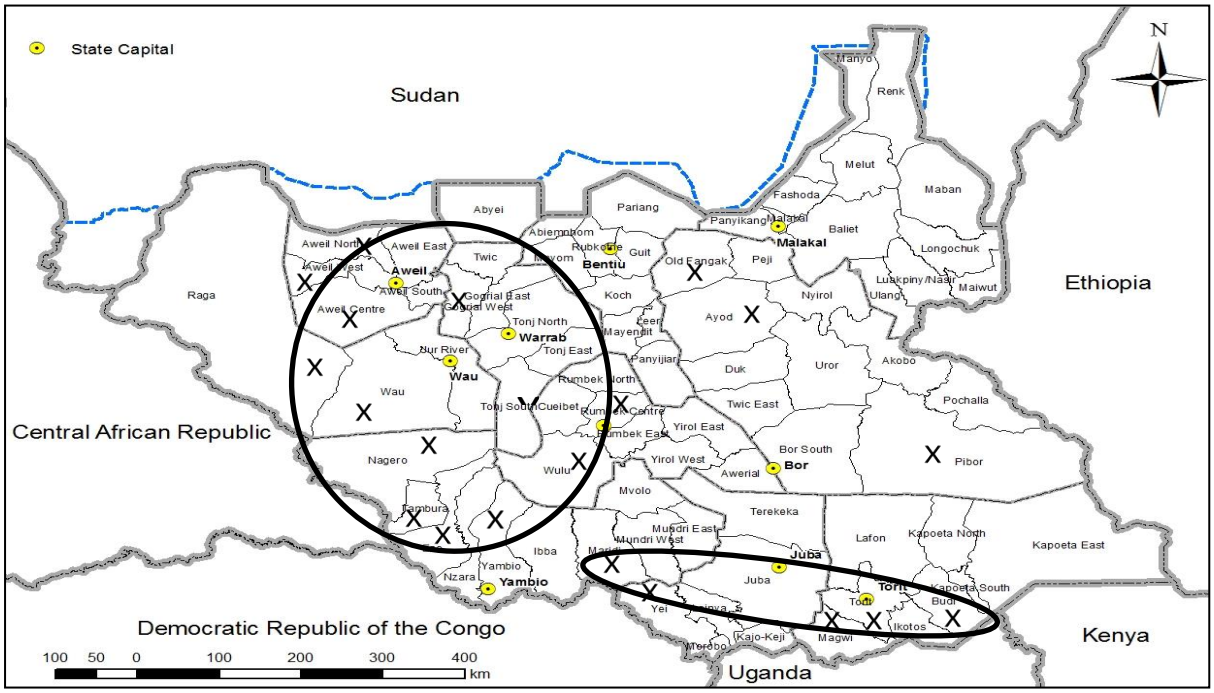
11.5.1.6 Population of honey producers, trends and areas of concentration

Honey production, especially through traditional practices and gathering of wild honey is a livelihood activity of many South Sudanese households who derive food and income from honey and other bee products. For some South Sudanese communities such as the Jurbel in Wulu County, Lakes State, honey plays important socio-cultural roles related to marriage

[356]Government of Southern Sudan/ Ministry of Animal Resources and Fisheries. 2006. *Animal Resources Sector Policy and Strategic Plan 2006-2011.*

and kinship[357]. The 2006-2011 MARF Policy and Strategy document estimated that the production potential for honey was about 100,000 metric tonnes and 5,000 metric tons of beeswax[358]. This may however be an overestimation as Ethiopia, which is Africa's leading producer, and 10th globally, produced 45,300 metric tons in 2010, up from 36,000 metric tons in 2005.

Figure 11-7: Areas of concentration of honey production



Source: CAMP data

A study showed that there are approximately 18,308 traditional beekeepers/honey gatherers in just three of the main honey producing states i.e., Western Bahr el Ghazal, Lakes and Western Equatoria. On average it was estimated that each could produce 420 kg just from traditional beekeeping and gathering, for a total of 7,690 metric tonnes. Traditional beekeepers and honey gatherers constitute 80.2% of honey producers, therefore together with modern beekeepers there are approximately 22,885 beekeepers in the three states producing a minimum of 9,611 tonnes. Based on these findings, since modern beekeepers have a much higher production, it would require approximately 238,112 beekeepers/honey gatherers, 18% of households to produce 100,000 tonnes of honey in South Sudan annually. There is a need to verify this data.

Areas of concentration: Vast natural forest covers over 80% of South Sudan's territory, meaning there is potential for honey production in most of the country. However, honey production is concentrated in the Greater Equatoria region and parts of Western Bahr el Ghazal and Lakes State, where there is expansive forest cover, but also adequate rainfall supporting growth of crops; this makes them natural habitats for bee colonies (Figure 11-7).

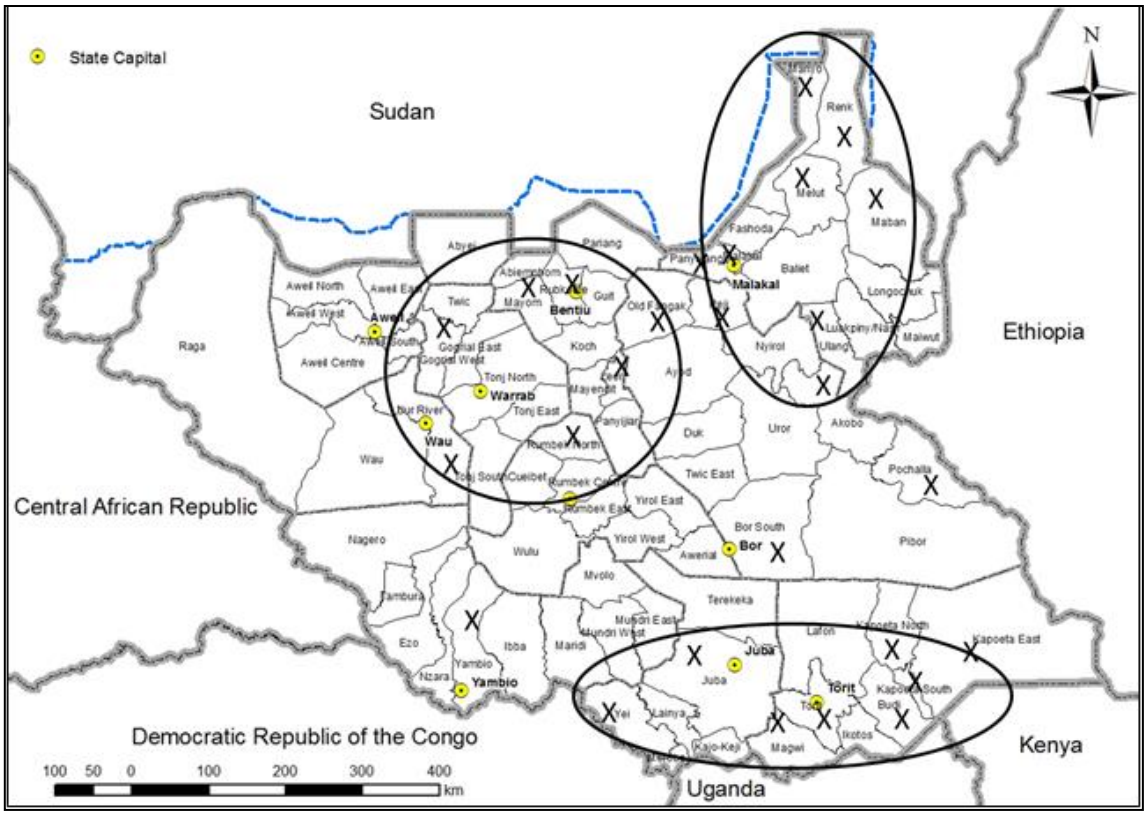
11.5.1.7 Population of emerging livestock, trends and areas of concentration

There is a paucity of information in the literature in relation to minor and emerging livestock species including camels, ducks, turkeys, ostriches, quail, pigeons and rabbits, and on equine donkeys, horses and mules. Neither is there data on crocodiles and snakes, which

[357] Sudan Institutional Capacity Programme: Food Security Information for Action. 2012. *A Study on Traditional Beekeeping and its Contribution to Food Security and Poverty Alleviation.* Information for South Sudan Food Security and Policy Intervention. Republic of South Sudan, EU and FAO.
[358] Maku. 2004. *Honey Market in Uganda. APICATA 38* (2004) p.302-306.

are potential sources of leather[359]. Data from the states is incomplete. Currently there are an estimated 100,000 camels and 10,000 donkeys. There are a few commercial enterprises producing rabbits in Western Equatoria and other parts of the country. Rearing of pigs is an emerging activity in South Sudan. The highest concentration of pigs is in Maban County, Upper Nile State, where there are an estimated 35,000 pigs kept by the indigenous community for whom pigs are the most important livestock, followed by small ruminants and then cattle[360]. Data collected by CAMP from states shows that there are an estimated 13,720 pigs in Eastern Equatoria. Other states have very few pigs, mostly kept by just one or two persons or communities i.e., 20 pigs in Rumbek North, Lakes State; 150 pigs in Rubkona Country Unity State and 163 pigs in Wau, Western Bahr el Ghazal. There are however a few commercial enterprises in Juba, the largest with 400 crossbreeds, and 100 local breed pigs.

Figure 11-8: Areas where pigs are currently being reared in South Sudan



Source: CAMP data and information

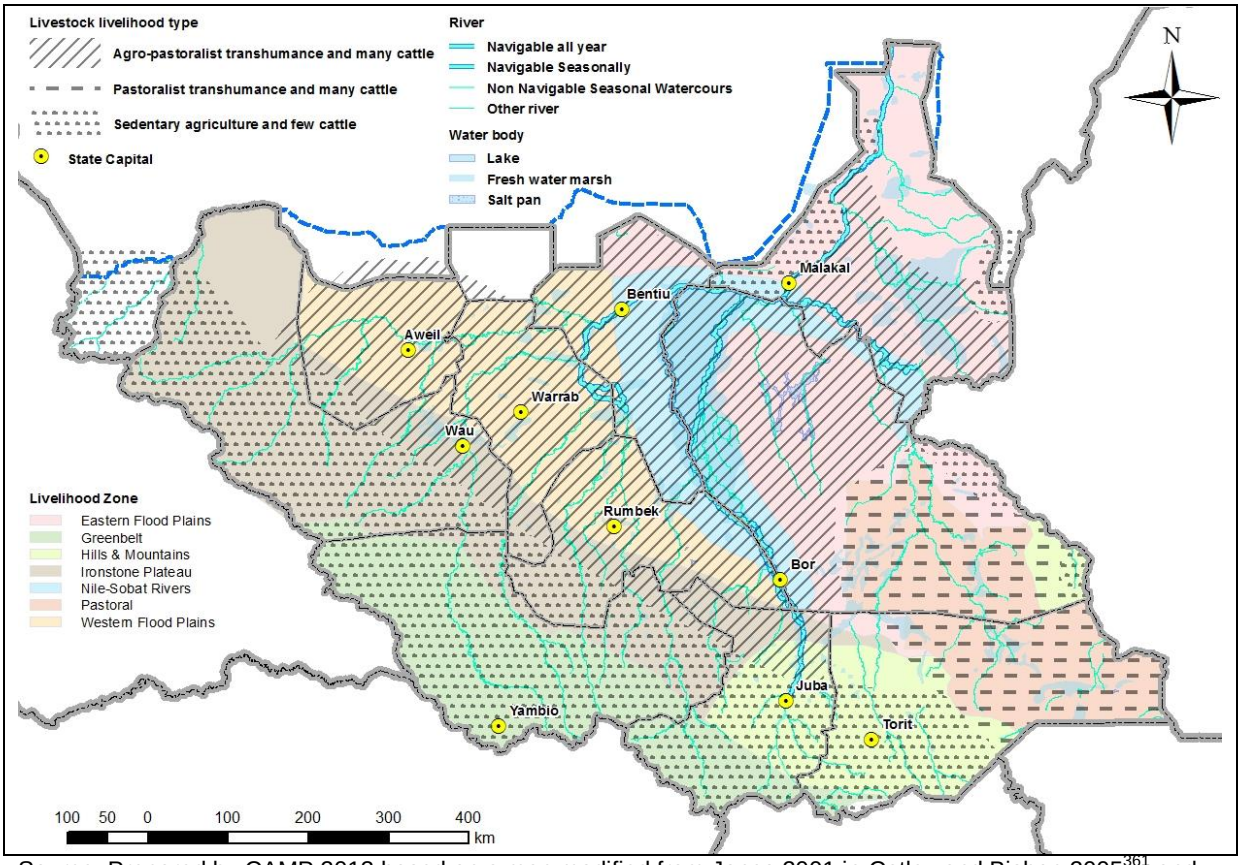
11.5.2 Production systems

There are commonalities among the main livestock production systems in South Sudan; all are largely traditional systems, of a subsistence nature, non-monetized/non-wage earning, with low inputs and a dependency on natural resources. Commercial production systems are emerging but still rudimentary. There is low adoption of other possible livestock production systems that could utilise a wider range of feed and management options. This is a result of protracted conflict, marginalization, and lack of infrastructure and services that led the South Sudanese population to revert to dependence on the natural resource base and indigenous knowledge systems and strategies. The main livestock production systems are therefore strongly aligned to the livelihood zones (see Figure 11-9 and Table 11-12).

[359]Government of Southern Sudan/ Ministry of Animal Resources and Fisheries. 2006. *Animal Resources Sector Policy and Strategic Plan 2006-2011.*

[360] Food and Agriculture Organization. 2012. *Maban Assessment Report: Livestock Livelihood Based Assessment.* September 2012.

Figure 11-9: Main cattle production systems in South Sudan



Source: Prepared by CAMP 2013 based on a map modified from Jones 2001 in Catley and Bishop 2005[361] and from SSCCE[362] livelihood profiles

Table 11-12: Livelihood Zones

Livelihood Zone and the States covered	Main zone characteristics in relation to livestock rearing	Key issues
Greenbelt Zone • Eastern Equatoria • Central Equatoria • Western Bahr el Ghazal	• Rely almost exclusively on agriculture • Smallholder rural and urban/peri-urban livestock keeping focused on poultry and goats. Few cattle • Emergence of commercial poultry • Honey through traditional and modern beekeeping and gathering of wild honey	
Arid/ Pastoral Zone • Eastern Equatoria • Jonglei	• Driest zone, with one cropping season and seasonal rivers except swamps which are dry season grazing areas	• Delayed rain and recurrent drought the norm • Seasonal migration for water and pasture with

[361]Jones, B. 2001. *Review of Rinderpest Control in Southern Sudan 1989-2000.* African Union – Interafrican Bureau of Animal Resources, Nairobi, Kenya. In Catley, A., T. Leyland and S. Bishop. 2005. *Policies, Practices and Participation in Complex Emergencies: The Case of Livestock Interventions in South Sudan.* A Case Study for the Agriculture and Development Economics Division of the Food and Agriculture Organization. March 2005.
[362]Southern Sudan Centre for Census, Statistics and Evaluation. 2006. Southern *Sudan Livelihood Profiles. A Guide for Humanitarian and Development Planning.* SSCCSE and Save the Children, UK.

Livelihood Zone and the States covered	Main zone characteristics in relation to livestock rearing	Key issues
	• Nomadic and transhumant pastoralism with strong reliance on livestock which are the main source of income, rely on wildlife and plants as well • Mostly cattle and goats • High reliance on milk as a source of food and nutrition • Crop supplementing livestock with small scale cereal production • Reliance on livestock trade for food and income (as high as 24% of households in some years). • Large herd sizes • Exchange of livestock for grain: during food shortage periods, distress sales with poor cattle to grain terms of trade	movements as far as Ethiopia, Jie, the Kidepo Valley and towards the Uganda border • Community priorities include need for provision of alternative water sources for livestock (hafirs) to reduce clashes and insecurity and improvement of market access • Crop failure • Insecurity, conflict and cattle raiding disrupt livelihoods and in Jonglei • Inter-tribal clashes hamper livestock trade • Natural resource based conflict • Animal disease • High reliance on market for purchase of grain therefore terms of trade between livestock and grain important • Mobility dependent coping mechanisms such as fishing, hunting and gathering
Hills and Mountain Zone • Central Equatoria • Eastern Equatoria • Jonglei	• Both agriculture and pastoralism Pastoralism mostly among households in Torit and Budi • Reliance on cattle increased during difficult years • Opportunity for trade with Ethiopia and Kenya	• Droughts in the mountains • Floods in the lowlands or plains • Resource based conflict
Western Flood Plains Zone • Northern Bahr el Ghazal • Warrap • Lakes • Unity	• Short vegetation, black clay soils and wetlands (toic) that are prone to flooding • Agro-pastoralists, who keep livestock combined with crop agriculture, supplemented by fish and wild foods • Seasonal flooding common in an area characterised by lakes, rivers and low lands. Flooding makes agriculture difficult • Livestock are important for both food and income • Stable security especially in NBG	• Vulnerability to flood and droughts • Poorly developed market infrastructure • Significant number of female headed households • Distress sale of livestock to cope with food shortages • Poor quality of dry season pastures
Eastern Flood Plains Zone • Eastern Equatoria	• Pastoralists and agro-pastoralists • Low lying terrain and black cotton soils pre-disposes to	• Long distance migrations for grazing • Inter-ethnic hostilities due to different tribes

Livelihood Zone and the States covered	Main zone characteristics in relation to livestock rearing	Key issues
• Jonglei • Unity • Upper Nile	flooding • Livestock, agriculture, supplemented by fish, wild foods and game hunting • Trade of livestock is important for food security	• Wildlife • Few vibrant markets in some areas and poor access to markets due to poor roads • Distress sale of livestock during food shortages
Ironstone Plateau Zone • Eastern Equatoria • Central Equatoria • Western Equatoria • Lakes • Warrap • Northern Bahr el Ghazal • Western Bahr el Ghazal	• Heavily dependent on crop production but parts like Terekeka in CES is largely agro-pastoral with livestock production predominant and sale of livestock especially as distress sales • High potential for commercial beekeeping • Host area for in-migrating cattle keepers from the Nile-Sobat River Zone	• Tsetse infested areas limit livestock production • Cattle raiding has affected parts of CES (Terekeka) • Drought • Soils with low water retention capacity, therefore prone to water shortages • Conflicts with in-migrating livestock keepers
Nile and Sobat Rivers Zone • Lakes • Unity • Jonglei • Upper Nile	• Clay soils and swampy areas(toic) close to the Nile and Sobat rivers so abundance of water sources • Good vegetation for grazing but flooding hampers access • An important dry season grazing area to which transhumant livestock migrate to set up cattle camps but also crops grown • Wild foods and fish important • Agro-pastoral zone • Both crops and livestock important sources of food security • In Unity small business along the highways • Good accessible roads due to oil companies in Unity • Remittances are important source of income like in Shiluk areas and in Bor	• Seasonal flooding • Limited access to major markets further hampered by tribal tensions, inter-ethnic conflicts and cattle raiding • High socio-cultural values attached to livestock which are rarely sold except as distress sales during food shortages when surplus livestock in markets results in low prices and erosion of productive assets

Sources: CAMP data 2013; Southern Sudan Centre for Census, Statistics and Evaluation.2007. *Southern Sudan Livelihood Profiles*. 2nd Edition May

11.5.2.1 Ruminant production systems

Ruminant livestock in South Sudan i.e., cattle, sheep, goats and camel are predominantly raised under extensive rangeland based pastoral systems where mixes of the different species are herded together. Pastoral systems are estimated to make up over 90% of livestock producers, with urban and peri-urban livestock keepers constituting the remaining

10%[363]. The main determinant of pastoral production systems is rainfall; pastoral and agro-pastoral systems are adapted to environments where rainfall is both low and highly variable, and temperature and evapotranspiration are high. Water stress, in the form of shortages during the distinct dry seasons and drought are the norm. The importance of pastoralism lies in the capacity to utilise livestock to convert resources into food for human consumption and income generation in marginal landscapes, where there are few other viable and sustainable livelihood options.

Pastoral strategies, which include migration to access resources in the dry season, mean that pastoralists compete for scarce resources with crop farmers and wildlife, and conflict is inevitable. Conflict has been rated as the most damaging hazard for livelihoods and basic food security in South Sudan[364]. The magnitude of natural resource based conflict, together with the widely held perception that pastoralists prefer to keep large herds as a status symbol, and not for economic reasons, has resulted in very strong political sentiments against traditional pastoralism. These views were presented very strongly at the Second Governors' Forum which coincided with the Second Annual Agricultural Forum held in Juba in November 2012 and presided over by the Vice President of South Sudan. There were equally strong proponents for the protection of pastoral systems. Resolutions from the Governors Forum included control of the movement of pastoralists by classification of land into farm (crop) and pastoral land and by demarcation of migration routes; and secondly, a call to implement innovative approaches to educate pastoralists on more attractive economic alternatives of livestock production to replace pastoralism[365]. Similar sentiments against traditional pastoral systems were expressed by the political leadership of many of the states visited during the CAMP field data collection, even those states where pastoral production is a key contributor to the state economy.

The national MARF Policy Framework and Strategic Plans (PFSP) recognizes the fact that South Sudan's huge livestock endowment is a legacy of the ingenuity of traditional pastoral systems that persisted through decades of protracted civil war and marginalization with little public sector support. However, beyond that acknowledgement, neither the national MARF Policy Framework and Strategic Plans, nor the State strategic plans, definitively address the development of pastoralists. An analysis of the contribution of pastoralism to food security, livelihoods, employment, trade, agricultural development, and socio-cultural cohesion is lacking, as is analysis of the efficiency and resilience of pastoral systems within the past, prevailing and future development contexts. Key interventions focus on more modern farming systems, with the PFSP seeking to 'modernize' pastoral systems on the basis of making them more sedentary (less migratory) and market oriented rather than taking a more transformative approach that supports pastoral production and lets the system evolve and integrate with the wider national and regional economy.

At the implementation level, especially within counties, communities grapple with how to keep a balance between different but equally necessary livelihoods. The prevailing approach to post-conflict interventions tends to favour settlement of pastoralists and support for communities to get into crop production, rather than developing pastoral migratory routes, restoring trade, developing new markets, and promoting the exchange and market

[363]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.
[364]Southern Sudan Centre for Census, Statistics and Evaluation. 2006. *Southern Sudan Livelihood Profiles. A Guide for Humanitarian and Development Planning*. SSCCSE and Save the Children, UK.
[365]Republic of South Sudan. 2013. *Final Resolutions of the Second Governor's Forum.* Freedom Hall, Juba. 26-29 November 2012.

opportunities that are central to the functional economy between pastoral and other non-pastoral groups[366].

The challenge of defining the most appropriate approach to the development of livestock resources, within a context where most or a significant number of livestock are held under pastoral systems is not unique to South Sudan. It is a subject of regional and continental concern. Inappropriate strategies and investments in pastoralism across the continent, including the Greater Horn of Africa region, have severely eroded pastoral productive and resilience capacities making them highly vulnerable to shocks. This was once again brought into sharp focus during the 2011 drought which put over 14 million people at risk of starvation, mostly pastoralists across the Greater Horn of Africa. Pastoral systems are the basis for livestock sectors across countries in the region which collectively have the largest concentration of livestock on the African continent, with 50% of the cattle, 39% of the goats, 36% of the sheep and 72% of the camels. Over 85% of the livestock in the region are indigenous and are largely in the hands of pastoralists, who hold 100% of the livestock in Somalia, 99% in Tanzania, 73% in Uganda, 70% in Kenya and 24% in Ethiopia.

Pastoralists supply most of the live animals and meat consumed domestically, as well as supplying the neighbouring Middle East and North Africa (MENA) region, in what is the largest global trade in live animals. The informal trade of live animals from Ethiopia into Kenya, Somalia and Djibouti, organized by pastoralists, generates an estimated total value of between US$250 and US$300 million[367]. On the other hand, exports of livestock and livestock products by the Ethiopian formal sector were worth US $121 million. In Ethiopia, exports of livestock and livestock products are second only to coffee, with livestock contributing 45% of the agricultural Gross Domestic Product (GDP). Within East Africa alone the live animal and meat industry, based largely on pastoral production, generates $5 billion annually, equivalent to an estimated 14% of the total GDP of the region[368]. The Horn and East Africa region produces 46% of Africa's milk[369]. In Uganda, one of the few low cost producers of milk globally[370], most of the milk is produced by pastoral herds and small holders with indigenous stock; improved cattle make up only 5% of the national herd. Uganda's dairy industry has expanded tremendously from 365 million litres in 1991 to an estimated 1.53 billion litres in 2013. This was based on interventions that included: improved collection of milk from pastoral areas, enforcement of food hygiene regulations, and increased processing and marketing capabilities. From importing milk in 1991, Uganda is now one of the key exporters of milk to the region, expected to earn USD 12.1 million in 2013, up from USD 3.4 million in 2011.

Despite the contribution of pastoralism to national and regional economies, public and formal private sector investments are not commensurate with the value provided by the pastoral sector, especially in relation to food security, poverty reduction and improved livelihoods. A Policy Framework for Pastoralism in Africa was approved by Heads of African Union Member States in 2011 to provide guidance for the development of more appropriate pastoral and livestock development strategies. Countries within the Greater Horn of Africa region are taking steps to review and re-articulate both pastoral development and the wider development of their livestock sectors. The Inter-Government Authority Development (IGAD), which is constituted of Members States within the Greater Horn of Africa, and of

[366]Southern Sudan Centre for Census, Statistics and Evaluation. 2006. Southern *Sudan Livelihood Profiles. A Guide for Humanitarian and Development Planning.* SSCCSE and Save the Children, UK.
[367]Pavanello, S. 2010. *Working Across Borders. Harnessing the Potential of Cross-border Activities to Improve Livelihood Security in the Horn of Africa Drylands*. Humanitarian Policy Group Brief 41. ODI.
[368]Kilimo Trust.2009. Livestock Product Value Chains in East Africa:Scoping and Preliminary Mapping Study. Final Report, Kampala, Uganda, March 2009.
[369]FAO. 2012. FAOStat data on milk production.
[370]Masinde, A. 2013. Only 20% of Uganda's Milk is processed. Agribusiness. The Daily Monitor Newspaper. Published January 28, 2013. Kampala, Uganda.

which South Sudan is a member, developed its regional Comprehensive Africa Agriculture Development Plan (CAADP) in 2012 with a strong focus on pastoral/ dryland development. In 2012, Kenya developed a National Policy for the Sustainable Development of Northern Kenya and other Arid Lands[371] and an accompanying Development Strategy for Northern Kenya and other Arid Lands, a strategy that is seen as important to achieving the national Vision 2030[372]. Most of Kenya's livestock (70%) is held by pastoralists in the arid and semi-arid lands. It is estimated that the contribution of livestock to agricultural GDP is Kshs. 320 billion, only slightly less than that from crops and horticulture, which attracts far more investment, and policy and regulatory support.[373]

Compared to other countries in the Horn of Africa and beyond, the differences between pastoral and agro-pastoral groups in South Sudan are not pronounced.[374] Both groups have a settled home base and practice transhumant[375] migration especially in the dry season or during drought. Cropping has become increasingly common even in pastoral communities[376], with both pastoral and agro-pastoral communities even planting crops at cattle camps[377]. The difference between the two groups is embedded in the level of dependence on livestock for consumption and income.

Nomadic Pastoral

There are no indigenous nomadic pastoralist communities in South Sudan but seasonally a significant number of nomadic groups from Sudan and beyond enter into the northern parts of the country to access dry season resources. With the exception of Northern Bahr el Ghazal, since South Sudan attained independence and an international border was established with the Sudan, there have been lower levels of migration into the northern states[378]. Nomadic communities that enter into South Sudan include: the Habbania and Rizegat who enter Western Bahr el Ghazal (WBG) and Northern Bahr el Ghazal (NBG); the Misseriya who migrate into Unity, with large groups entering into the contested Abyei area; and large migrations of Arab and Fellata communities into Upper Nile, with small groups entering into neighbouring states[379]. Conflict with host communities is a common feature of the migration of nomadic pastoralists into South Sudan; but, nomadic pastoral groups also bring benefits for communities and states, including livestock and livestock products, some livestock breeds of superior quality, and trade and border revenues. Makal County, Upper Nile State, receives over 50,000 head of cattle and shoats, with a revenue charge of 10SSP per head of cattle and 5SSP per shoat, providing important revenues for the County[380]. Most migrating groups stay for short periods, but there is a trend for longer stays among

[371]Government of the Republic of Kenya. 2012. *National Policy for the Sustainable Development of Northern Kenya and other Arid Lands. Realizing Our Full Potential*. Sessional Paper No. 8 of 2012. Ministry of State for Development of Northern Kenya and other Arid Lands. Office of the Prime Minister.

[372]Government of the the Republic of Kenya. *Vision 2030: Development Strategy for Northern Kenya and Other Arid Lands.* Ministry of State for Development of Northern Kenya and other Arid Lands.

[373]Government of the Republic of Kenya. 2012. *National Policy for the Sustainable Development of Northern Kenya and other Arid Lands. Realizing Our Full Potential*. Sessional Paper No. 8 of 2012. Ministry of State for Development of Northern Kenya and other Arid Lands. Office of the Prime Minister.

[374]Musinga, M., J. M. Gathuma, O. Engorok and T.H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

[375]Transhumance refers to the seasonal migration of livestock to suitable grazing grounds. World Initiative for Sustainable Development (WISP) website on Definitions for WISP, citing the Collins English Dictionary, 1992.

[376]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

[377]FAO/WFP 2013. Special Report: FAO/WFP Crop and Food Security Assessment Mission to South Sudan. 22 February 2013.

[378]Concordis International. 2012. *Crossing the Line: Transhumance in Transition Along the Sudan-South Sudan Border*. A Concordis International Report, drafted with the assistance of the European Union.

[379]Concordis International. 2012. *Crossing the Line: Transhumance in Transition Along the Sudan-South Sudan Border.* A Concordis International Report, drafted with the assistance of the European Union.

[380]CAMP 2013 data. Livestock subsector field visit to Upper Nile State, April 2013.

some groups, which impacts resources and services. It is therefore critical that their needs and those of the South Sudan host communities are factored into the development of CAMP, in particular those of competing livestock keepers.

There is no policy framework to govern cross-border movement of the nomadic pastoralists into South Sudan, although there were high level agreements between the two countries to establish areas for safe movement of people, livestock, goods and services[381]. There are no functional border entry points with veterinary authorities along the northern border with Sudan. There are differences in how states and host communities receive nomadic pastoralists. WBG and Warrap State policies oppose migration, while in NBG there is strong state support and security is guaranteed for cross-border pastoralism[382]. There is equally strong state support in Unity State, with local arrangements agreed between some nomadic groups and host communities, with similar arrangements for most nomadic groups entering into Upper Nile. Political will and leadership plus community leadership and traditional authority are critical in managing the migration of nomadic communities.

Transhumant Pastoral

A commonly used definition of pastoralism in literature is one where livestock are produced under extensive systems in arid and semi-arid environments, where there is some form of mobility, and at least 50% of gross household revenue, including income and consumption is derived from livestock or related activities[383]. A second commonly used definition, that de-emphasizes the economic criteria, defines pastoralist as an entire ethnic group, irrespective of whether all members actually keep livestock or not, making it a cultural identity[384]. In South Sudan there are communities that are traditionally recognized as pastoralist i.e., the Toposa and Nyangatom in Eastern Equatoria and the Murle and Jie in Jonglei. From the perspective of the economic definition, the National Baseline Household Survey (NBHS) 2012 indicated that nationally only 6% households i.e., 78,000 households depend mostly on livestock for their livelihoods[385]. According to the NBHS report, dependence on livestock based livelihoods is particularly important in the rural areas of Upper Nile and in both the rural and urban areas of Eastern Equatoria, Jonglei and Unity. Dependence on livestock is also important to a lesser extent in both the rural and urban areas of Warrap and Lakes States.

A 2010 report by SNV/MARF[386] gives much higher figures with an estimated 37% of all households being pastoral, 40% agro-pastoral, 8% livestock producers based on other system and 15% do not keep any livestock[387]. This data showed that as many as 70% of households in Jonglei State, 65% in Warrap State, 45% in each of Northern Bahr el Ghazal and Lakes State were pastoral. Only Western Equatoria had no pastoral population. There is therefore a large discrepancy between the two data sets generated within the same period, a matter that could be resolved by a livestock census.

---

[381]Concordis International. 2012. *Crossing the Line: Transhumance in Transition Along the Sudan-South Sudan Border*. A Concordis International Report, drafted with the assistance of the European Union

[382]Concordis International. 2012. *Crossing the Line: Transhumance in Transition Along the Sudan-South Sudan Border.* A Concordis International Report, drafted with the assistance of the European Union.

[383] Swift, J. 1998. *Major Issues in Pastoral Development with Special Emphasis on Selected African Countries.* FAO, Rome. On the World Initiative for Sustainable Pastoralism website, Definitions for WISP. http://data.iucn.org/wisp/pastoralism-definitions.html

[384]Baxter, P. 1994. *Pastoralists are People: Why Development for Pastoralists not the Development of Pastoralism?* The Rural Extension Bulletin No. 4. On the World Initiative for Sustainable Pastoralism website, Definitions for WISP. http://data.iucn.org/wisp/pastoralism-definitions.html

[385] National Bureau of Statistics. 2012. *National Baseline Household Survey 2009.*

[386]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

[387]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

There is evidence that pastoral livelihoods especially in Jonglei and Eastern Equatoria have been further eroded and decimated since the signing of the Comprehensive Peace Agreement (CPA) in 2005, due to increased conflict and insecurity. At the signing of the CPA the Sudan's Peoples Liberation Army (SPLA), which had provided security was removed, and not replaced by civil law enforcement[388]. In the same period, there were recurrent prolonged dry seasons and droughts. However, the crises were rooted in an escalation of conflict and cattle raiding related to increased migration and the changing dynamics of conflict, with large though infrequent raids by organized militia on top of repeated small scale incidents by a small number of raiders.[389]

Key characteristics and issues of pastoral production systems

- Based on the economic definition, pastoral communities are concentrated in the Arid/Pastoral, the Western and Eastern Flood Plain, and the Nile and Sobat livelihood zones. Common characteristics of these zones are lowland areas prone to drought and flooding, rainfalls ranging from 200 mm in south-eastern Equatoria to 700-1300 mm in the flood plains, with a distinct dry season in which temperatures reach as high as 35^0C.
- Livestock are the main assets and the fundamental basis for wealth and are a symbol of status and prestige.[390] Among Toposa pastoralists in South Kapoeta, marriage was given as the main objective for keeping livestock, followed by food, and income to solve socio-economic problems[391]. The institution of marriage and dowry payment serves to strengthen kinship ties, which are the main form of social capital and safety nets, which reduce risk through the distribution of livestock and building alliances and support systems that are critical during periods of food shortage[392].
- Production is for subsistence and non-specialized based on indigenous breeds. Herds are structured for breeding and milk production purposes with large cow/heifer to bull ratios.
- Milk and meat are important foods and sources of nutrients, as is blood, which is consumed in greater amounts during prolonged dry seasons and droughts.
- Pastoralist communities hold large herds: among the Toposa, medium sized herds range between 100 to 300 head, richer households have between 400 and 600 heads, while poor households have less than 30 cattle[393]. CAMP data collection in South Kapoeta found among 400 households in Koria village that on average a household had 500-600 head, with rich households having 2000, and those with 10-100 considered poor. Eastern Equatoria is known to have the largest herds in the country; in general across South Sudan, there are only 5% households with more than 200 head of cattle[394]; correlating with the NBHS figure of 6% of households reliant on livestock as their main source of livelihoods.
- Production is natural resource based, with households relying almost entirely on rangelands for grazing and water.
- The pronounced dry season and recurrent drought precipitate the need for seasonal transhumant migration. Core herds are left within the homestead to provide for the family. The rest of the livestock migrate to cattle camps located next to more permanent

[388]Richardson, T. 2011. *Pastoral Violence in Jonglei. ICE Case Study.* Number 274. December 2011.
[389]Richardson, T. 2011. Pastoral Violence in Jonglei. ICE Case Study. Number 274. December 2011.
[390]Southern Sudan Centre for Census, Statistics and Evaluation. 2006. Southern *Sudan Livelihood Profiles. A Guide for Humanitarian and Development Planning.* SSCCSE and Save the Children, UK.
[391]CAMP 2013. Field data collection between April and July 2013.
[392]Southern Sudan Centre for Census, Statistics and Evaluation. 2006. *Southern Sudan Livelihood Profiles. A Guide for Humanitarian and Development Planning.* SSCCSE and Save the Children, UK.
[393]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.
[394]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

water sources. Cattle camps are large; CAMP visited camps with as many as 6-8,000 head in Upper Nile and Jonglei, but larger camps up to 12,000[395] exist. Communities tend to return to the same camp site for a number of years (4-5 years) except when affected by conflict or disease. However, herders reported that there is a trend of a decrease in the number of cattle camps and the size of the camps.[396]

- Pastoral production depends on high labour engagement, employing household members and kin, many of whom are below 18 years, and who are not paid wages.[397] Men and youth are mostly involved in daily herding, migration and management of cattle camps. Women and young children manage livestock left within households.
- Cultivation is practiced within water catchment areas, with a growing practice of even cultivating within cattle camps. However, crop failure is not unusual.
- Trade and exchange are critical to ensuring food security among pastoral communities whose main source of grain is through the market, as their own production, if any, is insufficient for consumption needs[398]. During periods of severe food shortages, there are poor terms of trade between livestock and grain which threatens livelihoods. The trade generates important revenue sources for counties and states; the Greater Kapoeta area, with a significant pastoral population, contributes 80% of Eastern Equatoria's state revenues from live animal trade and other local taxes, and export of hides and skins to Uganda.
- Conflict and insecurity are endemic and major constraints and impediments to livestock production, marketing and trade. The nature of the conflicts has changed from largely natural resource based conflicts and small cattle raids to rebel activity, large scale inter-ethnic clashes and large scale, organized and sophisticated cattle rustling.

Transhumant Agro-pastoral

Most ruminant producers are agro-pastoral, where livestock are an essential part of their livelihoods, and co-existent with cropping activities. From an economic point of view, agro-pastoral households derive more than 50% of their household gross revenue from cropping and 10-50% from livestock[399]. In South Sudan agro-pastoralists are sedentary, and like pastoral groups, are dependent on the natural resource base and are transhumant, migrating for up to six months in search of grazing and water resources. The agro-pastoral systems are dispersed across South Sudan (Figure 11-9). There are ethnic communities that have been traditionally agro-pastoral such as the Dinka, the Nuer and the Mundari, for whom livestock are very important but do not contribute over 50% of their livelihood[400].

Key characteristics and issues of agro-pastoral production systems

- Cultivation of crops form a major part of production, with livestock supplementing crop production, and being particularly important for years when crops fail.
- Key objectives for keeping livestock include food/ household consumption, dowry/kinship relations, solving socio-economic problems including cultural and legal obligations,

[395]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

[396]CAMP 2013. Information from WBG, UN, CES (Juba and Terekeka) showed that both the number of camps and the size have shrunk over the last few years.

[397]Musinga, M., J.M. Gathuma, O. Engorok and T.H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat.* Draft. Report, SNV and MARF.

[398]Southern Sudan Centre for Census, Statistics and Evaluation. 2006. Southern *Sudan Livelihood Profiles. A Guide for Humanitarian and Development Planning.* SSCCSE and Save the Children, UK.

[399]Swift, J. 1988. *Major Issues in Pastoral Development with Special Emphasis on Selected African Countries.* Rome: FAO.

[400]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

pastoral investment by way of restocking and storage of wealth/savings, etc.[401] Milk is important but not the main source of food, rather supplementing grain.

- Herd sizes are small to medium: 10-100 head of cattle plus small ruminants. In Jonglei State 57% of the households fell in this category[402]. CAMP found that in Western Bahr Ghazal the average holding was 15-50 head of cattle per household; 1-10 head was considered poor and more than 200 wealthy. The communities reported that they are in the process of restocking, with numbers of livestock increasing since the CPA, when poor households had no cattle, and those with 5 head were considered moderately wealthy and 50 head well off. It is estimated that for an average household to sustain itself on livestock as a main source of livelihood, it requires at least 50 head of cattle.[403]
- There is a substantial reliance on natural resources but crop residues are also important. CAMP field surveys found that dialogue within a community can determine migration, with evidence that, as in Jur County, Western Bahr el Ghazal (WBG), some migrations were made during the wet season to avoid conflict with the crop farmers and to preserve dry season resources. When livestock returned during the dry season, they grazed on standing stover (leaves and stalks left after crop harvests) and provided manure for the crop fields.
- Similar to pastoral groups, cattle camps are important institutions, and while the camps are transient in nature, there is evidence of cropping at cattle camps[404].
- Market integration and trade are low, with most sales made only in periods of food shortage i.e., distress sales, or to address specific socio-economic issues or obligations. However, livestock plays an important role in food security as it gives households a coping strategy; in particular, households with goats have been found to be relatively more food secure than those without[405]. Market integration is hampered by market inefficiencies including distance to markets, insecurity and poor terms of trade against grain
- Years of insecurity have weakened kinship ties considerably, eroding resilience capacity leading to some households becoming chronically food insecure; this is shown by high levels of chronic food insecurity in states with high livestock populations.
- Natural resource based conflict and insecurity from ethnic clashes and cattle raiding are endemic, but especially concentrated in the two Flood zones and the Nile and Sobat Rivers zone.

Urban and Peri-urban

Small holder ruminant livestock keepers

Both cattle and small ruminants are kept within urban and peri-urban areas. Some urban centres like Malakal have passed ordinances banning urban livestock keeping, which has particularly reduced cattle numbers within town limits. The cattle kept with urban and peri-urban households are usually those for milking i.e., cows and calves. Only a few animals are brought at a time to provide for household milk needs and for milk for sale. They are kept in stalls or a kraal, and taken to graze by a herdsman or left tethered. Nutrition and other husbandry practices are major problems. Calves are allowed to suckle almost exclusively for six months before being put out to graze; this practice is not necessary for the calf's physiological needs and reduces production of milk for household consumption and for sale. However some farmers attached to milk collection centres, who had received training, had better practices; they milked up to 2.5 litres per cow per day compared to 500ml to 1 litre for most cows.

[401]CAMP Data. Collected during CAMP field trips April-July 2013.
[402]State Ministry of Livestock and Fisheries Jonglei State. 2012. Strategic Plan 2012 to 2017.
[403]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF
[404]FAO/WFP. 2013. *FAO/WFP Crop and Food Security Assessment Mission to South Sudan*. 22 February 2013.
[405]FAO/WFP. 2013. *FAO/WFP Crop and Food Security Assessment Mission to South Sudan*. 22 February 2013.

Small ruminants, goats and sheep, are kept within urban and peri-urban households across South Sudan. Most keep 2-20 animals, with the objective of meeting consumption needs for milk and meat, but also for income and meeting socio-economic obligations[406]. Households derive food, milk and meat from goats, Animals are left to free-range/ browse, scavenge or tethered depending on the surroundings. They are also feed on cut or purchased fodder, and on by products from local brews. There is a problem with adequate feed for small ruminants which are generally not given supplementary feeds. Goats are housed in whatever shelter is available including thatched huts (luak). There is no extension support, and households rarely seek veterinary assistance for treatment of small ruminants. Animals sometimes cause damage for which owners are fined.

Emerging peri-urban cattle camps

'Permanent' cattle camps are emerging next to urban centres in locations that are close to permanent water sources. Reasons for their existence are diverse including: communities moving away from insecurity and conflict areas; returnees and IDP's; and cattle camps created to provide holding and grazing services for large markets and cattle auctions. In some towns, new ordinances prohibit keeping livestock in urban centres resulting in congregation of herds in specific locations within the peri-urban precincts.

Key characteristics and issues of emerging peri-urban cattle camps

- They lack cohesion with no traditional institutions such as traditional leadership and kinship relations. They are made up of different communities/ individuals congregating in one area. There is a mix of permanent and transient communities.
- Most of the herders within these cattle camps are either households fleeing insecure areas often having lost livestock, returnees or hired herdsmen. These herders have different livelihood objectives to the actual owners of the livestock. Therefore, households within these camps have more than one livelihood source, with household members seeking wage earning jobs in nearby urban centres.
- There are poor services for both humans and livestock despite being close to urban centres; they have characteristics not unlike peri-urban slums: poor access to clean water; poor access to health services for both humans and livestock; poor and unsafe housing/ lack of housing; and poor sanitation facilities.
- Women and children face many challenges. Women struggle to meet household food needs; most of the livestock have owners who retain the right to milk. In a peri-urban camp in Upper Nile women resorted to buying their own cattle to meet needs for milk for household consumption and for sale to purchase grain. NGOs in the vicinity provided training on basic milk hygiene, supplied hygienic metal cans on a daily basis and purchased milk from the women. However, milk prices are low given the amount each woman can sell (no more than 50% of production) and the comparatively high price of grain, especially in the dry season. Children participate in livestock related activities and many miss school. Children, in the Upper Nile camp, purchased their own goats with money saved from fetching water in urban areas; their objective was to cover costs of school requirements themselves.
- The peri-urban cattle camps boost milk supply to the adjacent urban population. However milk purchase is affected by the cyclic pattern of salaries of civil servants, which has become more pronounced with the austerity measures; overall salaries have been reduced and are often paid late.

11.5.2.2 Poultry

Subsistence/backyard

[406]CAMP. 2013. Common questionnaire data collected between April and July 2013.

Most poultry in South Sudan is raised under subsistence/ backyard systems that produce for household consumption with sales only made in situations where families need to quickly raise money. Mostly chickens that are unselected for meat or eggs are kept[407]. There is a reluctance to raise exotic chickens due to lack of access to chicks and feeds, and the fact that they are more prone to disease. Other species being kept include ducks, turkeys, quail and pigeons: ducks are viewed as even more productive than chickens. The average number of birds kept is 15, with most households (80%) keeping 2-50 birds, and only 20% keeping more than 50[408]. Households in Western Equatoria are known to keep the largest numbers of local poultry.

Poultry are allowed to free range/scavenge for foods and are fed kitchen waste, supplemented by grain. Birds are housed in purposely built houses or within human shelter or stores. Generally households lack fences, exposing the poultry to disease and predation by wild animals. There is no extension support, and poor access to veterinary services constrained by the cost, and a misconception that veterinary services do not cover poultry. Almost all produced is consumed by the household; eggs are harvested only leaving enough to ensure flock increase. Poultry meat is not regularly consumed, with most households preferring to raise them for important occasions, consuming more red meat and fish. Some poultry are raised for even up to 3 years before consumption. However in Western Equatoria most meat is from poultry and small ruminants, with households consuming an average 44kgs of chicken and eggs annually, 97% of which comes from their own production[409].

Commercial poultry production

There are very few commercial poultry production enterprises in South Sudan despite the demand for poultry. The sector is falteringly emerging, with efforts hampered by lack of inputs within the country. In 2008 CES SMARF, working with NGOs, helped establish 42 commercial poultry farms; only 5 are in still in existence, and are struggling. Many of the commercial poultry enterprises are linked to projects or efforts by government and NGOs. Both local and exotic birds are kept. Most enterprises raise broilers, although layers were kept before the CPA. From the CAMP field data, enterprises range from 250 to 2500 birds. Currently there are no functioning hatcheries in South Sudan, although MAFAO farm, a public establishment, has a hatchery with an incubator with installed capacity to produce more than 26,000 chicks per batch. All chicks are imported from Uganda, Khartoum or Kenya as are all other inputs including feeds, nutritional supplements, drugs and feeding equipment. There have been unsuccessful attempts to start producing feed. Land for commercial poultry production is a recurring problem; communities are reluctant to release land to individual enterprises. Housing is made from locally available materials, some of which are not appropriate for poultry production. In many cases NGOs and government subsidize the establishment of infrastructure as well as the purchase of chicks, feeds and vaccination. This has left many communities as beneficiaries, who have no understanding of commercial poultry production.

Farmers hire workers from Uganda and elsewhere to manage their poultry enterprises, because of the lack of knowledge of poultry production within South Sudan and the lack of extension services. In NGO and government projects there is better access to information; in some cases the NGO or government provides the farm workers. Biosafety standards are lacking, especially among private owners. There are high losses within commercial poultry enterprises starting with the mismanagement of the importation process of day old chicks. However, the highest losses, of up to 30-60%, come from disease and poor nutrition

[407]The Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA). 2009. *Livestock Marketing in Southern Sudan. Information for Southern Sudan Food Security and Policy Interventions.* Funded by EC and implemented by GOSS with technical support from FAO.

[408]CAMP 2013 data gathered using a Common Questionnaire developed on the basis of the National Bureau of Statistics National Baseline Household Survey.

[409]National Bureau of Statistics. 2012. *National Baseline Household Survey*. Consumption Data.

management. Farmers attempt to mix feed to reduce costs and end up providing sub-standard nutrition. Almost all enterprises have poor access to clean water resorting to fetching water from rivers and other unsafe sources. Most commercial poultry enterprises fail after the first or second batch of chicks, due to the lack of support services, notably extension, animal health, input services especially for day old chicks, feeds and feeding equipment. High production losses discourage farmers from continuing with the enterprise.

11.5.3 Livestock productivity

Low productivity is the most significant constraint at the production level.[410] Natural herd increase is slow and most livestock keepers do not attain sufficient annual increases to allow them to meet social obligations (social offtake) and for commercial offtake. Key factors affecting productivity are the almost 100% reliance on unimproved indigenous breeds with low genetic potential, nutritional management of the animals, the poor resource base with seasonal changes in availability and quality of water and feed, and disease.

11.5.3.1 Breeds: production traits and potential

Nearly all cattle in South Sudan are indigenous *Bos indicus* species (Table 11-13). The endemic cattle are zebu species which include the Nilotic breed, the Toposa and Murle breed and the South-Eastern Hills Zebu whose main morphological and production features, and areas of distribution are summarised in Table 11-13. The different breeds are generally associated with specific ethnic groups, but by 1954, the Nilotic breed was the most widespread. They are well adapted to the South Sudan environment, with high heat tolerance, partial resistance to ticks, a frame adapted to walking long distances, low nutritional requirements due to small to medium size, low metabolic rate and efficient digestion at low feeding levels.[411] They are also physically adapted to walking long distances, and in the case of the South Eastern Hills Zebu, the small frame is suited to hilly areas. These are critical adaptations to the survival and sustainable production of livestock in South Sudan.

The breeds endemic to South Sudan have remained unimproved and have not been selected for economically related characteristics important for specialised milk or meat production. Reproductive efficiency is low, with females reaching maturity at 36-49 months, and first calving at about 44-56 months.[412] The Nilotic breeds have a medium frame, comparable to the Ankole breeds in Uganda, with a carcass weight of 160 – 200kg. Their meat is preferred over other breeds in the Sudan/Khartoum markets[413]. The Toposa – Murle breed, which is well adapted to survival in harsh arid environments, is rated to have both superior potential for meat and milk. The South Eastern Hills Zebu are small, with a carcass weight of 125 kg. Generally the indigenous cattle breeds have low milk production, with milk let down tied to the presence of the calf. The practice of castrating the best-grown bull calves for 'song bulls' eliminates superior genes from the core breeding stock.[414] Smaller numbers of other breeds exist in the country including Sudanese Zebu breeds i.e., the Kenana and Butana; and the Amborora (Red Fulani) brought into the north of the country by migrating tribes. The Kenana and Butana are the most promising dairy breeds of the African zebu with average yields of 1500 kg[415] per lactation period but it appears there has been very limited crossbreeding with the indigenous Zebu breeds. Ankole cattle, with strong meat

[410] Musinga

[411] Food and Agriculture Organization. Crossbreeding Bos indicus and Bos Taurus for Milk Production in the Tropics. Chapter 4: Types and Breeds of Tropical and Temperate Cattle. FAO Corporate Document Repository.

[412] Mugerwa-Mukasa,

[413] Government of Sudan. 1955.

[414] Government of Sudan. 1955.

[415] Food and Agriculture Organization. Crossbreeding Bos indicus and Bos Taurus for Milk Production in the Tropics. Chapter 4: Types and Breeds of Tropical and Temperate Cattle. FAO Corporate Document Repository.

conformation, are imported into the country from Uganda, but most are destined for slaughter markets. Research is required to better characterise the South Sudan breeds and potential for improved production and productivity under different livelihood zones and management systems.

Table 11-13: Breeds of South Sudan

Type	Key Morphological Characteristics	Production	Distribution
Cattle breeds/ strains			
Nilotic type Five major categories kept by a different Nilotic tribes: long horn by Aliab (Eastern Dinka); Mundari; Western Dinka; Abigar (Anyuaki) and Short horn by the Nuer	Medium sized, 'leggy' appearance. Cows reach 250 kg, 3 yr steers 240 kg, mature bull 400 kg. Height at withers 115 cm. Horns: gigantic in the Aliab and Bor cattle, growing outwards, upwards and forward, horn can be 152 cm in length, tips curving inwards and backwards. Northern (Aweil Dinka and Nuer) horns shorter and finer 30 -40 cm but of similar shape to Aliab and Bor cattle. Cervico-thoracic hump, small in female, medium large in male. Generally light boned and lean limbs. Dewlap fairly full up to 25 cm deep and seldom folded. Umbilical fold present in cows. Fairly level back, and tail setting higher than in most zebu cattle. Whole or broken colours: cream or grey especially Aliab, and dun, brindle, yellow, brown, black in Bor. But also patterns of colour on a white background or patches of color covering the flanks of a light colored animal.	Low milk producers 0.5 – 1.5 liters per day, but under good nutrition and management 896 liters over a 263 day lactation period (average 3.4 liters per day[416]) Beef: capable of producing a large steer, meat which is preferred in Sudan markets in comparison to the northern Sudan zebu	Found in all states except WE and Unity. In CES, Terekeka County; and South western Ethiopia. Kept by the South Sudanese Nilotic tribes: Anyuak, Dinka; Western Dinka (Aweil & Warrap) and Eastern Dinka (Aliab, Bor); Nuer (Eastern Nuer and Western Nuer; Shilluk & Mundari
Toposa-Murle type: (Toposa: Karamojong Zebu and Murle: Sudanese Shorthorn Zebu)	Medium sized, long bodied, height at withers 115 cm. Short – medium horns (not exceeding 46 cm) upward and forward curved, tips growing inwards and forwards. Cervico-thoracic hump tending towards thoracic, muscular, marked pyramidal shape, prominent and large in both male and female. Dewlap moderate developed and slightly folded, umbilical fold present by inconspicuous in cows and not apparent in bulls. Udder is moderately well developed. Medium heavy boned limbs. Color: a wide variety of whole and broken colours: grey, cream, yellow, brown, red, black with combinations of colors and roans.	Low milking ability 05. – 1.5 liters per day but under good feeding and management conditions up to 918 liters in 255 days (3.6 average per day) with calf suckling[417]. Beef: good beef conformation, with considerable value	Eastern Part of EES (Kapoeta East, K. South and K. North and Budi counties), up to the Kenyan and Ugandan borders. Boma (Pibor County) of Jonglei State up to the Ethiopian Border.
South-Eastern Hills Zebu Mongalla; Lugware (Kuku/ Mangbattu)	Similar to the Bukedi Zebu/ Small East African Zebu. Small, stocky, well-fleshed cattle, height at withers 100 – 105 cm. Mongalla is the smallest of the East African zebus. Short to medium horns (20 – 30 cm) in outward and upwards direction in line with or slightly in front of or behind the line of the profile. The hump is rather large in relation to the size of the animal, generally cerico-thoracic, marked slope to the rear, often with overhang to the rear and in bulls to one side. Umbilical fold small in female not apparent in the male. Light boned limbs. Generally light colors, grey, dun, brindle, brown, black with full colours and patterns on a white base. Grey and dun are predominant in the	Generally poor milk yield, 1.6 litres per cow per day, with 532 litres in 300 days with calf suckling. Some types like Bari capable of superior performance Good beef production	The Mongalla is found in CES (Juba, Terkeka, Lainya Counties). North-western and Western part of EES (Torit, Lafon & Budi Counties). Kept by Nilo-hamitic tribes: Bari, Didinga, Latuko, Lopit, Lokoya, Nyangwara, Pari and Pojulu The Lugware is in South eastern WES (Mundri East and West, Mvolo and Maridi, Southern CES (Yei, Morobo, Kajo-Keji, Kaya) up to the border with DRC and Uganda. Kept by the Jur-Mvolo, Kuku, Kakwa, Lugware and Moru tribes,

[416]Average of 47 records of Nilotic cattle at Malakal Government Dairy in 1953-54 obtained under dairy conditions with housing and better feeding than within community conditions. Government of Sudan. 1955.

[417]Mean value of 15 Murle cows at Malakal Government Dairy in 1953-54 under dairy conditions

Type	Key Morphological Characteristics	Production	Distribution
	Mongolla.		and tribes in Uganda and DRC
Other cattle breeds/strains in the country			
Baggara Cattle (Sudanese Zebu)	Medium size; varied coat colour, horn shape and conformation; cattle in Darfur have the largest horns; hump is large in males; dewlap is well developed		Western Sudan , Southern Darfur, Southern Kordofan, Nuba Mountains, Central Chad. Also found in some areas in the Western and North-western parts of the Republic of South Sudan (NBGS, WBGS, Warrap and Abyei). Kept by the nomadic (Baggara) Arab tribes: Rizigat, Beni Halba and the Misirya. Also kept by a few South Sudanese individuals close to the border
Kenana Cattle (Sudanese Zebu)	Medium to large cattle; coat colour is typically blue-grey to white with black shadings on the head, neck hump, hindquarters and legs; horns are black; hump is prominent in males and in most cases cervico-thoracic in position; large dewlap and sheath; udder is well developed	500 – 2000 per lactation; calving interval of 12 – 24 months. Mature bull 400 – 610 kg; mature cow 300 -435kg.	Northern Part of UNS (Renk , Maban Counties). In Sudan, east of the confluence of the Blue and White Niles, south-east to the Ethiopian border, and the western banks of the Blue Nile to southern Khartoum. Kept in small numbers by the Arab Nomads and by some South Sudanese individuals at the border areas of UNS
Ambororo/ Fellata (red Fulani) Cattle	Medium to large cattle; coat color is usually dark red, but may also be lighter red with white patches; hump is mostly in a thoracic position, but may be cervico-thoracic; dewlap is of moderate size; udder is well developed		Northern and North-western parts of South Sudan (UNS, US and Greater Bahr El-Ghazal). Kept by the Nomadic Fellata tribes: Ambororo, Selim, Sobajo and a few South Sudanese in UNS and Greater Bahr el Ghazal.
Sheep			
Southern Sudanese sheep	A small animal, 50 – 60 cm high at the withers, but vary with nutrition. The profile is straight to slightly convex, ears are short, with very short horns in both sexes. The tail is of medium length and does not carry fat. Normally white, with patches of another color, usually black or brown. The outer hairy coat is short and loose. The ram often has a ruff on the underside of the neck form chin to breast. The limbs are light and poorly muscled.		Greater Upper Nile and Bahr El-Ghazal regions (JS, UNS, WBG, US, LS and WS); CES, and other parts of the Greater Equatoria Region. Kept by Nilotic and Nilo-hamitic tribes
Murle-Toposa Sheep	About 50 – 60- cm high at the withers, but has a longer body than the Southern Sudan sheep. It's head is similar to the Southern Sudan sheep, but it has a prominent dewlap. The ram has well-developed horns, which grow downwards and with a single forward cure. Some ewes have small, straight horns. The rump and tail carry a considerable amount of fat which varies with the condition of the animal. The color is basically white with patches of black or brown, which normally include the head and neck giving it a close resemblance to the Somali sheep.	The Murle-Toposa sheep appears to have more value for meat production than the Southern Sudan sheep	Found in Greater Kapoaeta Region of eastern Equatoria State. Kept by the Toposa, Boya, Didinga, Tenet and other tribes of EES.
Nubian (Sudanese Nubian goat)	Tall (70–75 cm height) ,(40–70 kg); markedly convex facial profile; long, broad and pendent ears that may turn upwards at the tips and trail on the ground when the head is down for		Originally a Sudanese breed. Also found in some areas in the far Northern, North-eastern and North-western parts of the

Type	Key Morphological Characteristics	Production	Distribution
	feeding; neck is long; back is straight; croup is well developed with tail set high; long and well-proportioned legs; udder well developed; coat colour is generally black except for ears which are grey or speckled; coat is long haired, generally longer on front legs and hindquarters.		Republic of South Sudan (Border areas) Arabs Nomads Refugee from Sudanese' Blue Nile and Nuba Mountains Some few south Sudanese.
Mountainous goat (Equatoria goat)	Small and compact animals, about 40 – 50- at shoulder height. Small head with straight profile, and in the male a convex forehead. The horns, straight or backward curved and generally in line with the profile, are short in the female and of medium length in the male. The body is short, broad and deep with well-sprung ribs. The legs are strong-boned and well-muscled. Colors vary, with basic white common, with varying amounts of black, brown, or black and tan in large patterns or spotting. The coat is short and gleaming. The male is bearded and maned .	Hardy animals able to thrive in a number of environments, even those intolerable to cattle or sheep. Milk yields are small. Twinning (pairs of kids) is common.	Greater Equatoria region But mostly in Hills and Mountainous Livelihood zones of EES and CES Various Nilo-hamatic and Sudanic tribes of Greater Equatoria Other Sudanic tribes in Bahr El-Ghazal
Nilotic goat	Although displaying considerable local and individual variability in size and colour, the various populations included in this group, as widely separated geographically as they are, are of a fairly similar general type. They have small and slender body; head is small with straight or slightly concave profile; pendulous, semi-pendulous or horizontally carried ears of medium size; and homonymously twisted horns in both sexes; the back is of moderate length and the rump is very short and drooping to the tail root; the tail is carried high; coat colour varies with locality		Jonglei, Upper Nile Unity, WBG, NBG, Lakes, Warrap Nuba Mountain and Ingessana Kept by South Sudanese Nilotic ethnic group; Dinka, Shilluk Nuer, Anyuak.
Southern Sudan Dwarf goat	It is generally characterized by a black-and-white colour pattern, less frequently by a brown or black coat; a short head with prominent forehead; occasionally polled or furnished with short scimitar-like or twisted horns; short erect ears; absence of a beard: occasional presence of throat lappets: a large chest, and a plump; very compact and well covered body standing on short straight or crooked legs.	The milking qualities are negligible	Greater Equatoria region Some parts of Iron stone plateau in Bahr El-Ghazal Various Nilo-hamatic and Sudanic tribes of Greater Equatoria Other Sudanic tribes in Bahr El-Ghazal
Toposa camel			Found only in Kapoeta Region (especially K. East). Kept mainly by one tribe; the Toposa. Also kept by the neighboring Turkana in Kenya.
Pigs: Maban pig Other local non-descript pigs			Maban, Melut and Renk UNS, Khorfulus, JS. Kept traditionally mainly by the Maban people. Also kept in small numbers by other communities in Upper Nile and Jonglei States. Found throughout the country
Chicken: Beladi and the Bare Neck, exottic			Found throughout the country

Sources: CAMP field survey March to September 2013. Sudan Government. 1955. Natural Resources and Development Potential in the Southern Provinces of the Sudan. A Preliminary Report by the Southern Development Investigation Team 1954. London. International Livestock Research Institute. Background on African Cattle.

http://www.ilri.org/InfoServ/Webpub/fulldocs/Zebucattle/2Background.html. Udo, M. G. (2006). Livestock Field Survey in Central Equatoria State Report (Ph D Project). Udo. M. G. (2004): Prospect for Rehabilitation and Development of Post War Southern Sudan, University of Bahr el Ghazal. 1st edition. Udo. M. G. (2006): Sustainable Livestock/Range Management System – A way forward to Progressive Development of South Sudan.

The main breeds of goats include Nilotic, Southern Sudanese, Sudanese Nubian, Toposa and Yei. Local breeds of sheep include Mongola, Murle, Nilotic, Nuba Maned, Nuba Mountain Dwarf, Southern Sudanese, and Uda (Table 11-13). The sheep and goat breeds in Southern Sudan are all indigenous and unimproved, and generally of poor productivity both in terms of milk yield as well as low carcass weights for meat. A rigorous program for understanding the indigenous breeds and for improvement through management, selection and crossbreeding is needed.

11.5.3.2 Feeding and nutrition

Much of the desired improvement in both milk and meat production can he achieved through management of nutrition. Animals are generally released from kraals/ cattle camps late and returned early, with a significant part of the time spent trekking.[418] Seasonal feed shortages and lack of supplemental minerals also have negative impacts. Under experimental conditions, better milk production were realised under improved nutrition i.e., 3.6 litres and 3.4 litres for Toposa-Murle and Nilotic breeds. [419] Poor nutrition affects vulnerability to disease, attainment of maturity, and calving and growth of the calves.

11.5.3.3 Herd increase

Herd Structure: South Sudanese cattle and small ruminant herds are structured to favor reproduction and milk production with many more female than male animals: on average, minus calves, there are 56.3% female animals in the herd (Table 11-14). The average herd structure across African pastoral systems is between 51 and 63% females, not counting female calves. [420] On average the cattle herds have 23% male animals (not counting male calves). However, the number of breeding bulls alone is 10.5%, which is higher than that in other pastoral systems i.e., 4.2%.[421] But this differs from state to state: in Kapoeta South, EE, there are no castrates, and only 6% of the herdare breeding bulls. The herd structure has a very strong leaning towards maintaining a breeding herd and to herd growth rather than for example production for meat. This is important since the fertility rate among indigenous cattle is low and some of the endemic diseases tend to further reduce fertility or cause sterility. However the tendency is also to keep cows more than 10 years when their productivity has reduced markedly, for example 18% of the female animals in Jonglei herds are over 10 years[422]. The structure of small ruminant herds is between 67 and 75% female.

Table 11-14: Cattle herd structure

	Male (bulls and steers)	Female (cows and heifers)	Calves
Greater Kapoeta, EE	10	80	10
Warrap	30	50	20
Jonglei	30	53	17
Average	23	61	16
Africa pastoral average	19	56.3	22.9

Sources: CAMP field data collection April to September 2013. Republic of South Sudan. 2012. Strategic Plan 2012 to 2017. Ministry of Livestock and Fisheries Jonglei State, Bor. Otte, M. J. and P. Chilonda. 2002. Cattle and Small Ruminant Production Systems in Sub-Saharan Africa. A Systematic Review. Livestock Information

[418] An observation by both Musinga et al. 2010 and Government of Sudan. 1955. Refrences:

[419] Government of Sudan. 1955.

[420] Otte, M. J., and P. Chilonda. 2002. Cattle and Small Ruminant Production Systems in Sub-Saharan Africa. A Systematic Review. Livestock Information Sector Analysis and Policy Branch, FAO. Rome.

[421] Otte, M. J., and P. Chilonda. 2002. Catthe and Small Ruminant Production Systems in Sub-Saharan Africa. A Systematic Review. Livestock Information Sector Analysis and Policy Branch, FAO Rome.

[422] Republic of South Sudan. 2012. Strategic Plan 2012 to 2017. Ministry of Livestock and Fisheries, Jonglei State, Bor.

Sector Analysis and Policy Branch, FAO. Rome. Calves are < 2 years, heifers 2-3 years, cows and bulls >3 years.

11.5.4 Contribution to livelihoods

11.5.4.1 Source of livelihood

Ruminants: Over 72% of household's keep at least one type of livestock, but only 6% of households nationally cite livestock as their main source of livelihood. In UNS, almost 14% of the population, mostly in the rural areas (18% of the rural population) depend on livestock as their main livelihood. There are also appreciable populations in other states: 12.3% in EE, 9.5% in JS and 9.4% in US (Figure 11-10). For these households production, sale and trade of livestock and livestock products play an important role in household food security and incomes. For most South Sudanese households, livestock are essential but supplemental to crop cultivation, salaries, wages, fishing, remittances, petty trade and other livelihoods activities.

The capacity to make livestock the main source of livelihood is dependent on the maintenance of a herd size that can ensure meeting key household livelihood objectives of: sufficient supply of food of animal origin especially milk, but also blood and meat; and, income to meet basic needs such as purchase of grain, paying of medical bills and school fees. Among pastoral communities, meeting social obligations related to kinship ties, marriage, safety nets and rituals are important considerations. The household must also factor in the risks to livestock keeping such as the loss of animals or livestock productivity to disease and rustling and to drought and flooding. On average a South Sudanese household must own and maintain at least 50 head of cattle to be enable it depend on livestock as the main livelihood capable of meeting at least 50% of its needs.[423] Only 25% of households that keep cattle own 50 or more heads of cattle (Table 11-14).[424] The number need to sustain a livestock based livelihood would vary according to the environment, management practices and herd dynamics: households in more arid zones that have a higher dependence on livestock products for food and on sale of animals to buy grain, would require many more cattle. In parts of Greater Kapoeta South in EE, for example, a household with 10 – 100 heads of cattle is considered poor, with the average household owning 500-600 head of cattle.[425] The average number of cattle for EE is 174 head of cattle. [426] Households with less than 50 head of cattle tend to focus on herd building through purchase, loans of animals from other households to expand the breeding base or through illegal practices such as cattle rustling[427].

[423]Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. The Livestock Sector in Southern Sudan; Results of a Value Chain Study o fthe Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat. Draft Report, SNV and MARF.

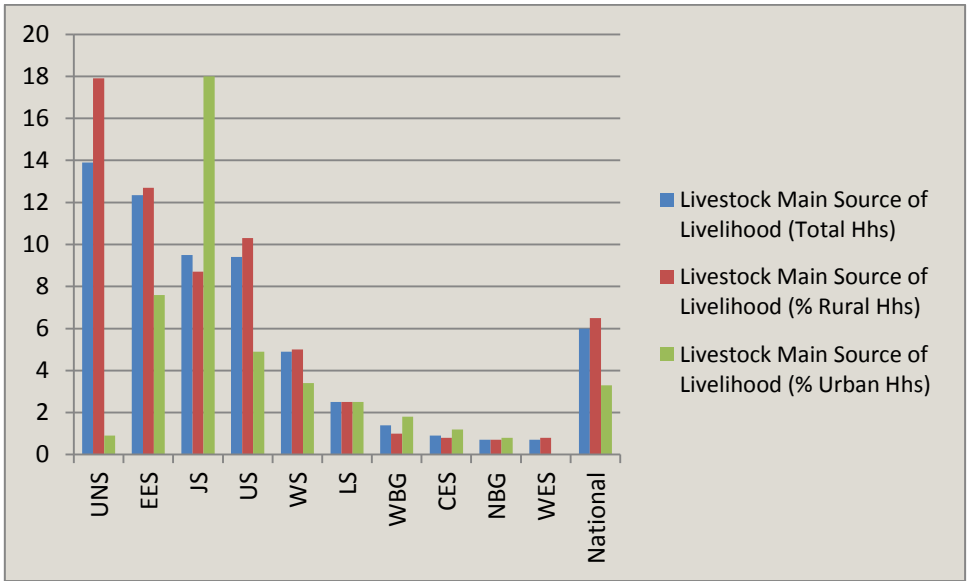
[424]South Sudan Centre for Census, Statistics and Evaluation. 2010. Population and Housing Census 2008.

[425]CAMP field data collected between March and September 2013

[426]South Sudan Census and ***. Population and Housing Census. September 2010.

[427]Republic of South Sudan. 2012. Strategic Plan 2012 to 2017. Ministry of Livestock and Fisheries, Jonglei State, Bor.

Figure 11-10: Importance of livestock as a main source of livelihood



Source: National Bureau of Statistics. 2012. *National Baseline Household Survey 2009. Report for South Sudan 2012*. Juba.

Table 11-15: Number of cattle owned per household

Number of Cattle Owned	Percent of Households
1-9	27
10 – 19	18
20 – 29	13
30 - 49	17
50 - 69	7
70 - 99	7
100 - 149	3
150 - 199	1
200 - 499	4
500+	3

Source: South Sudan Centre for Census, Statistics and Evaluation. 2010. Population and Housing Census 2008.

Beekeeping: Beekeeping is an important supplemental source of livelihood for 18% of South Sudanese households. It is practiced by mostly crop cultivators who keep bees or collect wild honey as an off-farm, off season activity. However, in some counties beekeeping is the most important enterprise such as in Mvolo, Bogori and Mundri West in WE, and in Raga WBG, where the county emblem is a honey bee, symbolising the importance of beekeeping to the economy of the county.[428] Honey contributes to food security, consumed locally, and is sold for income to meet food needs. The income potential of honey is not realized as over 56% is consumed locally. Beekeeping is an important livelihood option for vulnerable communities: women's groups, including those from female headed households are benefitting from income from sale of honey, as are returnees, for whom beekeeping is

[428]Sudan Institutional Capacity Programme: Food Security Information for Action. 2012. *A Study on Traditional Beekeeping and its Contribution to Food Security and Poverty Alleviation.* Information for South Sudan Food Security and Policy Intervention. Republic of South Sudan, EU and FAO.

one of the three most important livelihood options, such as in WBG. For some tribes such as the Jurbel in Wulu County Lakes State and the Bongo in Warrap, honey plays important socio-cultural roles related to marriage and kinship ties[429].

Poultry: Under the predominantly subsistence systems, the potential contribution of poultry to livelihoods, especially employment and as a source of income, is not realised, as most poultry are consumed within the household. Sale of indigenous chicken which attract as much as 85 SSP each could provide important income streams for many households especially those with low assets and vulnerable communities.

11.5.4.2 Food and nutrition security

Food insecurity is prevalent among the states with high livestock populations. Livestock are important as a source of food for many South Sudanese with protein of animal origin (livestock and fish) constituting close to 35% of total protein consumed[430]. Other than Western Bahr el Ghazal State, protein of animal origin is particularly important for the diets of those states where there is both high ownership of livestock and a significant dependence on livestock as a source of livelihood. Protein of animal origin makes up 53%, 44% and 39% of the total protein consumed in the diets in Upper Nile, Eastern Equatoria and Jonglei. Milk is a critical and preferred food for many pastoral and agro-pastoral livestock keepers. Blood is an important food especially during the dry season or when there is a poor harvest or insufficient milk – increased consumption of blood is therefore an indicator of food insecurity[431]. Milk from sheep and goats is drunk during the dry season when cattle migrate, Meat is not a staple component of many pastoral and agro-pastoral; households preferring to sell or exchange cattle for grain. Pastoral and agro-pastoral households are vulnerable to food shortages related to prolonged dry seasons, droughts, floods and conflict; and dependence on purchase of a large part of their grain needs from markets or through bartering to meet food shortages.

According to the WFP 2012/2013 Annual Needs and Livelihood Analysis Report dependence on high risk sources of income such as selling livestock, livestock products and fodder pre-disposes households to under nutrition. Most livestock sales are either of culled animals for income for food and other obligations or distress sales made when the livestock are in poor condition; this increases the risk of the loss of the animal en route to market; not making a sale; and obtaining a poor price in a saturated market. There are generally poor terms of trade between grain and livestock during periods of food shortage.

11.5.4.3 Employment

Livestock subsector activities provide employment for a significant population, most of whom are under 18 years[432]. Currently most livestock production activities are subsistence related and not monetized and those employed in the subsector do not receive wages. Women and girls in particular do not benefit as their ownership of livestock, and authority to sell animals and livestock products and to decide on the use of income is limited. On the other hand there are great potentials: the knowledge base, the opportunity for diversified production systems and for commercialization. There is a wealth of knowledge and capacity for livestock production within the South Sudan population passed down from generations of keeping livestock that is an important resource for the subsector. There are numerous opportunities to use a greater diversity of livestock species and employ a wider array of

[429]Sudan Institutional Capacity Programme: Food Security Information for Action. 2012. *A Study on Traditional Beekeeping and its Contribution to Food Security and Poverty Alleviation.* Information for South Sudan Food Security and Policy Intervention. Republic of South Sudan, EU and FAO.

[430]NBS

[431] WFP. February, 2012. Annual Needs and Livelihoods Analysis South Sudan 2012/2013. Juba.

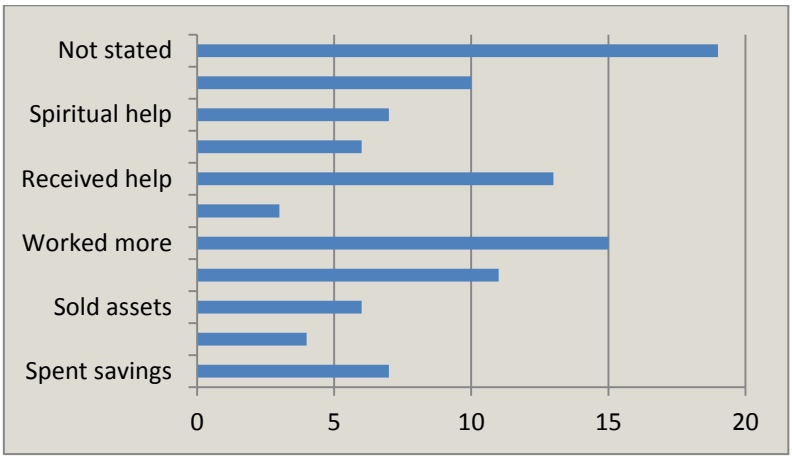
[432] Musinga, M., J. M. Gathuma,

production systems, which use a more diversified resource and input base, and that can harness areas of comparative advantage. There is huge potential for commercialisation of livestock production and for development of the livestock value chain. This would create thousands of additional jobs, both core livestock related jobs and services, as well as industries based on the subsector.

11.5.4.4 Mobilisation of resources for socio-economic needs and to cope with shock

In South Sudan, assets are commonly saved in the form of livestock which represent very significant assets for some families [433]. Indeed across farming households in South Sudan, livestock are the most important household asset for addressing socio-economic needs and for coping with shock (Figure 11-11 and Figure 11-12). The top two strategies for coping were: working more which included working more / longer hours, putting other household members to work who previously were not working, starting a new business, removing children from school to work, and migrating elsewhere to work; and turning to seeking help from elsewhere, from religious institutions, local NGO, international NGO's, government, or family/friends. While sale of livestock was overall the third most important coping strategy, its importance lies in the fact that it allowed households to rely on mobilising their own asset base. Livestock were particularly important in situations of drought and floods, where it was the most common response by 22% of households. Livestock were also key resources when there was loss of crops due to diseases or pests, and when there was a severe health problem or death in the family.

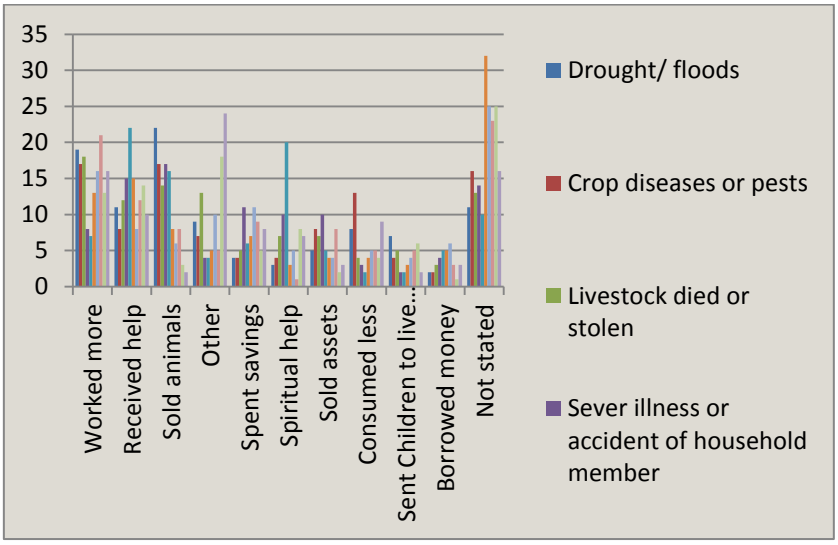
Figure 11-11: Main coping strategies employed by households affected by shock between 2004 and 2009



Source: National Bureau of Statistics. 2012. *National Baseline Household Survey 2009. Report for South Sudan 2012*. Juba.

[433] Muchomba, E and B. Sharp. 2007. Southern Sudan Livelihood Profiles. 2nd Edition, May 2007. Southern Sudan Centre for Census, Statistics and Evaluation and Save the Children, UK.

Figure 11-12: How households coped with different shocks experienced between 2004 and 2009



Source: CAMP 2013 presentation of data from the National Bureau of Statistics, National Baseline Household Data 2009

11.6 Endemic Animal Diseases and Pests

11.6.1 Priority diseases

The World Organization for Animal Health (OIE) has divided animal diseases into two broad categories: production and OIE listed diseases[434] [435] on the basis of who has responsibility for their prevention and control, public or private sector. Thus, the prevention and control of animal diseases with a view to the economic development of livestock production industries (production diseases) do not fall within the sovereign duties of the state, and are the responsibility of the private veterinary sector (provided it has the capacity). However, the prevention and control of OIE listed diseases (zoonoses or diseases with a strong economic impact, subject to veterinary inspection) are considered of national and/or global public importance and are therefore the responsibility of the state and its veterinary administration. FAO refers to the OIE listed diseases as transboundary animal diseases (TADs)[436] and categorises them into three types for the purposes of prevention and control, namely: strategic, tactical and emerging or evolving. Countries and regional and global organizations set their disease priorities based on these two precepts. Important endemic livestock diseases in all 10 states are presented in Table 11-16. Animal diseases can be prioritised according to their impact. In interviews in the situation analysis, the CAMP team prioritised diseases.[437] These results and those obtained in other studies are presented for each species in Table 11-17 to Table 11-20.

Table 11-16: Important endemic livestock diseases in South Sudan

[434] Means the list of transmissible diseases agreed by the World Assembly of OIE Delegates and set out in Chapter 1.2 of the Terrestrial Animal Health Code.

[435] World Organisation for Animal Health (OIE). 2012. *Terrestrial Animal Health Code*. OIE

[436] Those diseases that are of significant economic, trade and/or food security importance for a considerable number of countries; which can easily spread to other countries and reach epidemic proportions; and where control/management, including exclusion, requires co-operation between several countries.

[437] CAMP Task Team. 2013. Data was collected through focus group discussions with livestock keepers (including CAHWs) at 17 villages and cattle camps and with state and county veterinary service officials in all the 10 states and 15 counties between April and July 2013. Participants were requested to discuss and agree among themselves on 5 important diseases of each species (it was not necessary to list the diseases in order of priority). Next, they were probed to establish why the diseases are important as a basis for conducting disease impact assessment.

Disease/ Affected species	OIE Category and Brief Description	Economic Impact
Anthrax Cattle, sheep, goats, equine and wildlife	OIE listed. An acute infectious disease caused by the spore-forming bacterium *B. anthracis*	High mortality. Re-occurrence of outbreaks after heavy rainfall, flooding and drought, especially with close grazing of animals on fresh shoots of grass in contaminated areas after rainfall
Black quarter (BQ)	An acute, infectious disease caused by *Clostridium chauvoei* - a Gram-positive, anaerobic organism.	High mortality affecting herd growth Cost of prophylactic vaccine, and annual revaccination.
Brucellosis Cattle	OIE listed. A highly contagious zoonosis caused by *Brucella abortus*	Reduction in herd growth due to abortions in unvaccinated cattle, still births and birth of weak calves. Reduced milk production, weight loss in animals, loss of young, infertility and lameness. Costs of surveillance and vaccination, disruption of market access, loss of consumer confidence
Contagious Bovine Pleuro-Pneumonia (CBPP). Cattle	OIE listed.	Affects herd growth due to mortalities. Reduction in milk production. Loss of weight gain in diseased animals. Can impact international trade.
East Coast Fever (ECF) Cattle, sheep and goats	OIE listed. Infection by a protozoan parasite *Theileria parva* spread by ticks	Morbidity and mortality with high calf mortality 40-80% in unvaccinated calves therefore reduction in herd growth, calf growth severely impaired. Loss of income from sale of cattle and cattle products. High cost of measures to control ticks and disease (between $6-$36 per adult in East Africa). Endemic cattle tend to be carriers.
Foot and Mouth Disease (FMD) Cattle, sheep, goats and pigs	OIE listed. Highly infectious disease that can spread rapidly	High morbidity but with low mortality, i.e., deaths rare in adults, but can be heavy among calves; Abortion and infertility/ delayed conception, therefore need to cull mature cows or increase number of cows changing the herd structure. Greatest impacts are severe loss of milk production and chronic mastitis. Reduced meat production
Lumpy Skin Disease (LSD) Cattle and wildlife.	OIE listed. Caused by a virus of the family *Poxviridae*, spread by biting insects	High morbidity but low mortality. Loss in milk and meat production. Cost of vaccination and treatment
Haemorrhagic Septicaemia (HS) Cattle	OIE listed. Acute infectious bacterial disease that is highly fatal, with death within 10 -72 hours	High morbidity and mortality. The level of morbidity is a function of immunity, environment and herd management with close herding and wet conditions predisposing animals. Costs of control and eradication
Malignant Catarrhal Fever Cattle	Viral disease, for which sheep and wildebeest are reservoir hosts	Generally fatal, peracute (rapid onset) disease with few clinical signs, rapid progression and death. No treatment.
Trypanosomiasis (sleeping sickness in humans) Cattle, sheep and goats, wildlife, humans	OIE listed. Transmitted by tsetse flies Protozoan parasites that infect domestic, wild animals and man.	Debilitating disease that impedes cattle and small ruminant rearing especially in the most agriculturally productive areas due to inability to graze areas that are tsetse infested, altering livestock distribution. Conflict with forest conservation policy and tsetse control. Reliance on trypanotolerant species which are genetically limited. Abortion, mortality, loss of production of milk and draught power. Disruption of market access or lower prices for infected livestock. Costs of prophylactic drugs, and treatment, some parasite resistance and side effects of treatment.

Disease/ Affected species	OIE Category and Brief Description	Economic Impact
		Environmental consequences of control of vector.
Liverfluke disease (fascioliasis) Cattle, goats and sheep	Parasitic disease caused by *Fasciola spp.*	Mortality, and decrease in milk, meat and wool production and reduction in growth rate, fertility and draught power. Condemnation of infected liver at slaughter. If treated, animals recover quickly and resume healthy production. Public health significance, causing human fascioliasis
Peste des petits ruminants (PPR) (goat plague) Sheep and goats	OIE listed. Highly contagious viral disease related to rinderpest, caused by a morbillivirus	Loss of production, death and abortion; morbidity and mortality rates can reach 100% but lower in endemic areas. Limits trade, export, introduction of new breeds and development of intensive production. Cost of quarantine, movement control, no treatment, but a vaccine exists
Contagious caprine pleuropneumonia (CCPP). Goats	OIE listed. Highly contagious disease caused by members of the *mycoplasma* genus.	Cause of major economic loss to goat producers with very high morbidity and mortality rates especially under conditions of overcrowding and confinement, and under malnutrition and long transport. Cost of treatment.
Mange (scabies) Cattle, sheep and goats.	Contagious disease due to mites.	Scratching for relief causes damage to hides and skins, and wool and exposure of lesions to infection
Internal Parasites Goats and sheep	Gastrointestinal worms	Morbidity and mortality. Reduced performance and loss in productivity/ reduced growth rates. Animals badly affected can be hindered in reproductive performance. Affects land use practices as larvae live in the lower blades of overgrazed areas, therefore requires rotation. Costs due to resistance to common anthelmintics and cost of integrated approaches.
Sheep and Goat Pox (SGP) Sheep and goats.	OIE listed. Contagious, skin disease of small ruminants caused by viruses of the family *poxviridae*	High morbidity, but low mortality in endemic areas (5-10%); decreased milk production, damage to the hides and wool, and loss in meat production. Can limit trade, and prevent development of intensive production. Cost of quarantine, or isolation, and movement controls.
Foot Rot Sheep and goats	Foot rot is a contagious painful bacterial disease caused by *Dichelobacter sp nodosus* in association with other bacteria.	Can be a severe, debilitating disease resulting in poor growth rates, poor wool growth and quality, ewe fertility and reduced value of sale sheep. There are significant costs associated with the control of the disease including isolation of infected animals
Orf Sheep and goats.	A cutaneous zoonotic condition, caused by a *parapox* virus	Prevents lambs suckling therefore affecting growth of lambs. Infection on the udder of the ewe can lead to mastitis and affect milk production. Affects growth rates as severe cases affect many body parts and can cause lameness.
Newcastle Disease (NCD) Domestic and wild species	OIE listed, transmissible to humans. Contagious disease	Can appear in acute form, with high mortality and morbidity. Costs of improved management of faecal matter/ litter, and feeding and watering equipment; Cost of isolation and vaccination.
Coccidiiosis Poultry	A parasitic disease of the intestinal tract caused by seven different types of coccidian protozoa.	A common and costly disease. Chicks, older than three weeks, may suffer severe symptoms and die, most infected birds are asymptomatic. The outbreak may run its course, and clear of its own accord, or be severe with quite high mortalities. Birds may die suddenly before symptoms are obvious. Cost of treatment or medication.

Disease/ Affected species	OIE Category and Brief Description	Economic Impact
Fowl pox Poultry, especially chicken and turkeys	Slow spreading, viral disease with cutaneous lesions and lesions of mucous coats of the upper alimentary and respiratory tract.	Poor growth, poor feed conversion and reduced egg production. Mortality if the mouth and air passages are affected. No treatment. Poor handling of vaccination can cause infection. Cost of vaccination and mosquito control
Gumboro Poultry	Highly contagious viral infection	High mortality at age 3-6 weeks. Costs of improving biosecurity and management. Costs of research to establish a vaccination programme that is effective for the country taking into account the different production and management systems. Costs of vaccination.
Fowl typhoid Chicken, turkeys and other poultry	OIE listed. Transmitted from infected birds, their faeces and eggs, and ingestion of contaminated food, water or bedding	High mortality rate, especially in young chicks where there is an acute infection with sudden death. High risk from imported live infected chicken, and hatching eggs. High risk for hatchery enterprises. Loss from market disruption for poultry meat and eggs. Cost of isolation and destruction of contaminated flocks and carcasses
Ecto-parasites Sheep and goats	External parasites of sheep and goats like lice, ticks, mites and flies	Reduced weight gains and milk production, damage of hides, skins and wool resulting in rejection or downgrading, reducing commercial value of animal
Salmonellosis Poultry	From salmonella bacteria	Morbidity is 0-90% and mortality is usually low. Affects production. Costs of improving nutrition, improving management of breeding flocks and hatcheries, and treatment costs.

11.6.1.1 Priority diseases of cattle

As expected, the CAMP team found that the highly transmissible diseases or TADs are widespread and are therefore priorities in all or nearly all the 10 states with seven out of the nine top diseases OIE listed (Table 11-17). Contagious Bovine Pleura-Pneumonia and Hemorrhagic Septicaemia are important in all the 10 states, while the very highly infectious Foot and Mouth Disease, but with low mortality, is important in all except Warrap State. For cattle, the CAMP findings are comparable with the 2007 study but less so with the 2010 study The criteria used in 2010 gave more weight to zoonoses; perhaps the reason why CBPP is ranked 6th and HS not ranked among the top six, yet both are important diseases of production and land use, and trade as well in the case of CBPP.

Table 11-17: Cattle disease prioritization by different methods

CAMP 2013		**Baumann 2010**		**Kimani et al. 2007**	
Disease	***No. of States*** [a]	***Disease***	***Rank*** [C]	***Disease***	***Rank*** [b]
CBPP [d]	10	Tryps	1	CBPP	1
HS [d]	10	ECF	2	ECF	2
FMD [d]	9	Fasciolosis	3	HS	3
BQ	7	BQ	4	BQ	4
Tryps [d]	7	LSD	5	Diarrhoea	5
Brucellosis [d]	6	CBPP	6	Tryps	6
Liver fluke	5			FMD	7
ECF [d]	5				
Anthrax [d]	5				

Elaborated by CAMP Livestock subsector team. CAMP Situation Analysis. 2013.
Sources: Kimani, M Tabitha and W. S. Njue. 2007. *Socio-economic impact assessment of priority livestock diseases in Southern Sudan.*

Baumann, P O Maximilian 2010. *A study to identify and assess the relative importance of priority animal diseases in Southern Sudan.*

Notes: [a] Number of states where disease was listed among 5 important diseases, in decreasing order of priority. [b] Pair-wise or simple ranking based on whether disease is of socio-economic importance, in decreasing order of priority. [c] By livestock disease prioritisation methodology of EU, in decreasing order of priority. [d] OIE listed diseases

11.6.1.2 Priority diseases of goats

The CAMP team found that Peste des petits ruminants and Contagious Caprine Pleuro-Pnemonia are important in all states except Western Equatoria (WE) and Warrap State respectively. Also that production diseases predominate (4 out of 7). Results from the 2007 and 2010 studies are comparable, despite differences in sample sizes and methods.

Table 11-18: Goat disease prioritization by different methods

CAMP 2013		**Baumann 2010**		**Kimani et al. 2007**	
Disease	***No. of States***	***Disease***	***Rank***	***Disease***	***Rank***
PPR [d]	9	Mange	1	CCPP	1
CCPP [d]	9	PPR	2	PPR	2
Mange	9	Helminthiasis	3	Diarrhoea	3
External parasites	6	CCPP	4	Mange	4
Internal parasites	4	Pox	5	Liver fluke	5
Goat pox[d]	3	Lice	6	Foot rot	6
Foot rot	3				

Elaborated by CAMP Livestock subsector team. CAMP Situation Analysis. 2013.
Sources: see Table 11-17.
Notes: see Table 11-17.

11.6.1.3 Priority diseases of sheep

The CAMP team found that production diseases predominate (5 out of 7), but Pestes Petit des Ruminants, a highly infectious disease, tops the list even though it is not important in WE. Results from the 2007 and 2010 studies are comparable, despite differences in sample sizes and methods.

Table 11-19: Sheep disease prioritization by different methods

CAMP 2013		**Baumann 2010**		**Kimani et al. 2007**	
Disease	***No. of States***	***Disease***	***Rank***	***Disease***	***Rank***
PPR [d]	9	Mange	1	PPR	1
Mange	9	PPR	2	Pneumonia	2
Helminthiasis	8	Helminthiasis	3	Diarrhoea	3
Foot rot	5	CCPP	4	Mange	4
Other external parasites	4	Pox	5	Helminthiasis	5
Sheep pox [d]	3	Lice	6	Sheep pox	6
Orf	3			Liver fluke	7

Elaborated by CAMP Livestock subsector team. CAMP Situation Analysis. 2013.
Sources; see Table 11-17
Notes: see Table 11-17

11.6.1.4 Priority diseases of poultry

The CAMP team found that Newcastle Disease is a priority in all the states, but production diseases predominate (4 out of 6). The CAMP findings are comparable with the results obtained in 2010 and 2007 despite differences in sample sizes and methods.

Table 11-20: Poultry disease prioritisation by different methods

CAMP 2013		Baumann 2010		Kimani et al. 2007	
Disease	***No. of States***	***Disease***	***Rank***	***Disease***	***Rank***
NCD [d]	10	NCD	1	NCD	1
External parasites	9	Fowl typhoid [d]	2	Coccidiosis	2
Coccidiosis	7	Fowl pox	3	Ecto-parasites	3
Fowl pox	6	Coccidiosis	4	Internal parasites	4
Gumboro [d]	6	Gumboro	5		5
Salmonellosis	4				6

Elaborated by CAMP Livestock subsector team. CAMP Situation Analysis. 2013.
Sources: see Table 11-17.
Notes: see Table 11-17.

11.6.1.5 Priority diseases of other species

Among draught animals (horse and donkey), injury wounds top the list and are important in 4 states: Eastern Equatoria (EE), Jonglei, Upper Nile and Western Bahr el Ghazal (WBG) States. Rabies, a zoonotic disease primarily of the canine species, is prominent in all states except Lakes State.

11.6.1.6 Main animal pests

Ticks and tsetse flies, the vectors of East Coast Fever and trypanosomosis are the main animal pests in South Sudan. The following ticks have been identified: *Rhipicephalus appendiculatus* the vector for *Theilaria parva*, *Rhipicephalus evertsi* the carrier for *Anaplasma marginale* and *Babesia bigemina*, *Ambyloma variegutum* the vector for *Anaplasma marginale*, *Boophilus decoloratus* a carrier for *Anaplasma marginale*, *Boophilus microplus*, and *Hyaloma truncutum*.[438] So far the diseases they transmit are confined to the Equatoria region, Jonglei and Lakes States.

The tsetse fly belt has extended to areas previously free of the flies and now infests large areas of South Sudan covering all the Equatoria States as well as Warrap, WBG, NBG States and the eastern parts of Upper Nile State[439]. Animal trypanosomiasis is widely spread within the country, but only in the Equatoria region is there an occurrence of both the animal disease, trypanosomiasis, and the human disease, sleeping sickness. There are on-going efforts to eradicate the tsetse fly, but these are hampered by inadequate financial resources, poor facilitation, insufficient technical personnel at county level to implement activities, low awareness among communities of the dangers tsetse flies pose, inadequate laboratory facilities and field equipment[440,441].

11.6.2 Recent disease outbreaks

Reported outbreaks of notifiable[442] diseases in 2012 provide a picture of the disease situation in South Sudan (Figure 11-13). The four bacterial diseases (HS, CBPP, BQ and anthrax) that mainly affect production and land use have the highest number of outbreaks across all the states. Rabies, a multi-species zoonotic disease was also recorded across all

[438] Kivaria, Fredrick M. 2010. *Baseline survey to map the extent of the expansion of East Coast Fever in Southern Sudan,* 2010

[439] MARF. 2013. *Tsetse Fly Distribution and Trypanosomiasis Incidence in the Republic of South Sudan.* Compilation of Field Visit Reports from UNICEF Operation Lifeline 2000, University of Edinburgh 2004 and Free University of Berlin, Germany in 2013.

[440] Pan African Tsetse and Trypanosomiasis Eradication Campaign, Sudan National Programme

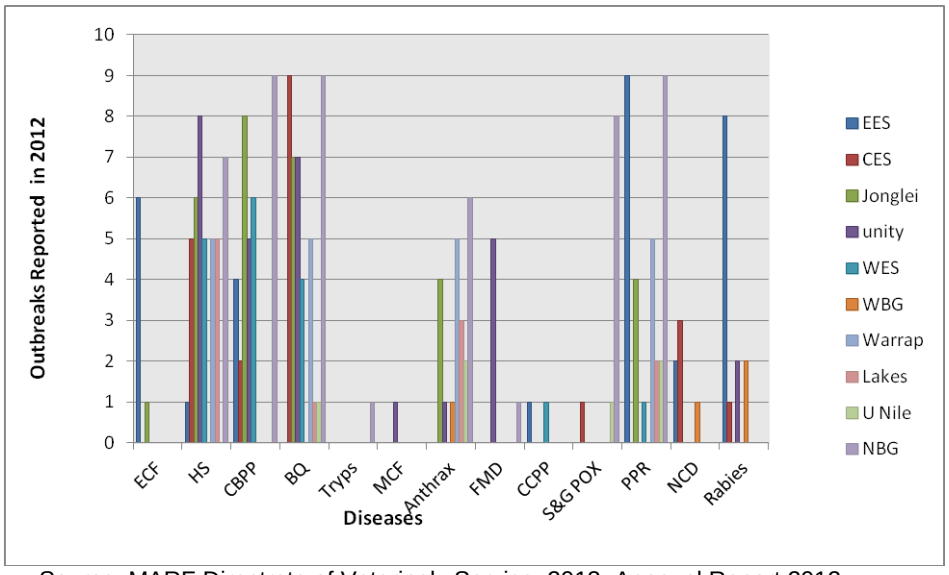
[441] MARF. 2013. *Tsetse Fly Distribution and Trypanosomiasis Incidence in the Republic of South Sudan*. Compilation of Field Visit Reports from UNICEF Operation Lifeline 2000, University of Edinburgh 2004 and Free University of Berlin, Germany in 2013.

[442] Means a disease listed by the Veterinary Authority, and that, as soon as detected or suspected, should be brought to the attention of this Authority, in accordance with national regulations (the list of notifiable diseases is normally determined from among the OIE listed diseases)

the states, the highest number of outbreaks being in Eastern Equatoria State, followed by Unity and Western Bahr el Ghazal States, while the least outbreaks were reported in Central Equatoria State. The highly trade sensitive FMD was only reported in Unity and Northern Bahr el Ghazal States, while ECF was limited to Eastern Equatoria and Jonglei States, and trypanosomiasis to Northern Bahr el Ghazal State.

For sheep and goats, Pestes Petit des Ruminants leads, followed by contagious caprine pleura-pneumonia and sheep and goat pox. For poultry, only Newcastle Disease was reported, with the highest number of outbreaks in Central Equatoria State, followed by Western Equatoria State and Western Bahr el Ghazal State.

Figure 11-13: Disease outbreaks reported in 2012



Source: MARF Directrate of Veterinaly Service. 2013. Annnual Report 2012.

Note: ECF East Coast Fever, HS Haemohagic Sepicaemia, CBPP Contagious Bovine Pleuro–Pneumonia, BQ Black Quarter, Tryps Trypanomiasis, MCF Malignant catarrhal fever, FMD Foot and Mouth Disease, CCPP Contagious Caprine Pleuro-Pneumonia, S&G Pox Sheep and Goat Pox, PPR Peste des Petit Ruminants, NCD New Castle Disease

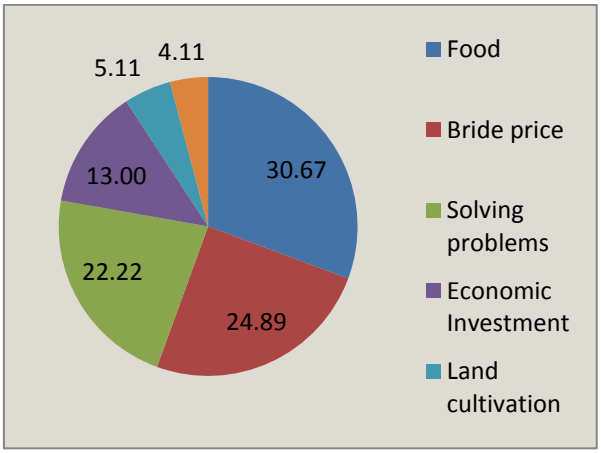
11.6.3 Disease impact

11.6.3.1 Impact of disease on benefits derived from cattle

Among the many benefits derived from rearing livestock are: sources of food and nutrition especially for the young, elderly and sick; economic investment; solving social problems (school fees, cash to buy food such as cereals and milk, and payment of fines); payment of bride price; draught power for land cultivation and transport and manure for crop production (Figure 11-14). Food (milk, ghee and meat) is the highest benefit derived from cattle (30.67%), followed by payment of bride price during marriage (24.89%).[443]

[443] By simple proportional piling method. CAMP Task Team.

Figure 11-14: Benefits derived from cattle in South Sudan (%)



Source: Elaborated by CAMP Livestock subsector team.
CAMP Situation Analysis. 2013.

The CAMP team found that CBPP has the highest impact on livelihood benefits (24.56%),[444] nearly twice as much as the second placed ECF (15.89%). HS and FMD are tied at 11.44% and followed by BQ and anthrax at 7%, brucellosis at 6.5%, trypanosomosis at 5.56%, while liver fluke has a significant showing at 4% (Figure 11-15).

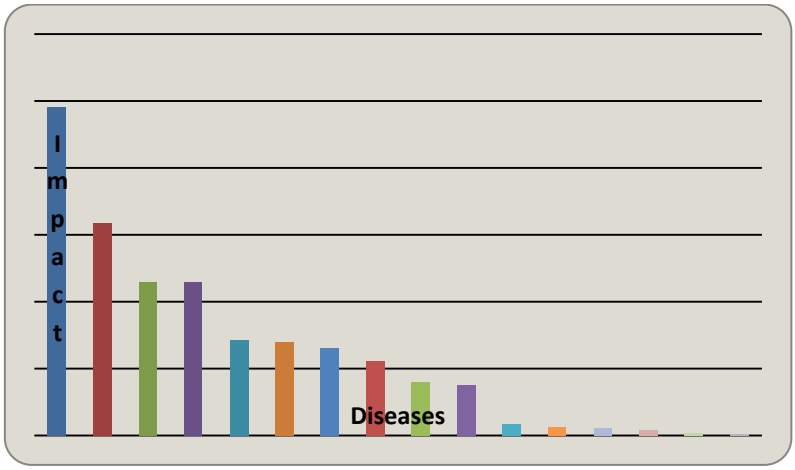
A benefit cost analysis[445] in 2007 showed that the total farm gate value and national value losses associated with 11 priority animal diseases in Southern Sudan to be USD436.4 million and USD264.0 million. Only losses with respect to milk and meat and disease control costs were considered. CBPP was the most economically important disease followed in order of decreasing importance by rinderpest, Rift Valley Fever (RVF), ECF, HS, FMD, PPR, black quarter and anthrax, CCPP and lastly highly pathogenic avian influenza (HPAI). Since then, out of these top 11 diseases, rinderpest has been eradicated globally; Sudan was certified free in 2008. Currently RVF is not listed as important by farmers interviewed. However, RVF is a disease that comes in cycles of about 10 years and was last in the Horn of Africa region in 2007. The global HPAI scare of 2005-2008 has disappeared; South Sudan is said to have been affected in 2007 but the infection disappeared without intervention.

[444] Disease impact matrix scoring. CAMP Task Team.

[445] Kimani, M Tabitha and Njue, W Sophycate. 2007. *Socio-economic impact assessment of priority livestock diseases in Southern Sudan*

.

Figure 11-15: Cattle disease impact on livelihood benefits (%)



Source: Elaborated by CAMP Livestock subsector team. CAMP Situation Analysis. 2013.

11.7 Animal Health Services

11.7.1 Provision of Animal Health Services

Animal health services provision falls into 4 categories, namely: veterinary care for animals, input delivery systems, advice (extension) and training of farmers. Veterinary care services in South Sudan are provided by both the public and private sectors.

11.7.1.1 Public sector actors

The public sector actors are mainly found in major towns (national and state capitals) and the surrounding areas where they provide curative and prophylactic services against non-notifiable diseases and do surgical interventions alongside their core business of prevention and control of notifiable diseases. On the basis of public sector staffing levels of 34 veterinarians, each on average caters for 344,117 cattle, 364,705 goats and 355,882 sheep.[446]

11.7.1.2 Private sector actors

Community animal health workers (CAHWs) are the only true private sector service providers in South Sudan. Private veterinary and para-veterinary practices are yet to emerge, and there are many concerns about the viability of private veterinary practice in South Sudan. Many livestock keepers are not able or willing to pay for services due to their subsistence orientation, made worse by a dependence syndrome that has been cultivated and entrenched by NGOs and the government practices of waiving or heavily subsidizing the costs of animal health services. CAHWs serve the vast but remote rural areas where they provide frontline curative services, participate in government/NGO sponsored vaccination programmes and report disease outbreaks to the public veterinary services directly or through NGOs. However, the number of CAHWs has dwindled over the years from a peak in the late 1990s and early 2000s. In Central Equatoria State, for example, the government at one time stepped in by replenishing their drug-kits, but these quickly run out. Sustainability of the CAHW system is a major problem, given that the government expects a lot from them, but without much incentive, and there are challenges with implementing a sustainable cost recovery scheme for the CAHWs. However, good examples exist where CAHWs were trained further to become animal health auxiliaries, and later stock-persons.

[446] South Sudan Livestock population of 11.7 million cattle, 12.4 million goats and 12.1 million sheep (FAO. 2009. Livestock Population Estimates)

11.7.1.3 FAO and NGO actors

FAO and various NGOs have over the last two decades or so been involved in training and equipping CAHWs with medical start-up kits, including bicycles for transport in some instances. The minimum entry requirements for training are: ability to read and write, interest, and be a cattle owner. The respective county veterinary services are responsible for supervising the CAHWs, selection for refresher training and subsequent absorption into the public service as veterinary auxiliaries. The other main NGO involvement is in emergency operations especially during droughts when they support treatments, such as de-worming and external parasite control, both materially and financially through the government and CAHWs.

11.7.1.4 Accessibility and cost of animal health services

Given the low collective coverage by public, private and FAO/NGO actors, there is generally poor accessibility to animal health services especially in rural areas. The residents of Aditidi village, located about 14 km from Wau town had this to say "Whenever our animals fall sick, we use local herbs to treat them, or at times buy drugs from the open air market, usually tetracycline powder meant for humans which we dissolve in water and treat the animals. We have never been served by the veterinary services, not even CAHWs or NGOs"[447]. This is a common experience across states. Table 11-21 shows the prices charged by the veterinary service veterinarians and para-vets for curative services for some of the common disease conditions in South Sudan.

Table 11-21: Cost of treatment in SSP of common livestock diseases in South Sudan

Species	**Cattle**					**Shoats (Sheep and Goats)**				
State	**CE**	**Jonglei**	**WBG**	**Unity**	**EE**	**CE**	**Jonglei**	**WBG**	**Unity**	**EE**
Disease										
Bacterial diseases	10	15	20	20	15	5	10	10	10	5
Trypanosomosis	5	22	10	15	10	-	-	-	-	-
ECF	70	100	30	0	60	NA	NA	NA	NA	NA
Babesiosis	15	-	20	-	-	NA	NA	NA	NA	NA
Anaplasmosis	10	-	20	-	-	NA	NA	NA	NA	NA
Deworming	15	24	10	20	20	10	15	6	5	10

Source: CAMP Task Team. 2013. Notes: NA Not applicable. - Data not available.

11.7.2 Disease prevention and control services

Disease prevention and control are the core of national veterinary services and could be made up of several components including: early detection and rapid response; epidemiological surveillance; laboratory diagnostic support and control interventions.

11.7.2.1 Early detection and rapid response

The key to success in handling animal disease epidemics is early detection. If a disease can be detected very early in the phase of epidemic development, the possibility exists that it can be arrested and eliminated before it actually inflicts damage. Early detection presupposes that there is a surveillance system in place that will bring infection to light when it is first seen.

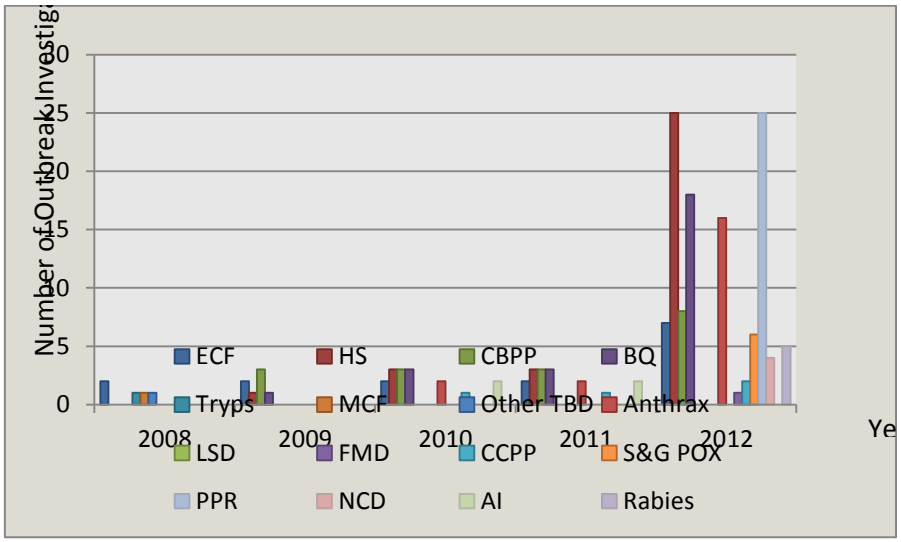
In South Sudan, service provision in this regard is at 3 main levels. At the grassroots level are the livestock owners, community leaders and CAHWs who by law are supposed to report notifiable disease outbreaks, and present animals for vaccination and/or treatment as required. Community leaders and CAHWs create awareness for impending interventions, with the latter also assisting the public sector in implementing disease control interventions. At the intermediary level are state veterinary services and NGOs. The former receive and

[447] CAMP Task Team. 2013. These words were said in the presence of the State Director of Veterinary Services.

transmit disease outbreak reports to MARF and implement disease control measures on the basis of the outcome of investigations. NGOs assist in disease outbreak reports transmission and during disease intervention by providing vaccines, operational funds and logistics. At the tertiary level is the MARF Directorate of Veterinary Services (DVS) who responds to outbreaks by conducting investigations and recommending and facilitating appropriate control measures including but not limited to vaccination and treatment.

Thus, the channel for disease early detection and response in South Sudan is: pastoralists, community leaders, CAHW, payam, county, state, and national. The means of reporting include telephone, email, paper, person-to-person and rumours. Depending on the seriousness of the disease/emergency; some of the steps in-between may be by-passed. Disease outbreaks reported between 2008 and 2012 are presented in Figure 11-16. The number of reported outbreaks is low for all the diseases in the first 4 years and suddenly increases up in 2012. Many state veterinary services complained of the poor response by MARF to disease outbreaks and expressed fear that this was likely to impact negatively on disease reporting.

Figure 11-16: Disease outbreaks between 2008 and 2012



Source: MARF Directorate of Veterinary Services 2013 . Annual Reports.

A comparison of the performamnce of South Sudan with other countries in the region is presented in Table 11-22. The comparison is based on 9 notifiable disaeses in the 4 countries. Furthermore, the diseases are the subject of regional harmonisation and coordination of control efforts for purposes of facilitating intra and extra-regional trade.[448] South Sudan's performance in the first 4 years (2008-2011) is dismal compared with its 4 neighnours, however, the performance is comparable in 2012, even performing better than Uganda.

Table 11-22: Comparison of disease outbreaks: South Sudan and neighbouring countries

Year	Country	FMD	CBPP	PPR	CCPP	SGP	BRU	LSD
		18	313	67	16	297	+	130
	Kenya [a]	43	+	0	7	0	4	0
	South Sudan [b]	-	1	-	-	-	-	-
	Sudan [a]	14	1	25	0	16	3	6
	Uganda [a]	32	3+	9+	+	-	2	-
2009	Ethiopia	34	15	75	6	270	+	248

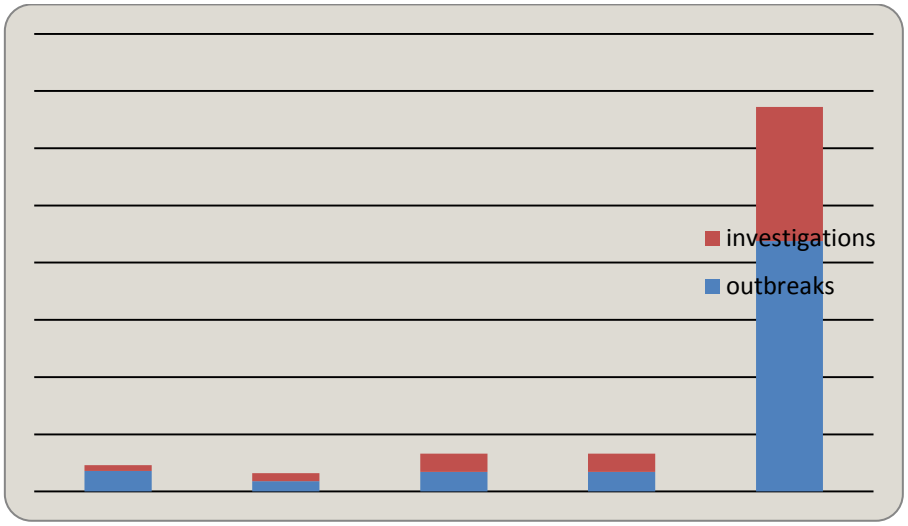
[448] Standard Methods and Procedures- Animal Health (SMP-AH) Project of AU-IBAR and IGAD as well as other initiatives in the pipeline by these two organizations.

Year	Country	FMD	CBPP	PPR	CCPP	SGP	BRU	LSD
	Kenya	62	3+	+	17	+	21	0
	South Sudan	2	4	0	-	-	-	-
	Sudan	6	4	19	0	23	2+	0
	Uganda	2+	4+	2	0	-	+	-
	Ethiopia	67	46	113	14	310	+	180
	Kenya	61	2+	+	5	0	11	0
2010	South Sudan	-	3	-	1	-	-	-
	Sudan	9	4	13	0	26	2	6
	Uganda	4	8	1	0	-	+	-
	Ethiopia	85	36	85	14	197	+	177
	Kenya	60	2	+	8	0	7	0
2011	South Sudan	+	3	-	1	-	-	-
	Sudan	9	2	20	0	18	2	6
	Uganda	20	11	+	0	-	17	+
	Ethiopia	97	28	63	13	171	+	79
	Kenya	49	+	+	2	0	4	0
2012	South Sudan	6	34	32	2	10	-	-
	Sudan	7	0	16	0	10	0	2
	Uganda	-	0	-	0	-	-	-

Sources:
[a] World Animal Health Information Database (WAHID). April 2013.
[b] MARF DVS. July 2013. MARF Directorate of Veterinary Services. Annual Reports
Notes: Key for WAHID derived data: - No Surveillance data available; + Suspected cases; 0 Zero cases reported and 1+ More cases than the number indicated. For South Sudan data, - No data available.

More than a half of the reported disease outbreaks in the country are not investigated (Figure 11-17). In effect, nobody knows the causes and outcome of these uninvestigated outbreaks. Most state veterinary services lamented the failure by MARF to investigate and respond to outbreaks and the lack of training opportunities and/or refresher courses for field based staff. MARF is also accused of conducting disease investigations without involving the state veterinary services. A major response activity undertaken by MARF in recent years was the containment of ECF in five counties of Jonglei State by a national ECF Task Force appointed by the Minister. During the exercise, 3,248 cattle were treated for ECF and 528 sprayed for ticks.

Figure 11-17: Disease outbreaks investigated, 2008-2012



Source: MARF Directorate of Veterinary Services 2013. Annual Reports.

11.7.2.2 Epidemiological surveillance

Epidemiological surveillance is the systematic and continuous effort to provide a reliable picture of the disease situation in time and space for use in planning, implementation and

evaluation of disease control measures. Passive disease reporting is the main form of epidemiological surveillance conducted in South Sudan.[449] The data captured includes notifiable disease outbreaks and clinical cases of non-notifiable diseases. The reports are submitted from the field to MARF DVS as an integral part of the monthly reports and follow the same channels described for outbreak reporting.[450] Table 11-23 shows how the states submitted reports to MARF in 2012.

Table 11-23: States submission of reports to MARF in 2012

State	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
NBG [a]	+	+	+	+	+	+	+	+	+	-	-	-
U Nile [b]	+	+	+	-	-	-	-	-	-	-	-	-
Unity [c]	+	+	+	+	+	+	+	+	+	+	+	+
WBG [d]	-	-	-	-	-	-	-	-	+	+	+	+
WE [e]	-	-	-	-	-	-	-	+	+	-	-	-
EE [c]	+	+	+	+	+	+	+	+	+	+	+	+
CE	-	-	-	-	-	-	-	-	-	-	-	-
Warrap	-	-	-	-	-	-	-	-	-	-	-	-
Lakes	-	-	-	-	-	-	-	-	-	-	-	-
Jonglei	-	-	-	-	-	-	-	-	-	-	-	-

Source: MARF Directorate of Veterinary Services 2013. Annual Report 2012.
Notes: [a] Monthly and 3 quarterly reports. [b] One quarterly report. [c] Annual report [d] Monthly reports. [e] Two monthly reports. Blank cells = No report submitted

Even though Unity and Eastern Equatoria States submitted annual reports, this is not sufficient for the early detection of emerging events. Northern El Bahr Ghazal State was the best performing (nine monthly and 3 quarterly reports). Four states (Central Equatoria, Warrap, Lakes and Jonglei) did not submit a single report. In addition to national use, OIE member countries are obliged to share these reports with other members by submitting bi-annual and annual reports to OIE to ensure transparency in international trade.

Three epidemiological studies have been conducted in recent years with a view to benchmark disease control interventions. ECF and other tick-borne diseases (anaplasmosis and bovine babesiosis) are endemic in the Equatoria states and are expanding northward into the northern state. FMD mean antibody prevalence was found to be 37%, 22% and 36% in cattle, goats and sheep respectively, and serotypes O, A.C, SAT 1 and SAT2 were identified.[451] The results of a PPR survey conducted in Eastern Equatoria State in 2012 are still awaited.

Some of the staff members of the Epidemiology and Disease Information Department of the DVS have been trained on 2 disease information systems: TAD-Info and ARIS 2 fronted by FAO and AU-IBAR respectively.

11.7.2.3 Laboratory diagnostic services

Laboratory diagnostic services are an essential and integral part of disease control and veterinary cares services in that they complement epidemiological surveillance, disease outbreak investigations and clinical diagnosis. The Central Veterinary Diagnostic Laboratory (CVDL) situated in Juba Town offers diagnostic services for the whole country as well as referral services for regional/satellite laboratories. The CVDL has developed a total of 4

[449] The reporting system is based on a standard format developed by the Epidemiology and Disease Information Unit of the Directorate of Veterinary Services.
[450] 11.7.2.1
[451] Ngeiywa, Kisa Juma and Sangula Abraham Kiprotich. 2012. *Sero-survey of Foot and Mouth Disease in South Sudan*.

standard operating procedures, 10 test methods, 6 working instructions and 14 formats, all of which have been approved. In addition, the central laboratory trains veterinarians and laboratory technicians on basic techniques and Enzyme Linked Immuno-sorbent Assay (ELISA), which together offer a practical approach to diagnosis of a wide variety of disease conditions. Table 11-24 shows the samples received and analysed by the CVDL in 2012.

Table 11-24: Summary of samples received and analyzed, January - December 2012

Sample type	Test(s) requested	Species	No. of samples
Whole blood	PPR	Caprine	10
Serum	ELISA (ECF)	Bovine	539
Eye swabs	PPR	Caprine	3
Nasal swab	PPR	Caprine	6
Rectal swabs	PPR	Caprine	2
Blood spot filters	ECF molecular	Bovine	400
Feacal sample	Microscopy for ova and cysts	Caprine and Bovine	27
Ticks	Identification		3
Pancreas (Impression smear)	Gram's Stain	Elephant	1
Tissue - Liver	Histopathology	Elephant	1
- Lung	Histopathology	Elephant	1
- Pancreas	Histopathology	Elephant	1
- Spleen	Histopathology	Elephant	1
Blood and Lymph node smears	Giemsa staining for heamo-protozoans Parasites	Bovine	790
Blood smear	Gram's Stain	Elephant	1
Total number of samples			**1786**

Source: MARF Directorate of Veterinary Services. *Annual Report 2012*.

Overall, the laboratory set up/design in respect of bench space and equipment for specialized diagnosis, waste disposal facilities and storage for equipment, reagents and chemicals is not appropriate for efficient diagnostic services. Furthermore, critical utilities, such as water and electricity, are irregular. The human resource capacity and technical capability to undertake specialized diagnostic tests and procedures are lacking as well as the specialized equipment necessary to perform them. Currently, the laboratory relies on neighbouring countries, particularly Kenya, for specialized diagnostic services.

At the state level, laboratory diagnostic services are available in Wau and Malakal in Western Bahr el Ghazal and Upper Nile states. The services are mainly limited to the 2 towns and their environs and limited to microscopy. Samples that require more advanced testing are submitted to the central veterinary laboratory in Juba; however, feedback is rarely provided. In Malakal, the services are provided by Indian Battalion of the United Nations (INDBATT) in collaboration with the Upper Nile University and SMARF in a very old building. A building that was ear-marked for laboratory work was converted into the minister's office after a Multi-Donor Trust Fund project failed to renovate the building as planned.

11.7.2.4 Disease prevention and control interventions

Disease prevention and control interventions are discussed in the context of: past projects and programmes, on-going disease control programmes and strategies, quarantines and border controls and livestock identification and traceability.

(1) Past projects and programmes

Some of the national or sub-national projects and programmes implemented in South Sudan in the last 10 years that have a strong bearing on the current animal health status of the

country are summarized in Table 11-25.

Table 11-25: Completed and on-going projects in animal health

Name of project	Development partners involved	Project focus and scope	Achievements
Pan African Programme for the Control of epizootics (PACE) 1999-2006	EU, AU-IBAR and FAO	Control and eradication of rinderpest	Controlled and eradicated rinderpest
Livestock Epidemio-surveillance Project (LESP) 2007-2012	EU	▪ Verification of rinderpest eradication ▪ Strengthen epidemiological surveillance for major diseases	▪ Sudan accredited free from rinderpest in 2008 ▪ Epidemiological surveillance capacity built ▪ Baseline epidemiological and socio-economic impact studies conducted (ECF and FMD). ▪ PPR control strategy formulated
Support Programme for Integrated National Action Plans in Animal for Avian and Human Influenza (SPINAP-AH) 2008-2011	EU and AU-IBAR	▪ Control of avian influenza ▪ Capacity building for avian and human influenza control (surveillance, diagnosis, bio-security and awareness)	▪ Avian influenza controlled and eliminated ▪ Capacity for early detection, surveillance and control strengthened
Emergency Relief Support to Combat Avian Influenza (ERSCAI)	AfDB and AU-IBAR	Capacity building for disease surveillance and diagnostic capacity	Capacity for early detection, surveillance and control strengthened
Sudan Productive Capacity Recovery Programme (SPCRP) 2007-2012	EU and FAO	Institutional capacity development (WE, Lakes, Warrap, NBG and WBG)	• Purchased vehicles • Constructed offices, • Started farmer field schools
Multi-Donor Trust Fund 2007- 2011	Various DPs through WB	Institutional capacity development (EE, CE, Jonglei, Upper Nile and Unity)	• Bought mobile clinics (20), motor-bikes (30) • Constructed research centre and offices in some states

Source: Compiled by the CAMP Task Team based on information obtained from GRSS MARF. 2013.

The lessons learnt from implementing projects in Table 11-25 and others not included in the table (mainly NGO-led projects in the counties and states) are summarized in Table 11-26.

Table 11-26: Lessons learnt in project implementation

Project clusters	Lessons
Rinderpest eradication and verification[452]	• Disease eradication programmes require sustained political will to support technical interventions in an environment of peace and security. • Sustained funding by development partners was critical in eradicating rinderpest. • Rational and strategic vaccination (immuno-sterilization) based on rigorous epidemiological surveillance, not only reduces wastage of scarce public funds but also speeds up the process of disease eradication. • Innovative approaches (including the use of CAHWs and participatory epidemiology techniques) to animal health services delivery facilitated access and elimination of the disease from remote areas affected by political instability, civil strife and insecurity. • Sustained funding for effective disease reporting/early warning system incorporating all stakeholders is necessary to ensure early detection and rapid stamping out of any future incursion of rinderpest. • Enhanced coordination and harmonization between the veterinary services of neighbouring countries proved critical for the final eradication of rinderpest.
Post CPA institution capacity building projects[453]	• Poor procurement and accountability capacity and practices in management of project resources • Some of the NGOs especially local ones like Vetworks used all the money but had no results to show for it. The international ones like VSF Swiss at least did something. • A pilot project on chicken broilers failed because when the day old chicks arrived in the country, they were not delivered to the intended beneficiaries. • Buying of mobile laboratories was a technological leap. Simpler, more appropriate technologies like kerosene run fridges would have been better. Generators and fridges were removed from the vehicles and all three put to the personal use of the State Governors.[454] • The procurement system particularly for MDTF was cumbersome, even with the World Bank technical experts seconded to MDTF. • MDTF helped improve linkage and coordination between the states and MARF which were very poor initially, however, the same problem between states and counties was not resolved. • Implementers wrote reports but never got feedback from management . • Monitoring and evaluation did not work even though training was done (done too late?). • There was a good attempt to coordinate all the partners, but there were also challenges
NGO projects in the states and counties[455]	• Many NGOs do not consult with SMARF veterinary services when designing projects and some NGOs lack transparency.

Source: Elaborated by the CAMP Task Team, CAMP situation Analysis.

(2) Disease control programmes and strategies

There are no national on-going disease specific control programmes. However, there are two on-going regional programmes in which South Sudan is participating as shown in Table 11-27. Even though the Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) has been ongoing for a number of years, it has not received sufficient funding to enable it to start control activities. The few activities the project has implemented were

[452] AU-IBAR. 2011.*The Eradication of Rinderpest from Africa: A great Milestone.*

[453] Discussion with development partners and NGOs, CAMP Task Team, March-July 2013, CAMP situation Analysis.

[454] Each mobile laboratory was bought at a cost of 150,000 USD.

[455]. Discussions with SMARF Veterinary services, CAMP Task Team. 2013, CAMP situation Analysis

funded by MARF and the Bill & Melinda Gates Foundation. MARF has developed a strategy for PPR control with a long term objective to eradicate the disease. The immediate and midterm objectives are to limit the socio-economic impact, using a combination of tools: strategic vaccination of 80% of the national sheep and goat population; quarantine and movement controls; decontamination; tracing and risk based surveillance and awareness campaigns.[456] So far, the strategy remains on paper. South Sudan subscribes to a regional roadmap for FMD control; as of March 2012, the country had not made much progress because it lacked sufficient data to enable it prepare a risk-based strategy based on the principles of the Global FMD Strategy.

Table 11-27: On-going regional disease control programmes

Project	DPs involved	Focus and scope	Achievements
Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) 2009-on-going	AfDB and AU Bill Gates Foundation	Eradication of tsetse and trypanosomosis- in Africa. In South Sudan, the focus is on 6 states	Field staff trained on basic survey and making of traps in Yambio in 2011 (MARF funding) Mapping studies in Kajo-Keji in 2011 and 2012 (financed by the Bill & Melinda Gates Foundation)
Standard Methods and Procedures in Animal Health (SMP-AH)	USAID, AU-IBAR and IGAD	Framework for uniform epidemiological surveillance, disease prevention and control, laboratory procedures and interpretation and quarantine and border controls All IGAD member countries and Tanzania	The project is still at MARF level.
FAO operated projects in different states		Provision of vaccines Training of CAHWs ECF control PPR vaccination Convenes food security meetings Drugs and logistics during emergencies	—

Source: Compiled by the CAMP Task Team based on information obtained from GRSS MARF. 2013

In the absence of disease specific control strategies that would need to be integrated for cost-effectiveness, MARF has developed a seasonal based vaccination calendar for all notifiable diseases.[457] The vaccination coverage for 2012, based on the quantity of vaccines dispatched by MARF, is shown in Table 11-28. The vaccine figures include what was used in outbreak responses. Veterinary officials in all the 10 states conceded that the vaccination coverage is too low to prevent and protect the target livestock populations.

Table 11-28: Vaccination coverage in 2012

State	Anthrax	BQ	HS	CBPP	CCPP	PPR	S/G Pox	NCD	Rabies	Total
Warrap	40,000	35,500	42,000	30,000	15,700	56,000				219,200
NBG	7,500	11,250	11,250	5,000		14,000				49,000
CE	30,000	61,000	31,500	62,500	27,500	55,650	7,500	8,500	200	284,350
Upper Nile	20,000		7,500	10,000	16,000	21,000	20,000			94,500
Jonglei		21,500	56,500	20,000	20,000	28,000				146,000
Unity	15,000	35,500	20,000	25,000		45,500				141,000
Lakes		10,000	66,950			14,000				90,950

[456] Kivaria Fredrick M. 2010. *Disease Strategy. Pestes des petits ruminants 2010*

[457] Kivaria Fredrick M. (Undated) *National Vaccination Programme to Control Epidemic Diseases in the Republic of South Sudan.*

State	Anthrax	BQ	HS	CBPP	CCPP	PPR	S/G Pox	NCD	Rabies	Total
WE		5,000	5,000		15,000			1,000	3,460	29,460
Total	**112,500**	**179,750**	**240,700**	**157,500**	**94,200**	**244,150**	**27,500**	**19,500**	**3,860**	**1,054,460**

Source: MARF Directorate of Veterinary Services. Annual Report 2012.

(3) Quarantine and border control

This is the authority and capability of the veterinary service to prevent the entry and spread of diseases and other hazards from animals and animal products. This is normally proved by the list of certificates and forms used in export/import activities, the infrastructure and facilities for the import/export of animal and animal products, and the legal framework which governs the activity of veterinary services.

Juba International Airport (JIA) and Nimule check-point are the only functional border entry points. The rest of the border entry points are not controlled. South Sudan has planned for the establishment of 10 border posts.[458] Goods entering through JIA are mainly day old chicks, which come from Uganda, Kenya and Ethiopia and pets brought in by expatriate workers. The rest of the recorded animals and animal products enter the country by road via Nimule (Eastern Equatoria State); they include eggs, day old chicks, frozen chicken, sausages, cattle and goats. The list of imports for 2012 shows that the origin of some livestock and livestock products, between March and May, was not established. At the 2 entry points, veterinary infrastructure is not developed, and the veterinary service is as yet to establish appropriate capacities to implement a compliance programme consisting of inspection and verification of regulatory norms for selected products and processes. The latter is linked to the Animal Diseases and Pests Control Bill 2013 becoming law. At JIA, for example, the only officer assigned to the airport has to split her time between the airport and the office at MARF.

MARF officials attend cross-border and regional meetings aimed at strengthening coordination and harmonisation of disease control activities. Internal livestock movement control throughout the country is constrained by the absence of a legal framework, a situation made worse by multiple taxation and widespread cattle rustling, creating a state of insecurity and undermining livestock marketing and trade. In Upper Nile State, the local authorities insist they are the *bona fide* authorities to issue livestock movement permits and therefore collect revenue.

(4) Animal identification and traceability

Animal identification and traceability are tools for addressing animal health (including zoonoses) and food safety issues. These tools may significantly improve the effectiveness of activities such as: the management of disease outbreaks and food safety incidents, vaccination programmes, herd/flock husbandry, zoning/compartmentalisation, surveillance, early response and notification systems, animal movement controls, inspection, certification, fair practices in trade and the utilization of veterinary drugs, feed and pesticides at farm level. Besides these technical uses, animal identification is also a useful tool for curbing livestock theft.

In an effort to develop a livestock identification and traceability system for South Sudan, a two-year pilot project for cattle identification and traceability has started in Northern Bahr el Ghazal State with the objective of identifying a suitable cattle identification and traceability system that can be applied to the whole of South Sudan.

[458] GRSS, MARF. 2012. *The MARF Policy Framework and Strategic Plans (PFSP) 2012-2016.* Juba: GRSS .

11.8 Marketing and Trade

11.8.1 Demand and supply

11.8.1.1 Demand for foods of livestock origin

In urban areas, the demand for animal source foods is high and will continue to grow driven by population growth (2.43% per annum) and the rapid urbanization that has characterized South Sudan since the CPA.[459] Juba is the fastest growing city in Africa, estimated to grow at more than 20% annually, propelled by the increased expenditure by government and new inflows of money from growth of the services and construction sectors, small businesses and development aid. Incomes grew from USD 90 in 2004 to USD 500 in 2010.[460] The austerity measures instituted since mid-2012 have however had a marked effect on demand: in some states, market sales of livestock have fallen sharply due to the cuts in civil servant salaries. The sales dwindle even further to largely only sales of animals for slaughter when there is a delay in payment of civil servant salaries. The effect is also felt in slaughter houses and butcheries where the supply of meat reduces. Demand for milk also follows the pattern of the dynamics in civil service salaries and allowances especially in the major upcountry urban and peri-urban areas. Input suppliers are also affected e.g., fodder vendors and the services of CAHWs. In the more affluent and faster growing urban centres to the south of the country, notably Juba, the demand for meat, milk and other products is met through importation from the region and globally.

11.8.1.2 Overall consumption and comparison to other African countries

Data from the National Household Baseline Survey estimates that the average consumption of meat fresh beef, beef liver, beef accessories, beef offals, goat meat, sheep meat, goat and sheep accessories, goat and sheep offals, chicken and other poultry, and other meat) is 16 kg/person/year (Table 11-29). There is higher consumption in the urban areas i.e., an average of 19.7 kg compared to rural areas with 13.8 kg. This is much higher than the average estimate made in the red meat value chain study of 4.745 kgs per person per year broken down as 1.095 kgs of mutton (sheep), 1.46 kgs of chevron (goat meat), and 2.19 kgs of beef (cattle).[461]

The average consumption of meat is lower than what was quoted for the former Sudan (before independence of South Sudan) i.e., 22.2kg; and is also below the average for Africa of 19.4 kg/person/year in 2009, and that of Africa in 2000 which was an average of 17.1 kg. In terms of the type of meat most consumed, the profile of meat consumption in South Sudan is similar to most of the countries where beef is the most important meat, unlike in South Africa and Egypt where poultry is the most consumed meat.

National consumption of milk averages 11kg/person/year, with more milk consumed in the rural areas i.e., 12 kg than in the urban areas 10kg (Table 11-30). Milk consumption is well below the average for the African continent which was estimated at 43.90 kg/person/year in 2009, and 38.30 kg/person/year in 2003.[462]

[459] Musinga, M., J. M. gathuma, O. Engorok and t. H. Dargie. 2010. The Livestock Sector in Southern Sudan: results of a Value Chain Study of the Livestock Sector in Five Stated of Southern Sudan Covered by MDTF with a Focus on Red Meat. Draft Report, SNV and MARF.

[460] Musinga, M., J. M. gathuma, O. Engorok and t. H. Dargie. 2010. The Livestock Sector in Southern Sudan: results of a Value Chain Study of the Livestock Sector in Five Stated of Southern Sudan Covered by MDTF with a Focus on Red Meat. Draft Report, SNV and MARF.

[461] Musinga, M., J. M. gathuma, O. Engorok and t. H. Dargie. 2010. The Livestock Sector in Southern Sudan: results of a Value Chain Study of the Livestock Sector in Five Stated of Southern Sudan Covered by MDTF with a Focus on Red Meat. Draft Report, SNV and MARF.

[462] FAOStat.

Table 11-29: Consumption of meat, milk and other livestock products in South Sudan

Commodity	Key Sources for Urban Areas	Key Sources for Rural Areas	(Average Kg/year/person)			Highest consumption	Lowest consumption
			Urban	Rural	Nation		
Meat							
Fresh beef	Procured 96%	Procured 58% except JS 40%, US 66% and EE 54% from own production	6	2	3	JS urban 10 kg, NBG & WE urban 9 kg, CES urban 8 kg	UNS urban/ rural and WS rural 1 kg
Beef liver	Procured 97%	Procured 75%	1	0	0	WE & EE urban 2 kg	Most areas
Beef accessories	Procured 100%	Procured 62%	4	0	1	UNS urban 19kg	Most areas
Beef offals	Procured 99%	From own production 91%	1.1	.2	.4	LS urban & EE rural 22 kg	JS and US urban, WS and NBG urban and rural and LS rural 0 kg
Goat Meat	Procured 58%; except JS 45%, EE 37% own production	Procured only 18%, own production 54%;	2	3	3	EE rural 9kg; & Jonglei urban 8 kg	US urban; WS urban & rural; WE rural 0kg
Sheep Meat	Procured 91%	From own production 46%	3	2	2	Jonglei/ urban 9kg; EE 8kg	WS, WE, CE both urban/ rural, and LS urban 0 kg
Mutton and Sheep offals, cleaned	Procured 75% except EE 100% from own production	From own production 86%	.6	.6	.6	EE 88 kg, & CES 17 kg	JS both urban/rural, WS, LS & WE rural & US urban 0 kg
Sheep & Goat Accessories	Procured 94%	Procured 79%	1	1	1	JS rural 6 kg	Most areas
Chicken and other poultry	Procured 68%	From own stock 80%	1	4	4	WE rural 44 kg, & JS and WS urban & CES rural 2 kg	US both rural/ urban; UNS rural, NBG rural & LS urban 0 kg
Other meat	Procured 88%	Procured 49%	0	1	1	JS rural 2 kg	Most areas
Total Meat			19.7	13.8	16		
Dairy and Other Products							
Fresh Milk	Procured 65%; except WS 40%, CES 61% and EE 45% own	Own production 70%; except NBG 58% & LS 41%	9	12	11	UNS rural 26 kg; US rural 23 kg, JS urban 20 kg,	WE both urban/rural 1 kg; CES & NBG rural 2kg

Commodity	Key Sources for Urban Areas	Key Sources for Rural Areas	(Average Kg/year/person)			Highest consumption	Lowest consumption
			Urban	Rural	Nation		
	production	procured					
Powder milk	Procured 85%; except US 69% gift/ other sources. EE 71% own production	Procured 69%; exception EE 87% from own production	1	0	0	UN urban, WS urban, & EE urban 2	JS, US, NBG, LS, CES rural & WE rural/ urban 0 kg
Total Milk			10	12	11		
Other dairy products: cheese, yoghurt etc	Procured 86%, except JS urban where 62% from own production	Own production 93% except US 54%, LS 84%, CES 100% procured	0	1	1	EE 8 kg	Most areas
Eggs	Procured 100% very low in JS, US, and WS urban	Procured 100%; very low in JS, US and WS	2	0	0	Western Equatoria 28 kg; N BG 2kg, EE 1 kg	Very low in JS, US, WS, WBG, LS and CES

Source: NBS 2012. National Household Baseline Survey 2009. Offals adjusted to 11.4% of meat weight

Table 11-30: Consumption of meat and milk in selected African countries

	Meat (Kg/person/year)								Milk Kg/person/year		
Region/ Country	Bovine Meat	Mutton & Goat Meat	Poultry	Offals	Pig Meat	Meat, Other	2009	2000	Region/ Country	2009	2000
Africa Region											
Africa 2009	6.4	2.80	5.5	1.7	1.4	1.6	19.4		Africa 2009	43.9	
Africa 2000	6	2.70	4.20	1.6	1.0	1.6		17.1	Africa 2000		38.3
Countries											
South Africa	15.4	3.8	32	4.7	6.8	0.7	63.4	45.4	Sudan (former)	175	164.2
Central African Republic	19.5	3.9	1.2	2.7	3.1	5.9	36.3	34.3	Kenya	92.9	72.7
Niger	14.7	6.9	0.7	3.8	0.1	3.2	29.4	23.6	Niger	63.8	53.2
Djibouti	13.2	5.2	5	3.7	0.2	0.2	27.5	19.3	Egypt	59.3	49.2
Egypt	12.3	1.8	10	1.5	0	1.5	27.1	24.4	South Africa	55.3	53.3
Sudan (former)	8	8	0.7	3.2		2.3	22.2	22.4	Djibouti	45.2	69.4
Kenya	12.2	2.2	0.6	2.5	0.4	1.2	19.1	13.7	Tanzania	38.3	23.8

	Meat (Kg/person/year)								Milk Kg/person/year		
Region/ Country	**Bovine Meat**	**Mutton & Goat Meat**	**Poultry**	**Offals**	**Pig Meat**	**Meat, Other**	**2009**	**2000**	**Region/ Country**	**2009**	**2000**
Chad	8.3	3.6	0.5	2.3	0.1	0.5	15.3	16.3	Uganda	33.9	20.2
Uganda	4	1.3	1.4	1.3	3.4	0.9	12.3	12.2	Eritrea	26.3	26.8
Tanzania	6.7	1	1.1	1.2	0.4	0.4	10.8	11.4	Chad	23.3	25.2
Ethiopia	4.8	1.8	0.6	1.6	0	1.3	10.1	8.2	Ethiopia	20.2	16.3
Nigeria	1.9	2.8	1.7	0.9	1.5	0.9	9.7	9.5	Central African Republic	17.9	17.1
Eritrea	4.5	2.4	0.3	1.7		0.5	9.4	10.8	Rwanda	16.9	14.9
Rwanda	3.4	0.8	0.2	0.9	0.7	1.3	7.3	5.1	Nigeria	8	6
Burundi	1.9	0.9	0.9	0.6	1.5	0.1	5.9	4	Burundi	5.7	5.2

Source: FAOStat 2009 and 2000 data. Milk data excludes butter.

11.8.1.3 Urban and rural patterns of consumption

Beef (bovine meat – meat with bones, liver, offals and accessories) is the most consumed meat, with a national average consumption of 4.4 kg/person/year. There is much higher consumption in urban areas i.e, an average of 12.1 kg/person/year compared to rural areas where it is only 2.2kg/person/year. There is a conservative slaughter of cattle in rural areas, mainly on special occasions and holidays. On the other hand, there is more chicken and other poultry consumed among rural populations, i.e., 4 kg/person/yr compared to only 1 kg among urban dwellers.

Most of the meat consumed in urban areas is purchased and not from own production: 96 – 100% of the different beef parts are from the market. However only 58% of goat and 68% of poultry meat is procured from the market indicating there is still a significant level of slaughter of small ruminants and poultry within households. Most sheep meat (91%) is bought from markets. In rural areas, only 58% of beef is from the market, with as high as 40%, 54% and 60% of beef coming from own production in JS, US and EE, respectively. Only 18% of goat meat and 36% of sheep meat is from the market in rural areas except in NBG, WE and Warrap where 89%, 80% and 60% of goat meat is from the market.

Most milk 65% consumed in urban areas is from the market, except in CES, EE and Warrap where 61%, 45% and 40% of the milk is from own production. Milk consumed in rural areas is largely from own production 70%, except in NBG and Lakes where 58% and 41% of the milk is purchased. Powdered milk is mostly purchased i.e., 85% in the urban areas and 69% in rural areas. Most of the other dairy products like cheese, yoghurt and other milk products are purchased in urban areas (86%) with the exception of urban JS where 62% of the dairy products are produced by households.

Most chicken (80%) consumed in the rural areas is from own stock. In both urban and rural areas, eggs are almost all from markets reflecting the sale of eggs by households and the importation of eggs from neighboring countries.

The highest consumption of beef is the urban centres of JS, NBG, WE and CES. JS and EE have the highest consumption of goat and sheep meat, while WE has a far higher per capita of consumption of poultry and eggs i.e., 44 kg per capita per year of poultry meat, followed by JS, WS and CES with a distant 2kg; and 28 kg of eggs. Milk consumption is highest in UNS, US and JS.

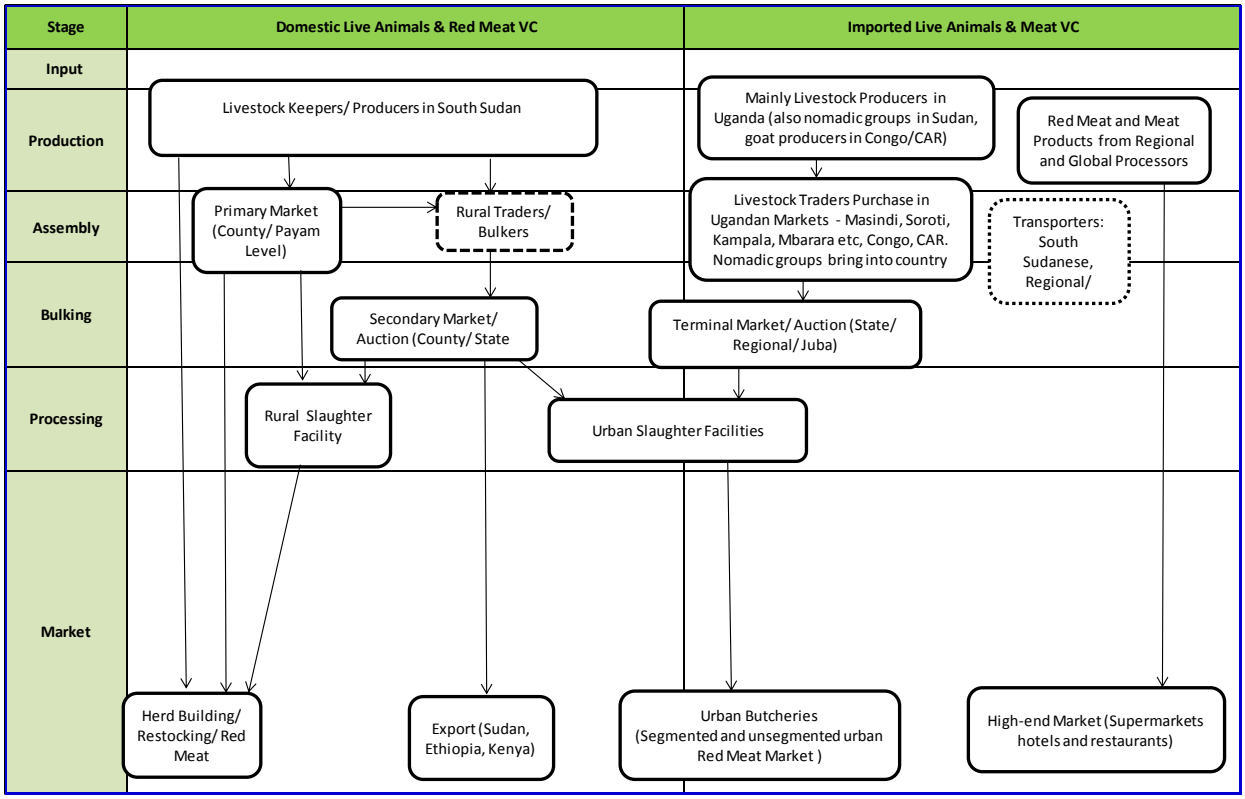
In the rural areas, the demand for milk is high as it is a staple of the diets of many livestock keepers alongside grains especially sorghum (dura). The consumption of meat is moderated by the reluctance to slaughter animals, especially cattle. For most livestock keepers, meat is consumed only on occasions or holidays. More goat, sheep and poultry are consumed in the rural areas than cattle.

11.8.2 Main value chains

Five main livestock subsector value chains exist: live animals and red meat, poultry, dairy, hides and skins, and honey.

11.8.2.1 Live animals and red meat value chain

Figure 11-18: Live animal and red meat value chain



Source: CAMP Task Team, March-July 2013, CAMP Situation Analysis

11.8.2.2 Poultry value chain

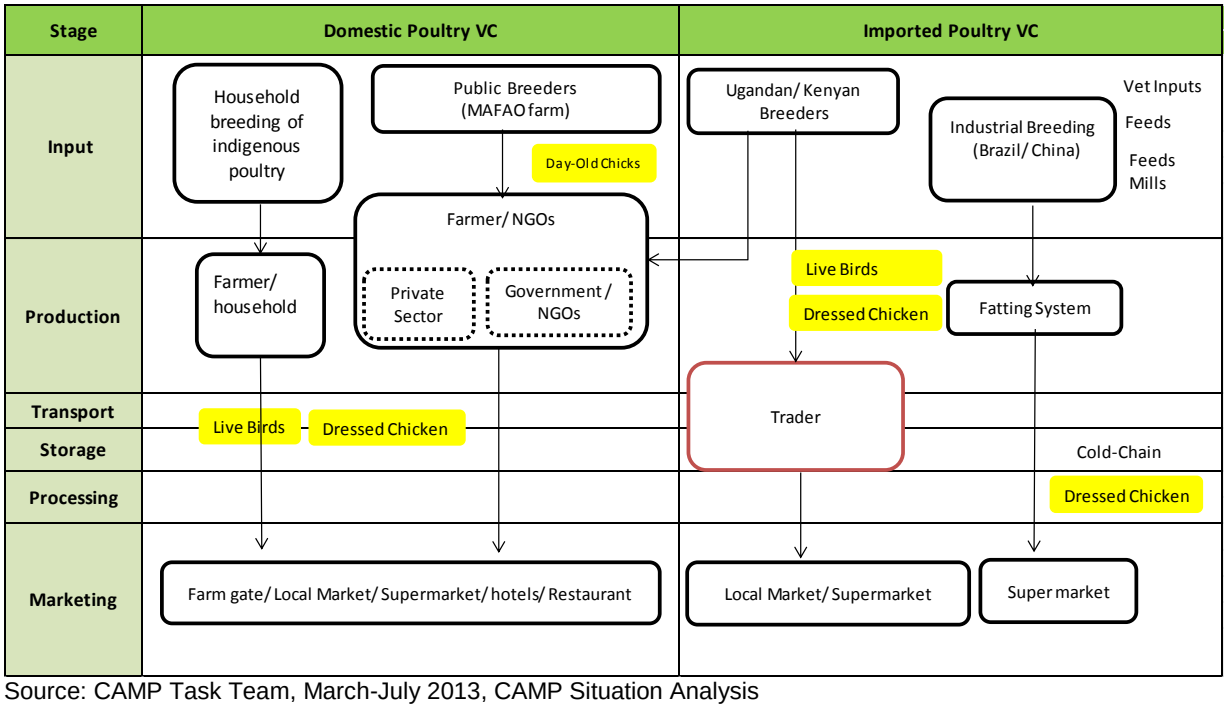
Key actors in the domestic poultry value chain (VC) include households which breed their own poultry and commercial breeders in Uganda, Kenya and the Sudan which supply both exotic and indigenous breed day old chicks. The majority of producers in the domestic VC in both urban and rural areas are smallholder subsistence farmers and households that raise largely chickens but also ducks, turkeys and guinea fowls for household consumption. Other important actors are NGO's and government actors who promote and facilitate poultry production working with farmers and groups. More often than not, they subsidise the farmers with in-kind support such as day old chicks, feeds, construction of housing, vaccination, management and identifying markets. On the other hand are private sectors actors with more focused commercial objectives, who are mostly located in urban and peri-urban areas. Generally they aim to run their enterprises along business lines bearing most of the costs and marketing their products themselves. The imported poultry VC is dominated in the production phase by competitive regional actors who produce both exotic and indigenous chicken, and also most of the eggs that enter the South Sudan markets. The regional actors face even more stiff competition from global actors, from as far as China and Brazil, who use

high tech. breeding, feeding, processing and cold chain techniques that cut costs of production; they ship poultry to South Sudan targeting mostly up-market outlets like supermarkets in urban centres.

Marketing: Live birds are sold predominantly at the farm gate or at local markets. Primary collectors/traders buy live birds and sell them at secondary markets. Live birds are brought from Uganda into the Juba markets. Frozen, dressed chicken comes from regional or global processors into supermarkets, hotels and other facilities in the main urban centres.

Major constraints include: The use of poor techniques and technologies in raising, processing and marketing poultry; failure of the emergence of a support industry for commercial production of poultry. There is a critical gap of domestic production of day old-chicks since the breakdown of the government owned and managed hatchery in Central Equatoria State. Many chicks are lost in transit due to poor handling, transit and customs delays. The sector depends on the importation of feed from Uganda; but, with no wholesale importers and distributors of feed, each farmer imports feeds on a per need basis, increasing the overall costs. Feeds and day old chicks are heavily taxed at the border as the tax regime does not accord special status to productive inputs important for developing the domestic industry. Currently there are no feed mills within the country despite the availability of the bulk feed resources i.e., by-products from milling of human food, suitable fish products and oyster shells. Mills and farmers who mix feeds on their own generally apply poor techniques and lack the full range of ingredients for properly mixing and balancing feeds. Poultry farmers face high costs of veterinary inputs and poor access to veterinary services and advice, with many farmers carrying out vaccinations without the necessary training and advice. A lack of knowledge and understanding of the importance of biosecurity is pervasive. Lack of credit and financing mechanisms limits the size of enterprises and discourages many poultry farmers from developing their businesses. In urban centres there is stiff competition from cheap products imported from the region and globally despite the fact that protracted transit time from country of origin reduces the quality of the products.

Figure 11-19: Poultry value chain



Source: CAMP Task Team, March-July 2013, CAMP Situation Analysis

Opportunities include: the high demand for poultry meat and eggs due to rapidly growing urban centres; the existence of regional hatcheries is important for immediate growth of the sector; the already installed hatchery capacity within the Central Equatoria Livestock and Poultry Integrated Farm more popularly known as MAFAO[463], with an incubation capacity of 21,000 eggs, should promote local production of day old chicks. There is potential for feed mill businesses in areas already milling human food, and for wholesale importation of feeds.

Policy issues include the need for a sectoral policy which should address issues of whether or not, like other countries, South Sudan should choose to put in place policies to protect, promote and support its nascent poultry industry. This is a policy that many other countries in the region adapted to provide the initial boost for growth of the sector. Other policy issues include the need to review the taxation policy on imports that support growth of commercialization; policy guidance on public sector versus private sector and public-private partnerships in facilitating and stimulating the emergence of support services for the poultry sector, such as the engagement in the hatchery industry and provision of day old chicks.

11.8.2.3 Milk value chain

Although a variety of different dairy products are available in the South Sudan market, there are two main segments: domestically produced fresh cow milk, and imported powder milk: the fresh milk segment dominates, with an estimated total production of around 550 million litres annually[464], with a value of SSP 4.5 billion at an average price of SSP 5 for 600 ml[465]. However some fresh milk is brought into the country, for example from Arua, in northwest Uganda to Yei. Powder milk is important in urban centres and even in the rural areas of states with low cattle populations where up to 2kg/person are consumed annually, with an estimated 3874 tons imported annually[466]. Small amounts of goat and sheep milk are produced in some states, like in Eastern Equatoria, mainly to supplement diets during periods of food stress especially during prolonged dry seasons and droughts. Most is consumed domestically and does not enter the market.

Key actors at the production level in the domestic milk VC are the over 903,995[467] agro-pastoral, pastoral and smallholder livestock keepers producing milk from indigenous dual purpose cattle with low genetic milk potential, further hindered by grazing patterns, poor nutrition and diseases that reduce milk production. There are very few exotic and cross-bred dairy cattle in South Sudan, most kept by political leaders for demonstration purposes, many of which tend to succumb to the prevalent diseases or do poorly under local conditions. Most milk is produced by individual households, and milk production is seasonal, following the patterns of rainfall and grazing and water availability. However, because of the congregation at water sources of large numbers of cattle (from 1000 to over 8000 head) in cattle camps during the dry season, there is a marked boost in the amount of milk available for the period of existence of the cattle camp. Many large urban centres are located close to the large permanent water sources which are preferred locations for cattle camps. There is an emerging phenomenon of 'permanent' cattle camps next to urban centres, due to insecurity and/or the enforcement of urban ordinances that restrict keeping of cattle within urban limits, forcing owners to keep livestock in the peri-urban cattle camps.

[463] The then MAFAO Dairy and Poultry Demonstration Farm established in 1970 was a joint venture between the Ministry of Agriculture and FAO

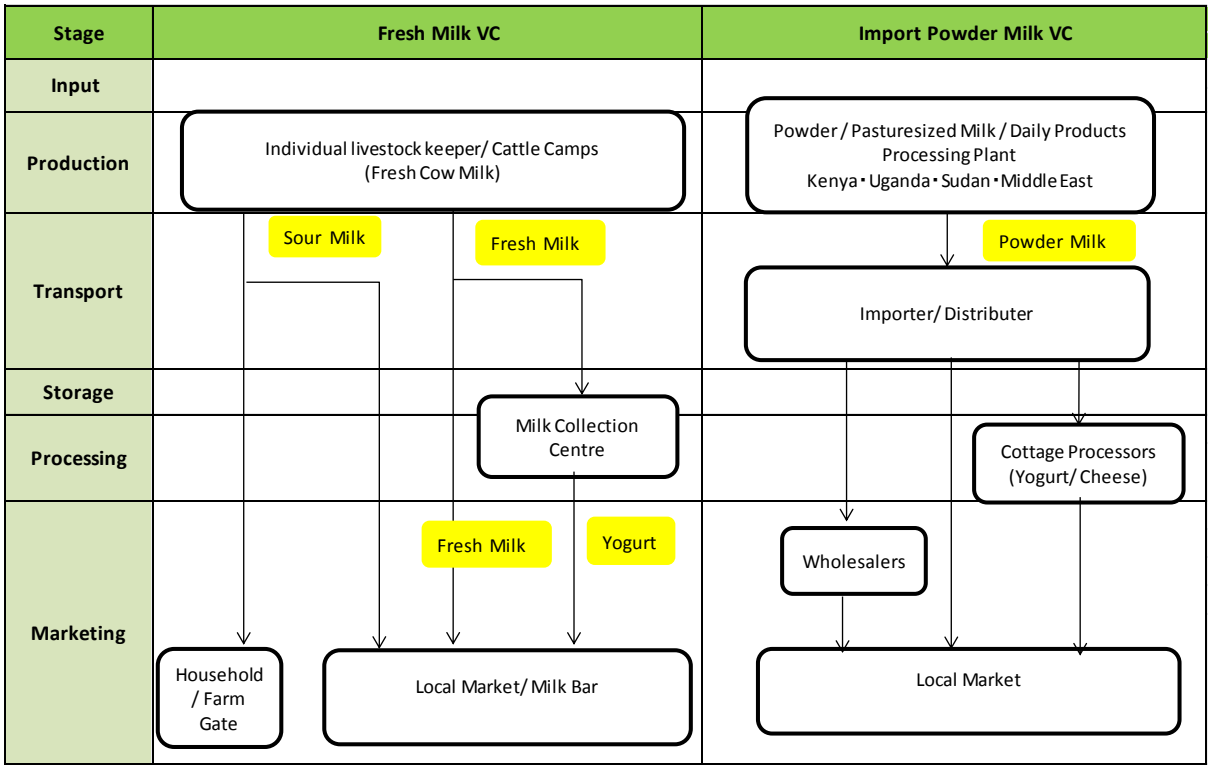
[464] Musinga et al. 2010, Muriuki, H.G. 2010. Development of the Dairy Industry in Southern Sudan: Issues and Suggestions. Ministry of Animal Resources and Fisheries, Directorate of Animal Production and Range Management and Directorate of Special Projects.

[465] From CAMP 2013 collection of field data the ten states between March and July 2013

[466] National Bureau of Statistics. 2012. *National Baseline Household Survey 2009. Report for South Sudan 2012*.

[467] National Bureau of Statistics. 2012. *National Baseline Household Survey 2009.*

Figure 11-20: Milk value chain



Source: CAMP Task Team, March-July 2013, CAMP Situation Analysis.

On average the indigenous breeds produce 0.5–1 litre per day per lactating cow, although some breeds like the Kenana and Botana area said to be high milk producers[468]. Generally traditional milking and handling practices with low hygiene standards are used. Some NGO's in Malakal, Upper Nile State are building the capacity of women, who do most of the milking, to improve their milk hygiene practices so that their milk can enter the local market. Close to 90% of the milk produced is consumed within households, only 10% is offered for sale. The powder milk segment is predominated by milk producers and processors in Sudan, Uganda, Kenya and the Middle East and North Africa (MENA) region, especially the United Arab Emirates and Egypt.

Marketing: For the fresh milk segment, there is a short marketing chain with the main actors being producers who market their products themselves, bulkers or milk collection centres and milk vendors. Two main marketing channels are evident within the domestic fresh milk segment: sour milk, which is an indigenous fermentation technology to prolong the consumption value of milk under conditions in which its quality would otherwise deteriorate rapidly; and fresh milk. Within the South Sudan market, there appears to be an almost equal preference for fresh and sour milk in most of the urban and rural areas of key milk producing areas. It is estimated that in some states, sour milk is the form in which as much as 80% of the marketed milk is sold In the milk markets visited by CAMP, almost equal amounts of fresh and sour milk were for sale.

Handling and packaging milk for sale is a major challenge; innovation and necessity has made use of empty bottled water bottles a common trend. The practice has immense public health challenges; almost all the bottles are recycled, and are gathered from where they have been disposed, almost invariably rubbish heaps. There is a general lack of clean water

[468] Muriuki, H.G. 2010. *Development of the Dairy Industry in Southern Sudan: Issues and Suggestions.* Ministry of Animal Resources and Fisheries, Directorate of Animal Production and Range Management and Directoroate ofSpecial Projects.

and detergent with which to carry out basic cleaning of the bottles. In Wau, milk vendors claimed that they had entered into a deal with a restaurant owner who collected empty water bottles within his premises and washed them before selling them at 1 SSP per bottle to the milk vendors. The milk vendors admitted that they could not verify nor control the process of cleaning the bottles. The bulk of both fresh and sour milk is sold at road sides or within local markets, often exposed to the elements. At a Malakal cattle camp, an NGO provided women with clean small metal cans that were exchanged daily as part of facilitating improved milk hygiene and marketing.

Powder milk is brought into the country by a few large scale importers in Juba who distribute to other urban centres. In some cases, wholesalers come to Juba to buy powder milk which they distribute in their respective towns; they incur high transport costs and face multiple taxation, including informal /unreceipted taxation. Different brands are imported to cater for different budgets and tastes. Main brands include Nido, Jesa, Safa, Al Mudhish, Powder milk from Khartoum has historically been cheaper than that from other locations.

Opportunities: High milk demand, but also a large gap between current per capita consumption levels and recommended levels, means there is a large and fast growing demand and therefore business opportunity. The major production and processing gaps can be closed with relatively low level technologies, promotion of milk hygiene and organization of the sector to give the sector an initial boost. Emerging peri-urban 'permanent' cattle camps provide a tremendous opportunity for an embryonic organized milk industry. Areas of high cattle populations are opportunities for the establishment of collection centres with installed cooling facilities. The fact that most urban centres are located close to permanent water sources is an opportunity for the growth of intensive small holder dairy production units that can use available or planted fodder and forages. Existing collection centres provide practical models for improving handling and bulking of milk.

Key challenges: Deeply entrenched traditional grazing patterns, disease management, milking and milk handling and management practices that lead to low production and productivity and poor hygiene practices. The natural expanse, remoteness and poor access to pastoral and agro-pastoral areas is a challenge for the improvement in production and milk handling practices and for collection and bulking of milk. Research and development and extension services are lacking. Financing and credit for South Sudanese actors to support initial capital intensive dairy infrastructure and to improve the organization of the sector is lacking.

Policy issues: Lack of a sectoral policy, lack of a legislative and regulatory framework and mechanisms for promoting and enforcing phyto-sanitary and food hygiene standards. Potential for herd improvement, especially for creating a nucleus dairy herd for urban and peri-urban centres, is impeded by lack of a breeding policy and public breeding institution.

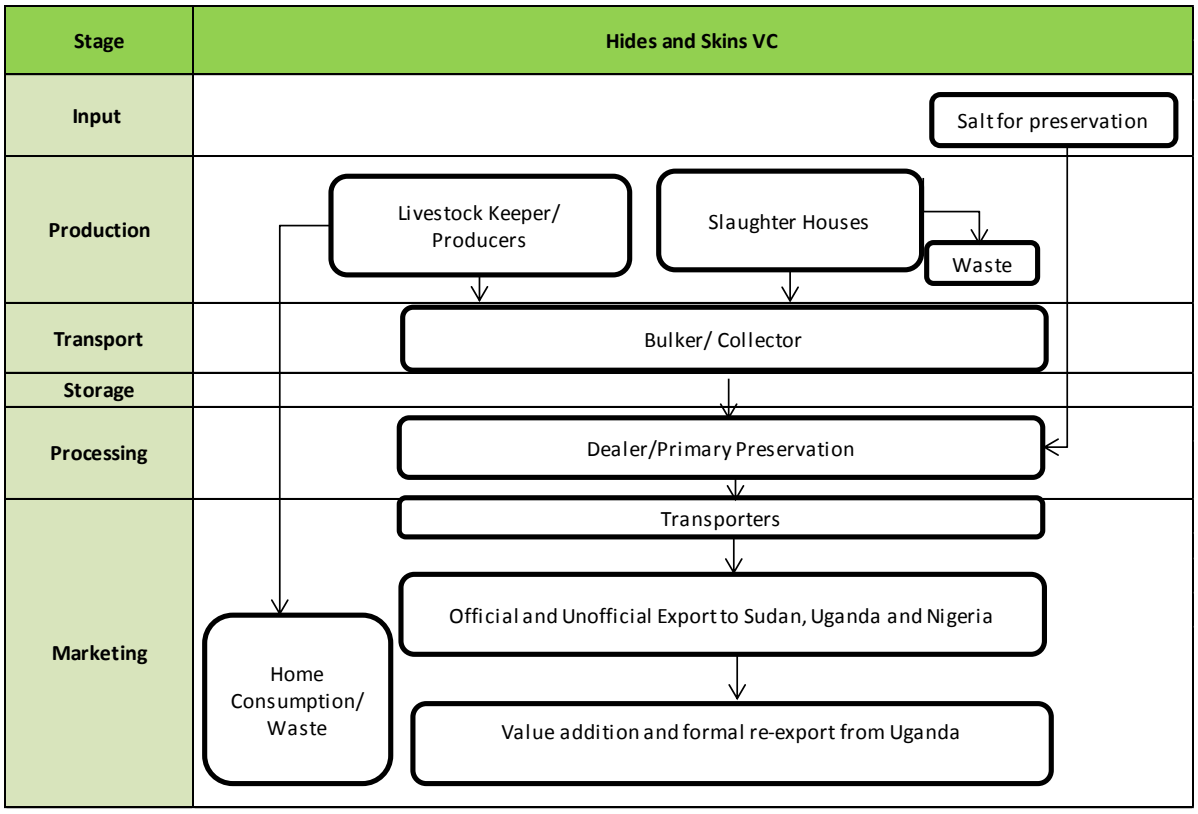
11.8.2.4 Hides and skins value chain

Two key factors characterise the hides and skins VC in South Sudan: first the virtual 'collapse' of the trade since the CPA in 2005. Before the CPA the trade was dominated by Ugandan and North Sudanese buyers, who have since exited the trade due to prohibitively high transport fees and taxes. The second factor is massive waste. Hides and skins emerge as harvestable commodities at slaughter, an estimated annual production of 170,000 hides and 1.6 million skins[469].

[469] Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

While the concentration of slaughter is within slaughter facilities, many livestock, especially small ruminants are slaughtered in homes or restaurants where the hides and skins are not recognized as a marketable commodity and either disposed as waste or consumed domestically. While most of the hides and skins that are traded originate from slaughter facilities, it is estimated that even through that channel only 20%[470] of recovered hides and skins eventually enter the market.

Figure 11-21: Hides and skins value chain



Source: CAMP Task Team, March-July 2013, CAMP Situation Analysis.

Slaughter facilities, households and any other facilities that slaughter animals are key actors; their role is critical in recognizing the commodity and protecting the quality of the hides and skins. It is the practice to utilise hides and skins as part of the protective surface during slaughter of livestock. Poor flaying techniques, and poor management of hides and skins after slaughter, expose the hides and skins to damage. In some slaughter facilities, routinely youth scrap hides and skins to recover any flesh which is sold in scrap meat markets that cater to lower budget customers.

Bulkers/ collectors play an important role in harvesting hides and skins from both slaughter facilities and from households and restaurants. Usually the bulker is a direct employee of the hides and skins dealer, and receives a monthly fee for his services plus assistance with transportation in form of a motor bike or money to hire transport. Hides and skins are usually bought on a per piece basis, in only a few cases are they sold on a weight/ quality basis, in which case the dealer has to provide the weighing scales.

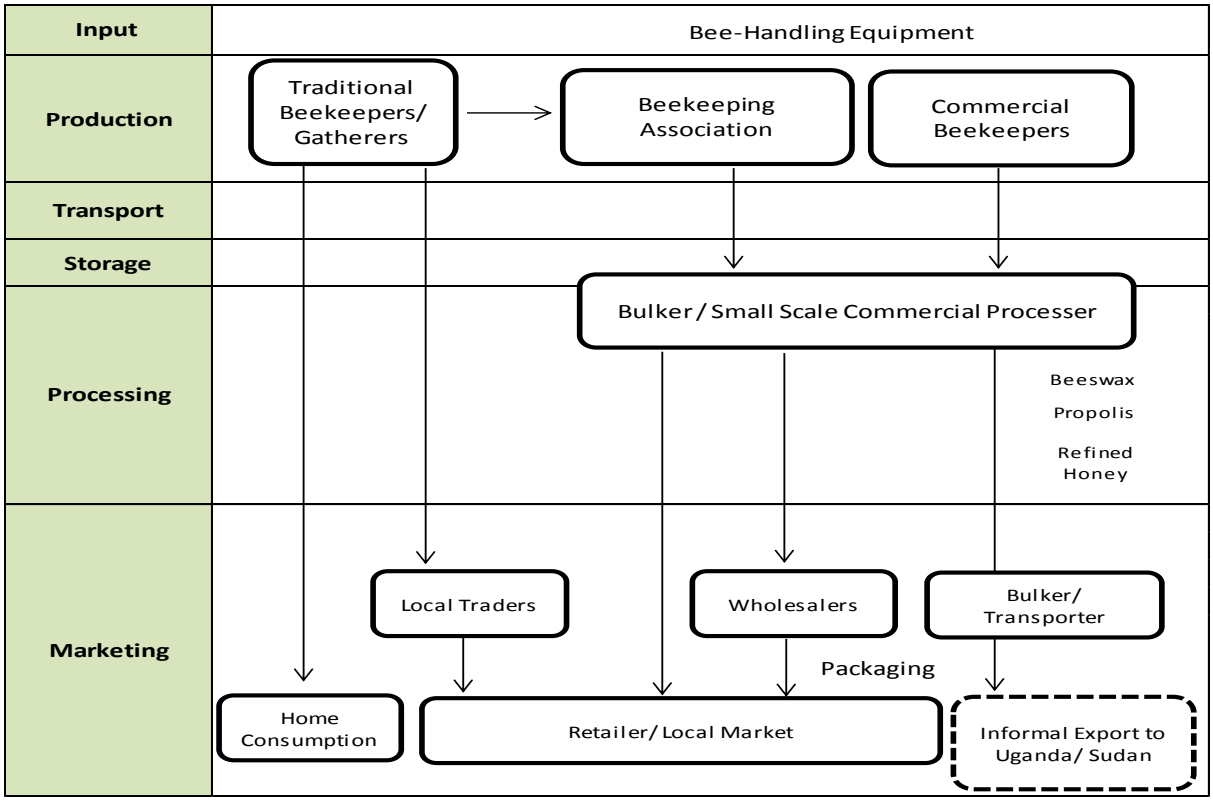
Dealers also hire a person to preserve and store the hides and skins. Preservation and storage facilities are rudimentary and public health issues are evident; where sun drying is

[470] Musinga, M., J. M. Gathuma, O. Engorok and T. H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft Report, SNV and MARF.

practiced, a combination of frame drying and drying on the ground is common practice. Poor salting techniques and management of effluent are issues as is the use of salt for preservation. Salting costs SSP 265 per 50 kg bag in Malakal which can preserve 7 pieces of hide. Generally more waste occurs at the processing phase. Where dealers are closely involved in the business, there is better management of processing and grading, as was the case in Yei. Preservation methods depend on the target market, with Khartoum preferring sun-drying. Hides and skins are transported in bulk, and therefore transportation is a large cost which is charged per hide or skin. Some dealers opt to take loans to purchase their own trucks to cut costs. Hides and skins are exported from the south of the country to Uganda, which in turn re-exports them after grading and minimal secondary processing. States in the north of the country export to Khartoum where there is a vibrant leather industry, or as far as Nigeria where they are consumed as food.

11.8.2.5 Honey value chain

Figure 11-22: Honey value chain



Source: CAMP Task Team, March-July 2013, CAMP Situation Analysis

11.8.3 Imports and Exports

11.8.3.1 Imports

Since the CPA, an increasing share of the high demand for livestock products in the main cities and towns of South Sudan is being met by imports from the region and from global producers and processors. This is despite the fact that South Sudan has a surplus of cattle, sheep and goats, and the meat of both local and commercial produced poultry is fresher than that that has been in transit for months. More basic products like cattle and goats, eggs, chicken (both live and dressed/frozen) are also imported, inflating the import bill. A total of 44,347 livestock were imported from Uganda through Nimule border point in 2012 which included 13,277 cattle, 23,524 sheep and goats, 7,529 poultry, 10 pigs and 17 donkeys. More and more high value processed livestock products are imported to meet the needs of

niche markets in Juba especially where there are growing expatriate and affluent populations, with six tons constituted of 1864.6 kg poultry, 1200 kg pork, 2463 kg beef, 178 kg fresh lamb and 250 kg cheese imported in 2012 via Juba airport alone. Larger amounts were imported through Nimule, and there were also importations from Sudan. Most of the eggs and chicken feed, come from Uganda. Chicks are imported from Uganda, Sudan and Kenya. Other countries include the Democratic Republic of Congo from which goats and chicken are imported into WE. Powder milk, frozen chicken and other value added meats and dairy products, and veterinary inputs and supplies come from Kenya, the Middle East and Egypt, and from Brazil and China. Goats and live chicken are brought in from the DRC into WE for slaughter and restocking. Imported live animals both for slaughter and for other purposes such as restocking attract premium prices as do livestock products. This has negative effects on growth of urban and peri-urban livestock enterprises given the stiff competition from more experienced high tech and low cost producers. This imbalance is fuelled by lack of an enabling environment for growth of urban and peri-urban livestock enterprises including lack of policies and regulations, lack of finance and credit and the low public and formal private sector investment, poor roads and transport, insecurity, numerous checkpoints which levy unreceipted informal taxes, and the lack of supportive input and service enterprises.

Main ports of importation are Juba Airport, Nimule and Kaya to the south of the country for goods from or transiting through Uganda and Kenya, and the northern border with Sudan. Hostilities with Sudan since the CPA and or greater effect since the establishment of the international border when South Sudan got independence from Sudan have affected importation of livestock goods from Khartoum, which were considered cheaper than the goods coming into the country through the southern ports. Movement permits and health certificated are demanded for live animals at Nimule and Juba airport the only official border points.

11.8.3.2 Exports

South Sudan is not realizing its potential for export of live animals and livestock products, with the export profile characterised by low and/or largely unofficial export of live animals and export of only meagre quantities of low quality raw products. Potential for export was documented as early as 1955 when it was established that the country had a large surplus and opportunity to enhance offtake for export to existing and new markets should be explored. Before the CPA there was a net export of livestock and livestock products including live animals to Uganda, Kenya and Ethiopia, and hides and skins and honey to Uganda and Sudan, and hoofs and horns to Uganda[471]. Currently, there is no export of live animals to Uganda through Nimule, and unofficial export of livestock into Kenya and Ethiopia. Trade of live animals to Sudan was reported in Sudan Government 1955 report, which cited preference for meat from South Sudanese breeds to that of Sudan breeds. According to the Jonglei State Strategic Plan 2012 to 2017, the trade of live animals from the state into Sudan through Malakal and Nassir, and to Ethiopia from Akobo is estimated to be the highest proportion of states' commercial offtake. Export of live animals has been affected by insecurity and taxation, disease, and the apparent desire to restock livestock and to clear social obligations such as dowry payments since the cessation of the civil war. The Lamu Port- South Sudan – Ethiopia Transport Corridor (LAPSSET) is expected to stimulate export of livestock from South Sudan.

It appears that the export of hides and skins from the southern part of the country to Uganda has again picked up from lows after the CPA due to insecurity and prohibitively high taxation. Trade of hides and skins from the northern parts of the country (the Greater Bahr el Ghazal and Upper Nile regions) has continued, albeit with considerable disruption due to the

[471]Yoshino. Y., G. Ngungi and E. Asebe. 2011. Africa Trade Policy Notes: Enhancing the Recent Growth of Cross-Border Trade Between South Sudan and Uganda. Policy Note No.21. World Bank.

volatility of hostilities between South Sudan and Sudan. In some states there is strong support and involvement of government which facilitates the trade like in WBG, CES and UN where government facilitates storage and grading. Onl;y a small proportion of hides and skins are prepared for export, all of which are exported with only the most basic of processing, a significant opportunity for increased value addition and increased export. A policy is needed to enhance hides and skins from production through to export and addressing the development of a domestic leather industry.

There is an unverified export of honey to Uganda and Sudan. It appears that in the early to mid 2000s large quantities of honey from South Sudan entered the Uganda market, helping to boost Uganda's export of honey to the European Union. There are conflicting reports of export of honey to Uganda now, with claims that there is not an appreciable differential in price to make export to Uganda profitable due to high transport costs and poor accessibility to production areas, and poor organisation of producers and processors. South Sudan has potentially high quality honey due to the pristine nature of its vegetation which is chemical free.

South Sudan has both long standing and recent experience with trade of livestock, and has breeds with the desired qualities for meat, and can generate substantial livestock products for export. There is a large regional trade of live animals in the Greater Horn of Africa worth millions of US dollars, with trade flows towards more lucrative markets such as Nairobi, Kenya and to high demand Middle East and North Africa (MENA) regional markets. Like other countries in the region, there is need to balance the objectives of formal trade and the reality of the informal structures within which pastoral live animal trade are conducted in. Policies and infrastructure to support export are lacking.

11.9 Services

11.9.1 Extension Services

A National Agriculture and Livestock Extension Policy (NALEP) and a NALEP Implementation Framework, Plan and Budget were developed jointly in 2011 jointly by the then Ministry of Agriculture and Forestry (MAF) and MARF. The NALEP promotes a pluralistic extension system, with government as a regulator, but little has yet been implemented. Currently extension is by the public sector, led by the national Directorate of Extension and Pastoral Development, and the either state level Directorates (UN and US) or Directorates combined with research and or animal production and veterinary services, and through NGOs. There are no private sector extension services[472].

Key challenges for livestock extension are the inadequate staffing and facilitation at state and county level, and lack of clear mandates and clarity of the functions of the extension agents[473]. Resources for extension are lacking such as authoritative information on appropriate technologies and technology packages, demonstration facilities, and access to technologies and inputs, and financing for their proper exploitation. Extension staff themselves lack training and exposure to the appropriate technologies. In animal health, where even curative services are lacking, the only form of extension provided is sensitisation and awareness during vaccination campaigns, and through the efforts of CAHWs. While NGOs often provide the only source of information, most also lack the technical staff who can provide the necessary extension services. The current focus of extension is production, with little or no attention to processing, packaging and marketing components, and to social

[472]Republic of South Sudan. 2011. National Agriculture and Livestock Extension Policy.

[473]Republic of South Sudan. 2012. Lakes State Strategic Plan 2012 – 2016. Ministry of Animal Resources and Fisheries, Lakes State

and cultural issues[474] as is evident from the focal areas in which most NGOs function. Without the existence of a vibrant research system to generate technologies and technology packages, a functional input system and marketing network there may be a need to review the NALEP to reflect the realities on the ground until the sector is more market oriented and stakeholders can demand for services based on the anticipated profits. There also seems to be a disconnect between the NALEP approach to extension services for pastoralists and the view in the MARF which focuses on education and 'modernization' of pastoralists

11.9.2 Research and development

South Sudan has a rich research history, with animal health research documented in the MARF Policy framework and Strategic Plan (PFSP) 2012-2016, and animal production captured by the 1955 Government of Sudan report on the resources and potential of Southern Sudan, and MAFAO and Marial Bai reports. The research facilities were decimated by 1983 to 2005 civil war and important research information and technologies lost. The national MARF Animal and Fisheries Research and Development Directorate is the public sector lead, and has a mission to establish a participatory, demand driven, pluralistic and sustainable research system. The research agenda elaborated in the MARF PFSP is limited: not reflective of the subsector stakeholders, of the production systems, and of the existent technologies and technology packages and collaboration and innovative funding opportunities within the region. The PFSP research agenda focuses on construction of veterinary research facilities, tsetse and ECF research on the animal health side, and genetic improvement of animal resources, feed formulation and quality assurance under animal production. A comprehensive research policy, regulatory and legal framework to facilitate the development of a national and pluralistic research system that will provide guidance for all stakeholders and to provide linkage to extension services is needed. The integrated livestock centres (formerly model farms) should be considered as potential candidates for research and development centres. South Sudan has the potential to make significant contributions in livestock and rangeland genetic resources and indigenous livestock production knowledge to the wider region.

One of the efforts after the CPA, and funded by the Multi-Donor Trust Fund was the construction of a Central Veterinary Lab (CVL), and two regional ones with diagnostic and research functions. The CVL facility with basic infrastructure is situated on 500 x 500 metres of land at Rejaf West, about 10 km from Juba Town. So far, little has been achieved concerning the priorities set out in the strategic plan due to limited funds for the necessary infrastructure and initiating research activities. The only work being undertaken is the mapping and molecular characterisation of tsetse flies, supported by the Bill & Melinda Gates Foundation under PATTEC. The centre currently employs young graduates who need further training to meet the research needs of the country.

11.9.3 Input Delivery Systems

Veterinary supplies outlets are mainly found in state capitals and county headquarters, although in some cases, they have networks in payams and bomas. Currently, the state veterinary services licence veterinary pharmacies and agro-veterinary stores. The main criteria for licensing in Central Equatoria State are: the license owner is a professional veterinarian, the inspected and compliant (concrete, well ventilated and roof with ceiling board). In Upper Nile State, two types of licences are needed: veterinary licence (150 SSP/year) and local authority (1,350 SSP/year). The main clients of these stores are pastoralists, CAHWs and NGOs. Drugs are sold to pastoralists based on a clinical description of the ailment. In Malakal, medicines sourced from Juba are more expensive compared to those from Khartoum or Ethiopia, while in Northern Bahr el Ghazal State, medicines from Khartoum are very expensive compared to those from Uganda. A sample of

[474]Republic of South Sudan. 2011. National Agriculture and Livestock Extension Policy.

prices of commonly used veterinary medicines and products is presented in Table 11-31.

There are opposing views on the trend of business since the signing of the CPA. In Upper Nile State, it is felt that before CPA, people moved freely and therefore sales were higher. Excessive taxation post-CPA has made matters worse. On the contrary, veterinary supplies operators in Northern Bahr el Ghazal State feel that the business environment has improved after CPA. They are able to move around freely and market their products. Many of the operators see no role for the government in the distribution of drugs; and feel that the government only hinders the private sector. For example, the government took over all the bush pharmacies OXFAM had developed in Upper Nile State, but within a short time, they all stopped functioning.

The main constraints cited by veterinary supplies operators across the country include: poor road infrastructure making access to the interior very difficult; unreliable supply sources; high cost of transport; huge seasonal fluctuations in sales; low purchasing power even for those with many animals; and insecurity across many parts of the country.

Table 11-31: Prices of Commonly used Veterinary Medicines and Products

Medicine	CE	U Nile	NBG	Jonglei	Unity	EE	WE	WBG	Lakes	Warrap
Ox tetracycline 5%	*	20	16	15	20	*	*	15	20	*
Ox tetracycline 10%	*	*	20	20	40	15	25	0	0	*
Ox tetracycline 20 %	20	35	25	25	50	15	25	20	30	*
Ox tetracycline 30%	30	*	*	30	50	*	*	0	0	*
Amoxicillin	35	*	*	25	40	25	*	50	30	*
Penicillin	35	*	37	30	40	25	*	50	30	*
Ethidium—Tab	5	7	*	5	5	3	*	5	5	*
Tryponil 25%--Sac	3	7	*	5	5	5	*	3	5	*
Acaracides	25	30	*	35	50	20	*	15	35	*
Multivitamin	25	50	*	70	50	35	15	30	30	*
Ivermactine 50ml	50	35	*	50	35	45	35	15	50	*
Albandazol /oral	35	50	*	35	50	35	35	50	50	*

Source: Compiled by the CAMP Task Team based on information obtained from GRSS MARF. 2013

Agro-input/ animal feed and equipment/ day old chick outlets: dealers specialising in providing animal production inputs and equipment are almost non-existent across South Sudan. There is very low utilisation of inputs among the majority of livestock keepers. Commercial enterprises or those supported by NGOs import feed, equipment and other inputs directly from Uganda, Sudan, and Kenya increasing unit costs. A number of feed mills were started but closed due to lack of finance, in consistent supply of key ingredients or poor sales. A government feed mill at MAFAO, renovated under the Multi-Donor Trust Fund (MDTF) closed due to disease that affected the adjacent hatchery. Private sector dealers are reluctant to carry equipment and other inputs on their stock lists without assurance of sales.

11.9.4 Food safety assurance

To provide a better guarantee of food of animal origin, one of MARFs key objectives is to improve meat and milk hygiene in all the 10 states. So far, no milk quality assurance takes place in any of the states, understandably because the quantities of milk produced and marketed are too limited to warrant such efforts. NGOs in different states are working with communities, especially women to improve the quality of milk on offer for sale.

Most state capitals have slaughter slabs, with some like Aweil, Northern Bahr el Ghazal State, now having a slaughter house. However, in the majority of county capitals animals are slaughtered in the bush without veterinary supervision and inspection. The slaughter facilities are government owned but operated by local authorities. Visits to some of the slaughter slabs/houses revealed the following: 1) animals are not accompanied by

movement permits; 2) absence of animal handling facilities. In the case of Juba, the land originally meant for this has been grabbed and put to personal use; 3) ante-mortem is conducted the previous day. Slaughtering is done at dawn and meat inspectors cannot travel to the slaughter slabs at this hour due to security concerns and lack of transport; 4) animals are not stunned before slaughter; 5) some carcasses are inspected on the floor alongside the offal; 6) meat inspectors have no jurisdiction over meat carriers; 7) very poor waste management systems (drainage and soak pits are either missing or blocked); 8) human settlements and businesses are fast encroaching on the slaughter facilities; and 9) there is an uncontrolled dog population.

Good examples exist: the Awei slaughter house was constructed under SPCRP which has animal handling facilities that offer ample space for animals to rest and drink water and facilitate ante mortem inspection. A major constraint expressed across the country is the absence of a legal framework to facilitate meat inspection and failure by the other arms of government to consult with veterinary authorities in situating slaughter houses. Since the CPA, the veterinary service directorate relies on goodwill and the old laws to carry out meat inspection. Otherwise, the owners of the meat/cattle have the final say on the status of the meat. The common reasons for organ or carcass condemnation are bovine tuberculosis, *Cystercircus bovis*, icterus, liver flukes, liver cirrhosis and abscesses.

11.9.5 Animal welfare

Animal rights fall into five categories namely; freedom from hunger, thirst and malnutrition; freedom from fear and distress; freedom from physical and thermal discomfort; freedom from pain, injury and disease; and freedom to express normal patterns of behaviour. Good animal welfare is therefore an integral part of animal production and manifests in better production, market access and safe and mutually beneficial companionship. This is all summed up in this quote from Mahatma Gandhi, *"*The greatness of a nation and its moral progress can be judged by the way its animals are treated*".*

At most markets and auction yards, ruminant species are generally well catered for. This was very evident in Malakal where fodder is available for sale in the markets, while animals that fail to sell are taken for grazing in the afternoon to early evening. The main concerns for ruminant species is at the slaughter houses where the majority have no animal handling facilities for animals to rest and drink water and the failure to stun before slaughtering. Some of the vehicles used for moving animals are not appropriate; in Nimule trailers were used. Horses and donkeys are mistreated and left to die, despite being the main means of transport for goods and water, especially in the northern states like Upper Nile. As a result, over 75% of the cases handled by the INDBUTT clinic for these two species of animals are injury wounds inflicted by owners and through poor harnessing techniques.

In Wau Town, the state veterinary service conducts fitness tests for draught animals. However, the same town has perhaps the most stray dogs. The veterinary service absolves itself from blame and instead blames it on the municipal authority. Luckily, the Ministry of Health in the area has taken on leadership and brought together all the key stakeholders with a view to containing the stray dog and rabies menace.

11.10 Infrastructure

Infrastructure is a key foundation for development, necessary for lowering the cost of doing business including enforcement of regulations and standards, improving security, increasing value addition, improving coordination and strengthening integration of the subsector with the rest of the economy.

11.10.1 Production facilities

Water for production infrastructure: Livestock across the states depend on natural water bodies as the main sources of water. The seasonality of these sources is one of the triggers of migration and of inter-community conflict over scarce water during periods of prolonged dry seasons and drought. Extensive mapping of grazing lands in Central Equatoria, Eastern Equatoria and Jonglei showed the strong link of migration to water needs. Movement is towards more permanent water resources or to areas where it is possible to dig temporary wells. In the past, development of water infrastructure, such as haffirs (manmade lake/ water reservoir), were common, documented in the 1955 Government of Sudan report. Pastoral communities hand dig micro-scale haffirs, but these are often too shallow and inadequate for the needs, drying up during the dry season. A 30 million cubic-meter water haffir constructed by UNDP under the South Sudan Recovery Fund (a joint GOSS, donor community and UN) in Jie, Kapoeta East County curtailed Toposa migration for the first time in the living memory of the community, deflecting the occurrence of tensions and violent conflicts often associated with the migration. Three more haffirs are being constructed within the Greater Kapoeta area. Haffirs are planned in Duk, Pibor, Ayod and Akobo Counties under SSRF funding in areas most prone to water related conflicts after the success of four haffirs in Nyirol and Uror Counties. SSRF also funded two haffirs in Tonj East, Warrap State. Community consultations and Crisis Recovery Mapping Analysis were used to determine the appropriate location of water points. Such large infrastructure is costly and experience in the region has showed their long term disadvantages including degradation of rangelands. More localised infrastructure, which is aligned to rangeland resources, cheaper and amendable to community management, is also needed.

Migratory infrastructure: Security of migration to access dry season resources is critical for nomadic and transhumant pastoral and agro-pastoral livestock keepers. Access to seasonal resources is protected under the Transitional Constitution of South Sudan, but there is no policy, legal and regulatory framework. Migratory routes were mapped by MARF but protection of the routes is yet to be actualized. South Sudan stands to learn from Darfur State, where between 2005 and 2012, 4000 km of transhumance routes were demarcated, each 150 metres wide, with markers at 1-3 km intervals. The State compensated land that was integrated into the migration route, and services such as water points, schools for nomadic communities, mobile veterinary clinics were established. Security is also provided for the migrating groups, with local administrators and police accompanying the migrating communities.

Poultry infrastructure: Production infrastructure for poultry production including feed mills and hatcheries is lacking. Mills for food for human consumption exist and generate substantial by-products needed for feed mills.

11.10.2 Marketing facilities

Stock routes: stock routes from main production areas to markets are not developed. Herds in transit to markets are exposed to water and feed shortages and to disease that affects the body condition of the animals. Periodic flooding makes the stock routes impassable affecting supply of livestock to markets. Insecurity and rustling are common and directly affect the usage of a route and the selection of the destination market.

Ruminant market infrastructure: the ruminant livestock markets infrastructure is a network of:

(1) Primary markets (local markets, rural to rural transactions) where producers are the main seller. These are an estimated 3-4 per country that has a significant livestock population i.e., approximately 60% of the counties or 136 markets.

(2) Secondary markets/auctions (domestic markets with rural to urban transactions) where sellers are a mix of producers and traders. There is approximately one market or auction per county that has a large livestock population i.e. 4 in Unity, 5 in Warrap, 5 in NBG, 9 in Jonglei, 5 in CES, 1 in WE, 2 in Upper Nile, 3 in WBG, 9 in Lakes and 6 in EE for a total 48 secondary markets or auctions .

(3) Terminal markets/auctions (hubs in the Greater Equatoria, Upper Nile and Bahr el Ghazal regions with urban to urban transaction) where livestock from surrounding counties and states are sold for mostly slaughter: eight in Central Equatoria, and one each in Upper Nile, Western Bahr el Ghazal, Jonglei, Northern Bahr el Ghazal and Eastern Equatoria, i.e. 13 terminal markets; and a total of 197 livestock markets. Livestock from South Sudan are exported to markets in Sudan, Ethiopia and Kenya; and were exported to markets in Uganda before the CPA.

The number of markets, given the size of the country and the livestock population, is inadequate. Livestock keepers trek 2-3 days to reach primary markets and more than a week to reach secondary and terminal markets. At least one primary market is necessary per payam to adequately serve livestock producers. The infrastructure at local markets is rudimentary, an open space, with trees and no facilities, sellers and buyers negotiate and agree a price. The local authorities levy taxes and the sellers manage and keep the facility clean. The infrastructure at secondary markets and auctions differ from one to another, but with more animals on offer for sale, the site is larger, and the sale area is enclosed, and cattle and shoats are sold in separate areas. Water and grazing are challenges: there may be a market based kraal on site, with or without a small, adjacent grazing area, or a 'permanent' cattle camp nearby which offers kraaling services. A fee is paid per head of livestock for the kraaling services. The markets are owned by the state and/or the county and managed by them or private entrepreneurs. Animals that die at the facility are burnt or thrown in a river. Some terminal markets/auctions may have more facilities including holding grounds and water sources, and auctioneer and revenue collection offices. Land for markets is a key issue: with the re-zoning that has taken place since the CPA, markets have officially been allocated land outside of town/urban centres. Traders consider this a risk to business and in terms of security. Some markets have lost land to other developments. The uncertainty with land affects investment in market facilities.

Poultry markets: poultry are sold within local markets in rural areas and at the main markets at county and state level. An area of the market is dedicated to poultry sale, with a shelter constructed for the poultry which are displayed on the ground or on raised platforms. No veterinary services are offered.

Border check points and quarantine stations: Nimule and Juba International Airport are the only functional border points that are controlled. Ten other border posts are planned.

11.11 Investment

11.11.1 Public sector expenditure and investment

Due to significant issues of public interest, the national government's role is important in funding and investment in development of the livestock sector. Key infrastructure and services such as markets, border control posts and quarantines, diagnostic labs and facilities, water for production (dams, hafirs), protection of migratory routes are areas where the nature of investment is best suited to public sector funding.

National budgetary allocation to MARF for livestock subsector development is well below the 3% stipulated under the Maputo Declaration and envisioned to as critical to achieving 6% annual growth. Between 2006 and 2012/13, the whole Natural Resources and Rural

Development Sector which included Agriculture and Forestry, Animal Resources and Fisheries, Cooperatives and Rural Development and the Land Commission received a meagre 1.5% of the government budget. Under the 2012/13 austerity budget, Development Partners funded 31% of the MARF budget, and some key areas important to livestock were left unfunded including: support to animal health service delivery i.e., control of diseases, sero-surveillance, and procurement of drugs and vaccines; land management (land policy development, research on land ownership and causes of disputes over land, and resolution of conflict over land); and economic management projects to improve livelihoods in rural areas and facilitate the settlement of returnees[475].

State governments: At state level, budget allocation to the livestock subsector is not commensurate to the contribution of the sector to the state economies. In Eastern Equatoria, the Greater Kapoeta area, with a significant pastoral population, provides 80% of the State revenues through taxation on live animal trade and other local taxes related to livestock subsector activities, and from the export of hides and skins to Uganda. Although state revenues are quite modest in relation to central government transfers, they are important for state functionality, as emphasized by loss of that income under austerity measures.[476] Only 1.1% (2,212,438 SSP out of 193,041,480 SSP) of the 2012/2013 Eastern Equatoria State budget was allocated to animal resources development. This was a common trend across the states.

Since the CPA and through support from MDTF and FAO, GIZ, VSF, SNV and other NGOs state and county governments have made greater investments in livestock infrastructure including markets, auctions, slaughter facilities, hides and skins storage facilities and water infrastructure. These have been important investments especially in states in which government has successfully divested the business to private sector. In some cases the divesture is neither complete nor is a public private partnership formalized impeding private sector investment.

11.11.2 Private investment

Formal private sector in the livestock subsector is emerging, the informal sector dominates. Cash circulation is minimal in a non-monetized economy where the majority of the subsector assets are held as live animals. A large proportion of primary transactions (between producers or with grain traders) are on an exchange, loan or batter arrangement. Traders and butchers function with minimal cash investments, sometimes procuring animals on credit from producers or rural traders. The indigenous poultry and honey value chain similarly functions with minimal cash investment by primary actors. Few formal private sector actors have a substantial investment in the sector besides a few commercial producers and processors, wholesale traders in livestock products such as powder milk and a handful of veterinary input dealers based with urban areas.

South Sudan is however attracting attention from regional investors who are already benefitting from exporting to the lucrative urban markets. The fast growing dairy industry in Uganda is looking to expand milk collection and processing into the country. There are also similar plans for development of hatchery facilities.

11.11.3 Development partner investment

Development Partners (DPs) have played an important role in funding livestock subsector investments from support to establishment of state ministries, in strategic planning, development of infrastructure, capacity building and investment in animal health especially

[475] National Budget Plan, Financial Year 2012/13. June 2012. Ministry of Finance and Economic Planning, Republic of South Sudan.

[476] Republic of South Sudan. 2012. Final Resolution of the Second Governor's Forum. 26-29 November 2012. Freedom Hall, Juba.

annual vaccinations and supporting the establishment of veterinary input supply chains. However much of DP investment timeframe is short.

11.11.4 Investment climate

The growth of private investment is impeded by lack of sectoral policies; a legal and regulatory framework and enforcement mechanism; lack of finance and credit; lack of coordination between segments of the different value chains; limited infrastructure; land issues and conflict and insecurity which all undermine investor confidence.

12. Forestry

12.1 Overview

South Sudan is endowed with diverse natural forests and woodlands with a high potential for economic and environmental value creation. Previously, the resources and opportunities were taken advantage of by previous governments and the private sector. Since the early 20th century, legal and institutional arrangements were established to guide, regulate and support development of the forestry subsector. South Sudan went through the two civil wars before its independence in 2011. Although it is said that forest resources, teak plantations in particular, helped to finance military operations, the wars disrupted proper management of forest resources for decades. During this period, institutional strengths and human resources necessary for the proper management of forest resources deteriorated.

Since South Sudan's independence in 2011, the forestry subsector in the country is in a transitional period as the old legal system must be replaced by a new system. The new system is in the early stage of development; so far, the forest policy was only recently formally adopted. Many perceive that there are no laws to govern the forestry subsector because (although arguable) the old legal system is invalid. This perceived legal vacuum creates a peculiar situation for the subsector where anyone can do anything without fear of, for example, prosecution. This absence of a legal system influences the professional community of the subsector, and it is necessary to report this at the beginning of this chapter. Interpretations of the legal framework vary even in the same individual, who can describe an activity as illegal but comment that there is no law to arrest the perpetrator of the activity.

The Directorate of Forestry in GRSS and state governments, and forest officers and guards deployed to county governments and Central Forest Reserves (CFRs) are the main public sector actors in the subsector. Their limited resources and capacity are shown in their inadequate level of on-the-ground public service delivery. Management of CFRs is, in general, disastrous. Natural and plantation forests in CFRs are the subject of widespread illegal activities and encroachment. However, large tracts of teak plantations in CFRs in the Greater Equatoria Region are still intact or less affected by illegal activities due to bad road conditions. Private sector involvement in the subsector is represented by two concessionaires operating in Western Equatoria State, timber dealers, out-growers, sawmills, forest products wholesalers and retailers, charcoal producers, traders and retailers, and small informal businesses handing various minor forest products. Forest products are marketed locally (e.g. fuelwood), nationally (e.g. charcoal), regionally (e.g. gum acacia), and globally (e.g. teak timber).

12.2 Key issues and challenges

Key issues and challenges identified through the situation analysis are summarised based on the structure defined in the Forest Policy 2013. Most of the key issues are directly or indirectly linked with the most challenging issue of weak management and service delivery capacity in the public sector.

(1) Commercial forestry

- Development of forest plantations and woodlots by farmers and businesses in the form of agroforestry and small-scale plantations has happened to some extent in the Greater Equatoria Region. However, potential further expansion of teak plantations and woodlots for sustainable production is not fully exploited due to limited extension efforts by the government and a speculative market environment.
- A poor legal framework and infrastructure result in a perceived high investment risk and high production and marketing costs, which seriously hinder private sector investment

and employment creation in the subsector. Up to now the limited cases of private investment were forest management under concession arrangements.

- Traditional and micro- and small-scale enterprise oriented marketing of forest products and services dominate in the sector. Only specific products (teak timber and gum acacia) have accessed regional and global markets but to a limited extent. Risks and uncertainty associated with the poor legal framework and infrastructure, and weak technical and regulatory support from the public sector discourage the further investment necessary to enhance existing markets and explore better marketing opportunities for other forest products and services.

(2) Community forestry and agroforestry

- Food security and rural development through enhancement of community forestry and agroforestry require clear legal frameworks consistent with the varying customary law mechanisms and governments' extension expertise and skills in order to clarify land rights and to mobilise local resources for forest production. Although the concept community forestry is defined in the Forest Policy 2013, there is no firm legal framework nor sufficient experience and expertise to implement on-the-ground public service delivery for the promotion of community forestry and agroforestry.
- The same is true for collaborative management of Central Forest Reserves and other types of public forest reserves involving forest fringe communities, private sector concessionaires and processors, traders, and governments. The legal framework, governments' experience and technical expertise must be enhanced to realise a community management regime.

(3) Conservation

- It is probably too early for South Sudan to invest a significant amount of public resources in biodiversity conservation and habitat conservation. Illegal and uncontrolled utilization of biodiversity resources has, and still is, widespread and the country has experienced rapid degradation of such resources. Government resources are limited and are not sufficient to implement conservation measures in an effective manner.
- Conservation and management of CFRs deteriorated during the period of the second civil war. The current status of CFR management is disastrous and recovery and strengthening of CFR management are urgently to avoid further uncontrolled exploitation of forest resources and encroachment.
- Collaboration among authorities in GRSS and state governments for management and conservation of forest resources is weak due to an inadequate legal framework, expertise, and communication and transportation resources.

(4) Institutional arrangements for the forest sector

- The legal framework to determine power, responsibilities, functions and financial modalities of the national, state and local governments is still under development. Coordination among the national, state and county governments is lacking for the generation of complementary efficiency gains. There are serious accountability, and supervision and reporting problems concerning, for example, transfers from the national to the state governments.
- Although the establishment of the South Sudan Forest Commission and Forest Development Consultative Forum is proposed in the Forest Policy 2013, the viability and efficiency of such organisations in contrast to private sector investment and decentralised forest management have not been thoroughly analysed.

(5) Policy implementation

- Government delineation of authorities and responsibilities and their ownership of projects and programmes have been inadequate for the implementation of the Forest

Policy 2013. Key legal instruments such as Forestry Law, related acts and other legal instruments are still not in place or only partially implemented.

- Completeness, fairness, and efficiency of forest revenue collection are neither achieved nor can be achieved due to unrealistic administrative provisions with respect to the human and financial resources allocated. Therefore forest revenue and fee collection became sporadic and in many cases tarnished by corrupt practices which hinder private sector development. It is reported that the private sector considers the government as a business obstacle who provides no public service delivery for the taxes and fees they paid. Both the public and private sectors do not trust each other and this is a serious issue.
- There is a common perception that budgets of national, state and local governments are insufficient.
- Planning, implementation, monitoring and supervision, and evaluation of GRSS agencies, state and local governments, and DP supported programmes and projects are not well coordinated.
- Insufficient financial resources are allocated for human resource development, application of modern science and technology, and knowledge creation activities.

12.3 Forest resources

As shown in Figure 12-1, South Sudan is endowed with diverse natural forests and woodlands with an estimated total area of 191,667 km^2, or about 30% of total land area.[477] The extreme south and southwest of South Sudan represent the sub-tropical vegetation zone, which changes relatively abruptly into savannah. Large areas of South Sudan exhibit low-density woodland savannah vegetation of mixed scrubs and grassland. These are the areas abundant with gum trees. The Ironstone Plateau, which borders the Democratic Republic of Congo (DRC) in the southwest, supports forestry and intensive agriculture. In the extreme south of South Sudan are the Imatong, Dongotona, and Acholi mountain ranges that flank the White Nile and contain dense forests. Mount Kinyeti within these ranges reaches an elevation of 3,187 meters, being the highest point in South Sudan. Further west of these ranges contain one of the best remaining teak plantations.[478] However, deforestation pressures are increasing, driven mainly by demands for agricultural land, fuelwood, and charcoal.[479]

Over 5% of South Sudan is covered by permanent wetlands and flood plains, linked to the Nile tributaries that traverse the southern plains, with the largest such wetland, the Sudd, covering 30,000 km^2 and lying between the towns of Bor and Malakal. This large wetland area comprises multiple channels, lakes, and swamps, which have been less impacted by man and represent a safe haven for wildlife, including migratory birds.[480]

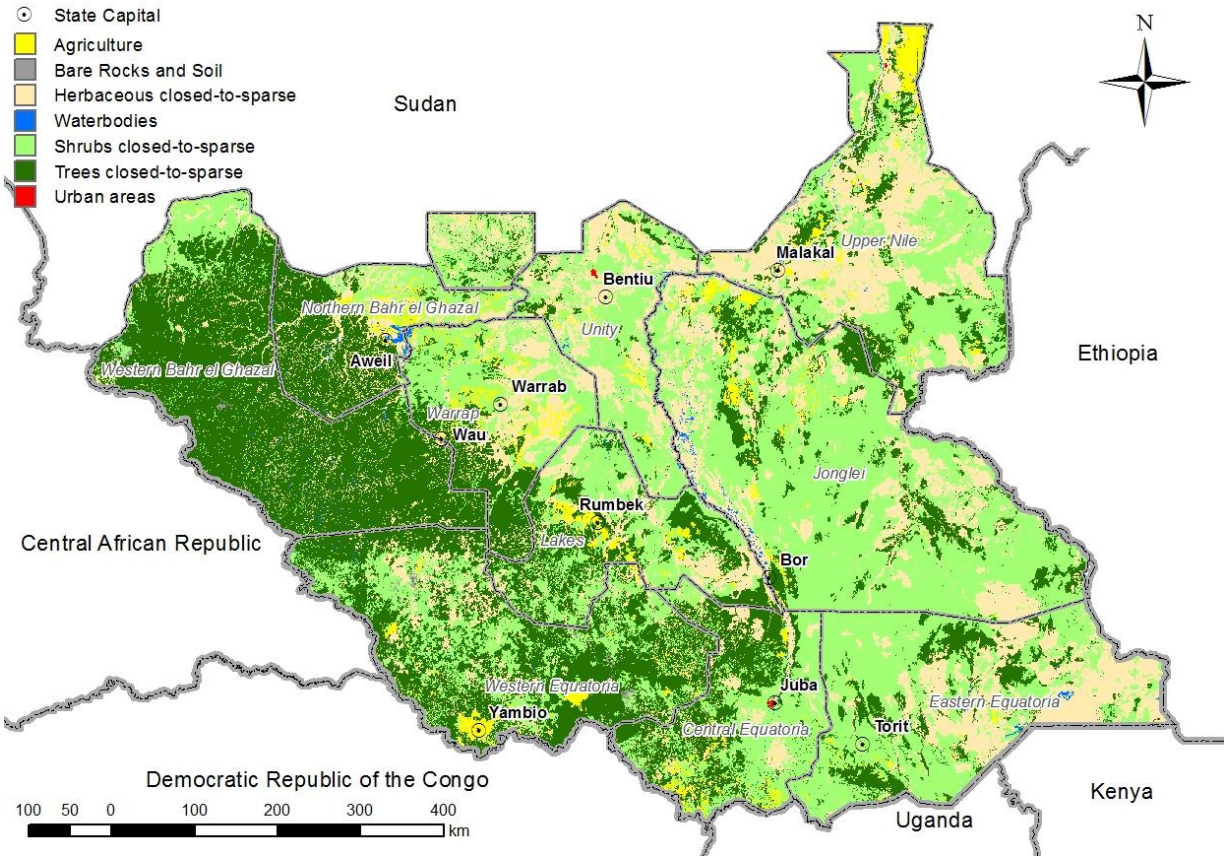
The country is endowed with soil and rainfall conditions favourable for growing forest plantations with a wide range of trees from rainforest species (such as mahogany, teak and eucalyptus) to temperate climate species (including pines and cypresses).[481] Forest reserves comprise 17,460 km^2. Plantations, consisting largely of teak, covered 1,879 km^2 prior to the

[477] Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan. p. 10.
[478] World Bank. 2010. A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note. World Bank: Washington D.C.
[479] World Bank. 2010. A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note. World Bank: Washington D.C.
[480] World Bank. 2010. A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note. World Bank: Washington D.C.
[481] Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan. p. 10.

start of the civil war, but are now estimated to have been extensively degraded during the years of conflict. [482]

Non-wood products include shea nut, locally known as "lulu" fruits, fibres, grasses, honey, oils, resins and gums, plus sand, gravel and forest soils. Many non-timber forest products are harvested for local use and to some extent for trade. Gum acacia also constitutes one of the major export products of South Sudan. In Eastern Equatoria, Northern Bahr el Ghazal, Upper Nile, Unity, Jonglei and Warrap States, there is significant unexploited potential for gum trees.[483]

Figure 12-1: Forest cover (trees closed-to-sparse) in South Sudan



12.4 Forest policy and legal framework

12.4.1 Background

In July 2013 the draft Forest Policy 2013 was presented to the National Legislative Assembly of the Government of Republic of South Sudan (GRSS) for its approval. The policy is the first framework forest policy for the new nation of South Sudan, which has been formulated during the period from the Comprehensive Peace Agreement (CPA) in 2005 and through independence in 2011. The policy has been developed in the legal and policy context shown in Table 12-1.

[482] World Bank. 2010. A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note. World Bank: Washington D.C.

[483] Republic of South Sudan. 2013. South Sudan Development Initiative 2013-2020 Final draft report. Government of Republic of South Sudan: Juba.

The history of forest management by public authority in South Sudan dates back to early 1900s when the Anglo-Egyptian government[484] passed the Forest Law and Ordinance of 1902 which was premised on policies to ensure sustained production of fuel and sleepers for railway operation and to ensure forest protection and conservation. Although this marks the first attempt to manage and control forest resources by colonial authority, natural and forest resources have long been managed through customary laws and rules by community based traditional authorities. The Central Forests Act of 1932 and the Provincial Forest Act of 1932 provided for (i) establishment and management of central and provincial forest reserves, (ii) development of industrial and non-industrial plantations of fast-growing tree species, and (iii) regulated access by and benefits to forest adjacent communities. The Forest Law and Regulations of 1972 provided for sub-regional (i.e., by Southern Sudan) planning and control.[485] This devolved system was repealed by a 1983 Presidential Decree, and management and control of Central Forest Reserves (CFRs) were returned to the central administration of the Government of Republic of the Sudan[486] (GRS) in Khartoum.

12.4.2 Major policies affecting the Forest Policy 2013

In Southern Sudan the outbreak of civil war in 1983 limited further policy formulation and implementation until the CPA of 2005. During this period the following four major policy and legislation were developed by the government of GRS affected the forestry sector[487]:

1. Adoption of the 1986 forest policy which holds to the present day. The policy gave a mandate for actions related to conservation, sustainable utilization of forest products, promotion of environmental protection and individual and private sector contribution to national afforestation efforts. The policy sets a national target of 20% of total land to be under forest reserves and protected forest.
2. Through Ministerial Order No. 284 of 1986, the Forests National Corporation (FNC) was established to manage Central Forest Reserves in a business-like manner and to provide technical guidance on forestry development throughout the country.
3. Through a Constitutional Order 1994 the government adopted a federal system with 26 states and local governments.
4. A new Forest and Environment Act was introduced in 2003 which applies to the present day. The act ensures sustained environmental services of forests. It provides for a mandatory area of agricultural land which must be forest at least 10% of rain-fed agricultural schemes and at least 5% of irrigated agricultural land must be forest.

12.4.3 Devolution of power and benefit sharing arrangement

The Forest Policy 2013 is consistent with the legal framework adopted by the Transitional Constitution of the Republic of South Sudan 2011. The devolution of powers to and benefit sharing arrangement with state and local governments, among others, are significant characteristics of the legal framework adopted not only by the Transitional Constitution but also by the CPA and the Interim Constitution of Southern Sudan 2005. In the framework, responsibility for managing forests is shared between GRSS and state governments. The equitable sharing and allocation of natural resources and their revenues are based on the constitutional requirement. The framework also recognizes Traditional Authority and customary law which is a major part of the legal system in South Sudan. In line with the devolution of powers, active community participation in forest management is to be

[484] Anglo-Egyptian Sudan referred to the manner by which Sudan was administered between 1899 and 1955, when it was a condominium of Egypt and the United Kingdom.

[485] Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan

[486] Independence on 1 January 1956.

[487] Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan

promoted. Previous forest policies before CPA had focused on government-managed forestry development where communities adjacent to the forests were allowed limited benefits from forests and did not actively participate in management of the forest. On the other hand mobilization of community capacity for sustainable forest management and conservation can be achieved under this new framework. [488]

Table 12-1: Summary of the legal and policy framework for forestry in South Sudan

Legal and policy framework for forestry in South Sudan		Period		
		Pre-CPA*1 (Before Jul. 2005)*2	Southern Sudan AR*3 (Jul. 2005 - Jul. 2011)	Republic of South Sudan (After Jul. 2011)
Constitutional framework	• Constitution of the Republic of Sudan, 1998	Established		
	• The Comprehensive Peace Agreement, 2005		Established	
	• Interim Constitution of Southern Sudan, 2005		Established	
	• Interim National Constitution, 2005		Established	
	• Transitional Constitution of the Republic of South Sudan, 2011			Established
Forest policies	• Forest Policy, 1986	Established	Applicable	Applicable
	• Forest Policy Framework, 2007*4		Established	
	• Forest Policy, 2013			Established
Forest laws	• Woods and Forests Ordinance, 1901	Established	Repealed	
	• Forest Law and Ordinance, 1902	Established	Repealed	
	• Forests Ordinance, 1908	Established	Repealed	
	• Forest Conservation Rules, 1917	Established	Repealed	
	• Central Forests Act, 1932 (CFA 1932)	Established	Repealed	
	• Provincial Forests Act, 1932 (PFA 1932)	Established	Repealed	
	• Forest Law and Regulations, 1972*5	Established	Repealed	
	• Forest Act, 1989*6 (FA 1989)	Established	Repealed?	
	• Forests National Corporation Act, 1989 (FNCA 1989)	Established	Repealed	
	• Forests and Renewable Natural Resources Act, 2002*7	Established		
	• Timber Utilization and Management Act, 2003 (SPLM law)	Established	Not applied	
	• Forest and Environment Act, 2003	Established	Applicable	Applicable
	• Forestry Commission Act, 2004 (SPLM law)	Established	Not applied	
	• Forestry Training Centre Act, 2004	Established		
	• Forestry Bill, 2009 (draft)*8			(draft)
Related policies and laws	• Land Settlement and Registration Act, 1925	Established	Applicable	Applicable?
	• Limitation and Prescription Ordinance, 1928	Established	Applicable	Applicable?
	• Land Acquisition Ordinance, 1930	Established	Applicable	Applicable?
	• Unregistered Lands Act (ULA), 1970	Established		
	• Civil Transactions Act (CTA), 1984*9	Established	Applicable	
	• Local Government Act, 2006			
	• Land Act, 2009		Established	Applicable
	• Land Policy (under preparation)		Established	
	• Customary laws*10	Established	Established	Established
Regulations and executive orders	• Ministerial Order No. 284, 1986*11	Established	Applicable	Applicable
	• Official Circular on the Rule of Law Institutions, 2006*12		Established	
	• Ministerial Decree, 2006*13		Established	
Strategies and plans	• Forest Sector review, 1984-86	Established		
	• Ministry of Agriculture and Forestry Strategic Plan 2007-2011		Established	
	• South Sudan Development Plan 2011-2013 (SSDP)			Established
	• Ministry of Agriculture, Forestry, Cooperatives and Rural Development Strategic Plan 2012-2018 (Draft)			(draft)
	• South Sudan Development Initiative 2013-2020 (final draft)			(draft)

Note: 1) CPA: Comprehensive Peace Agreement. 2) Anglo-Egyptian Sudan (condominium of Egypt and the United Kingdom) period is 1899-1955, and the year of Republic of the Sudan's independence is 1956. 3) AR: Autonomous

[488] Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan. p. 23.

Region. 4) The policy states that 1986 Policy and 1989 Forest Act are still applicable to date. 5) The Act allows sub-regional (i.e. South Sudan) planning and control. The Act was repealed by a 1983 Presidential Decree which returned management and control of Central Forest Reserves to central administration of Khartoum. 6) This Act repeals CFA 1932 and PFA 1932. 7) This Act merges Ministerial Order of 1986, FA 1989 and FNCA 1989. 8) This bill will be finalized once Forest Policy 2013 is approved. 9) This Act replaces ULA of 1970 and declaring that unoccupied and unregistered land is deemed to be government property. 10) Customary law varies from community to community, and is largely oral, unrecorded, and dynamic. 11) This order establishes National Forest Corporation. 12) This circular declares that laws enacted in SPLM-held areas are part of the legal framework. 13) This decree bans illegal logging and prohibited the export of teak and mahogany.
Source: WB. 2010. A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note. Washington D.C.:WB
The Republic of South Sudan Ministry of Agriculture and Forestry. 2012. Final Draft of Forest Policy. Juba.
United Nations Environment Programme. 2007. Sudan post-conflict environmental assessment. Nairobi: UNEP.

12.4.4 Forest Policy 2013 and legal framework

The Forest Policy 2013 is a national policy providing a framework for managing forests at all levels across the country. National forest laws and regulations, and state forest policies, laws and regulations will be formulated in conformity with this policy. Because the Forest Policy is approved recently (in July 2013), there are no forest statutes and state policies approved conforming to the Policy. Currently a draft of forestry bill has been prepared conforming to the Policy for further discussion. As shown in Table 12-1 the relevant existing laws and regulations are temporarily applied to allow public service delivery to administer the forestry subsector. These existing laws and regulations may not be fully consistent with the 2013 Forest Policy; also, policy and legal frameworks of other sectors in South Sudan are in the midst of development. This means that effective implementation of the Policy will require more consistent legal and institutional arrangements. Linkage with the Land Act 2009 and customary law

Proper implementation of Forest Policy is dependent on the recognition of rights associated with land and forest resources on the land by all stakeholders concerned. Therefore, administration and management of the forestry subsector require coordination with the policies, laws and institutions governing land. The 2009 Land Act provides for community land to be designated for forestry purposes. This provision, for example, creates uncertainty around forest and land ownership which will cause serious limitation to any investment in forestry development. The effect of these ambiguities is that National Forest Reserves and other public forests are frequently claimed by various stakeholders. This is an important example of institutional issues to be addressed during CAMP development. For the implementation of the Forest Policy integration of customary law and the functions of Traditional Authority with forest resources management needs to be considered. Customary law is sometimes the only regulatory framework for the management of land both for cultivation and pasture. Under communal ownership systems, customary land law plays a central role in dispute resolution and also in general land use.[489]

12.4.5 The Forest Policy 2013

The policy recognizes the importance of forest for commerce, communities, and conservation, and it defines a set of institutional and implementation measures.[490] As indicated in Table 12-2 these core elements for forestry subsector development are reflected in the structure of the policy statements. The forestry subsector part of CAMP will be consistent with this policy structure. To meet South Sudan's development goals, 1) commercial forestry management is important to achieve sustainable national economic growth and development, 2) involvement of communities in forest resources management contributes to improvement of their livelihoods, food security and welfare; and 3) conservation of the natural resource base upon which the people and ecosystems of South Sudan depend contributes to creation of public and global goods and values.

[489] World Bank. 2010. A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note. Washington D.C.: World Bank.
[490] Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan. p. 7.

The Forest Policy 2013 identifies strengths and opportunities, and challenges for the forest sector as indicated in Table 12-3. Although the Policy recognizes the very high forestry potential and the opportunities to enhance people's livelihoods in rural areas and to develop sound forest product industries and markets, it also recognizes the challenges that the forestry subsector faces. In order to address the challenges, effective and efficient interventions by the government are justified in the Policy.

Table 12-2: Structure of policy statements of Forest Policy 2013

Contents of policy	
1 Policy goal	The policy aims at ensuring a sufficient and sustained forest resource base and flow of forest goods and services to support livelihoods and socio-economic development for the present generation without compromising this endowment for future generations.
2 Guiding principles	• Consistency with Constitution • Commercial, community and conservation values • Sustainable and equitable management • Conservation of biodiversity • Sustainable forest management • Forest sector growth • Meeting wood demand • Community participation through collaborative management schemes • Partnership among forest stakeholders • Promotion of forest products industries • Strengthening of forestry institutions and services • Commitment to regional and international agreements • Application of best knowledge, information and practices
3 Commercial forestry	1) Development of forest plantations and woodlots; 2) Private sector investment; and 3) Marketing of forest products and services
4 Community forestry and agroforestry	1) Forestry in integrated rural development; and 2) Collaborative forest management
5 Conservation	1) Biodiversity and habitat conservation; 2) Enhanced benefits from forest services; 3) Collaboration with relevant GRSS authorities
6 Institutional arrangements for the forest sector	1) GRSS Ministry responsible for forestry; 2) South Sudan Forest Commission; 3) state governments; 4) Counties, payams, bomas, and communities; and 5) Forestry Development Consultative Forum
7 Implementation	1) Delineation, ownership, and management responsibility; 2) Forest revenue collection; 3) Funding for implementation; 4) Central, state, and local government planning; 5) Human resources development; 6) Effective application of modern science and technology; 7) Inter-agency coordination; 8) Monitoring and evaluation; 9) Prevention and control of wild fires; and 10) Forest Act and implementing legislation

Source: Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan.

Table 12-3: Strength and opportunities and challenges identified in the Forest Policy 2013

Strengths and opportunities and challenges
1. Strength and opportunities 1) Forest resource base; 2) Climate, soils and land forms; 3) Investment potential in the forest sector
2. Challenges for the forest sector 1) Deforestation and forest degradation; 2) Poor forest governance and lack of agreement regarding ownership of forest resources; 3) Forest fires; 4) Charcoal and fuelwood; 5) Limited investment and technology; 6) Linkages with land; and 7) Gender inequality

Source: Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. Forest Policy. Juba: The Government of Republic of South Sudan.

12.4.6 Forestry Bill 2009

A summary of the Forestry Bill 2009 is shown in Table 12-4. Currently, the approval and adoption of the Forestry Law by GRSS is urgently needed; there have been no laws and regulations to manage and enhance forestry subsector in South Sudan since its independence in 2011. This situation is one of major causes of the devastating status of, for example, Central Forest Reserve (CFR) management. The approval of the Forest Policy 2013 in July 2013 should result in the alignment of the Bill with the Policy and accelerate drafting and approval of the Bill. The Bill establishes public forest reserves and rights associated with the reserves. The Bill also defines the establishment of the Southern Sudan Forest Corporation[491] and its functions. Although the Bill establishes ways for communities to participate in public forest management, but the degree of decentralised management is less than that proposed in the Forest Policy 2013. Furthermore, the Bill is silent about private sector involvement in forest management and conservation, and in this regard the Bill needs further alignment with the Policy.

Table 12-4: Summary of Forestry Bill 2009

Chapter and contents
Chapter I - Preliminary provisions 1) Short title and commencement, 2) scope, 3) repeal and saving, and 4) interpretation
Chapter II - Reservation and management of forests 1) Reservation of forests, 2) acquisition of land for reservation, 3) maps of areas declared forest reserves, 5) revocation of reservation, and 6) creation of forests in urban and peri-urban areas.
Chapter III - Southern Sudan Forest Corporation 1) Establishment, 2) functions, 3) board of directors, 4) staff of the Corporation, 5) decentralization of Corporation operations, 6) corporation funds, 7) forest management plans, 8) collaborative forest management, 9) forest concessions, 10) management of indigenous forest and woodlands, 11) mining and quarrying within forests
Chapter IV - Community participation in forest management and protection 1) Establishment of community forestry associations,2)participation in forest management, 3) benefits to community forestry associations, and 4) termination of management agreement.
Chapter V - Enforcement 1) Forest offences, 2) enforcement, and 3) penalties.
Chapter VI - Miscellaneous 1) Subsidiary legislation, rules and guidelines, 2) registry, and 3) international and regional obligations.
Chapter VII - Transitional provisions 1) Repeal, vesting of assets and transfer of liabilities

[491] Southern Sudan Forest Corporation should be read as Sough Sudan Forest Corporation under current circumstances.

12.5 State and local governments engaged in forest management

At state level the Directorate of Forestry is found in a relevant state ministry (usually the ministry of agriculture) and plays a major role in forest resources management. The Directorate deploys Assistant Commissioners of Forestry to county governments in the state. At the county level, Assistant Commissioners are the main actors for on-the-ground delivery of forest management and extension services to address food security, poverty reduction and rural development issues. In the rural setting in South Sudan production and marketing of timber and non-timber forest products are important elements of the coping mechanism of rural communities. Under the supervision and policy guidance of GRSS, the Directorates in the state governments throughout South Sudan perform the following functions:

(1) Implementation of forest policies and regulation of the forestry subsector;
(2) Collection of forestry related revenues;
(3) Conservation and protection of forest resources;
(4) Management and protection of public forest reserves including Central Forest Reserves;
(5) Extension training of agroforestry and afforestation by out-growers;
(6) Enhancement of forest products industries and markets;
(7) Monitoring and supervision of concessionaires; and
(8) Operation of nurseries and sawmills belonging to a forestry directorate for production of tree seedlings and timber products.

12.5.1 Human and physical resources

As shown in Table 12-5 and Figure 12-2 with respect to the major roles assigned to the Directorates, their human, physical, and financial resources are far from sufficient to restore the forest management system. The system has deteriorated due to the long-lasting civil war where significant areas of forest plantations were logged to finance the war. The high priority given to the recovery of the livelihoods of war-affected populations after the CPA, and the growing markets and demand for forestry products such as charcoal, fuelwood, logs and timbers, resulted in the rapid degradation of natural and plantation forests and unregulated conversion of forest land for agriculture.

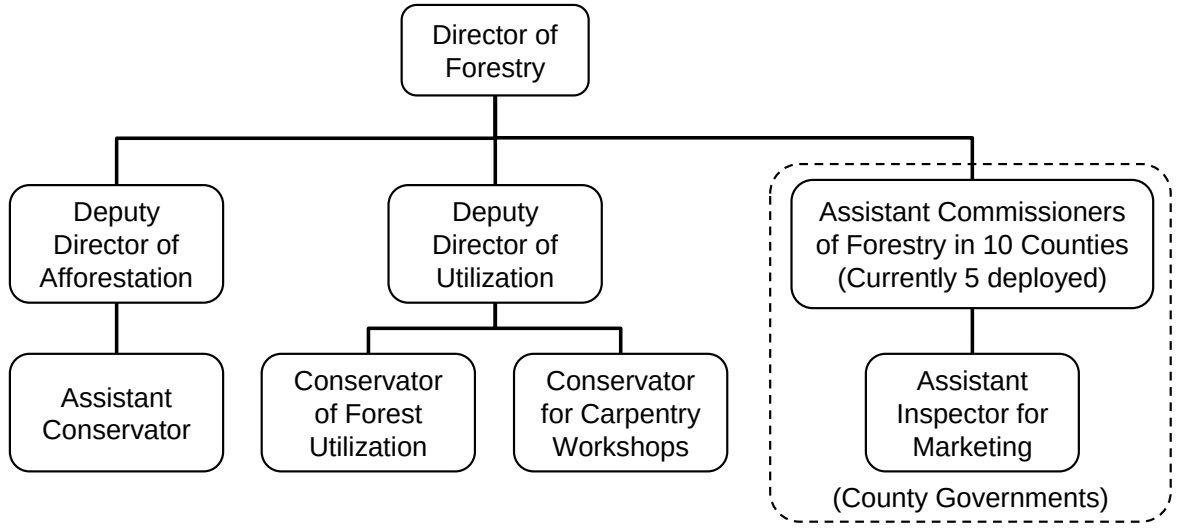
For example, state Directorates in Western Equatoria and Eastern Equatoria States, both of which are endowed with rich forest resources and high forestry production potential, deploy 17 and 19 forest officers, respectively. In terms of the mobility necessary to conduct forest management and revenue collection functions in these states properly, each Directorate operates only one car. The situation is even worse in Greater Bahr el Ghazal and Greater Upper Nile Regions where widespread destruction and encroachment of the forest reserves and degradation of natural forests are serious problems. However, there are only 5 to 8 forest officers in each state to regulate and enhance the forestry subsector in Warrap, Northern Bahr el Ghazal, Western Bahr el Ghazal, and Lakes states.

Table 12-5: Human and physical resources of state Forestry Directorates interviewed

State	Upper Nile State	Warrap State	Northern Bahr el Ghazal State	Western Bahr el Ghazal State	Lakes State	Western Equatoria State	Central Equatoria State	Eastern Equatoria State
1. Name and year of establishment								
1) Name of state ministry to which forest department belongs	(TBD)	(TBD)	State Ministry of Agriculture and Forestry	State Ministry of Agriculture, Forestry and Livestock	(TBD)	State Ministry of Agriculture, co-operatives and Environ-ment	(TBD)	(TBD)
2) Name	(TBD)	Directorate of Forestry	Directorate of Forestry	Directorate of Forestry	Directorate of Forestry	Directorate of Forestry	(TBD)	Directorate of Forestry
3) Year of establishment	(TBD)	2006	1971	1953	2006	2006	(TBD)	1940s
2. Human resources								
1) Officers								
Director level	(TBD)	1	1	1	1	1	(TBD)	1
Deputy/assistant director level	(TBD)	0	1	3	2	4	(TBD)	5
Inspector/conservator level	(TBD)	3	2	2	4	11	(TBD)	6
Forest ranger/guard level	(TBD)	1	3	2	0	1	(TBD)	7
Total number of officers	(TBD)	5	7	8	7	17	(TBD)	19
5) Temporary staff/casual labour	(TBD)	45	11	128	66	72	(TBD)	106
Total number of human resources	(TBD)	50	18	136	73	89	(TBD)	125
3. Asset and equipment								
1) Car	(TBD)	0	1	2	1	1	(TBD)	1
2) Lorry	(TBD)	0	1	0	0	0	(TBD)	1
3) Tractor	(TBD)	0	1	0	0	0	(TBD)	1
2) Motorcycles	(TBD)	0	2	0	1	0	(TBD)	1
4) Buildings	(TBD)	1	2	1	1	1	(TBD)	1
5) Sawmill	(TBD)	0	1	0	0	0	(TBD)	0

Source: CAMP Task Team

Figure 12-2: Organogram of Directorate of Forestry, Western Equatoria State Government



Source: Directorate of Forest, Western Equatoria State

12.5.2 Financial resources and revenue collection

As shown in Table 12-6 the budget sources for a state Directorate of Forestry are the conditional transfer from the then Ministry of Agriculture, Forestry, Cooperatives and Rural

Development (MAFCRD), GRSS, the state's own revenue sources, and external sources such as DPs and NGOs. In general, major expenditures incurred by state Directorates of Forestry are 1) salaries, 2) capital development, 3) purchase of vehicles and equipment, 4) nursery establishment and operation, and 5) other operation costs such as costs of fuel, consumables, and maintenance services.

The amounts and types of conditional transfers, particularly from MAFCRD to each state Ministry of Agriculture where the Directorate of Forestry belongs are shown in Table 12-7 Whereas the values of the conditional transfers for operating and capital expenditures are uniform among the 10 states, the transfers to cover salaries of officers in the state ministries vary significantly due to the large difference in numbers of officers supported by the GRSS transfers. The largest amounts of conditional transfers to cover salaries of state officers including forest officers (i.e. forest guards for the protection of Central Forest Reserves) are provided to Central Equatoria and Western Equatoria states. However, according to state officers such funds were never recognized nor applied to engage forest guards for the protection of CFRs.

State Directorates of Forestry collect fees and revenues shown in Table 12-6. Particularly, licence and permit fees, and rates on forestry products indicated in Table 12-8 are important revenue sources for state governments. Responsibility to collect these fees is given to the Directorate of Forestry. However, their consolidation as state revenue and allocation of the revenue to the Directorate is the responsibility of the state revenue authorities. To enhance forestry services and forest resources by the Directorates, there is a regulatory arrangement that a set percentage (usually 40%) of the collected fees by the Directorates is to be allocated as a part of their annual budget. However, according to state forestry officers, this arrangement not normally respected and no budget is allocated regardless of the amount they collect. Further, budgets for operations and capital investments are not generally executed due to insufficient state revenues to cover budgeted costs.

12.5.3 Issues of revenue collection by Directorate of Forestry

Table 12-8 indicates that an extensive range of forest products are subject to fees. However, these products are ubiquitous, commonly produced, traded and consumed in rural settings in South Sudan. It is impractical to perform fair and complete revenue collection according to the regulations and rate list. Field observation indicates that such fee collection can only be fair and complete at the enclosures officially assigned to forest products wholesalers and retailers, for registered business entities, and well organized checkpoints where all transported forest products can be captured.

Table 12-6: Budget sources of and revenue collection by Directorates of Forestry

Budget sources	Revenue collection responsibilities/opportunities
1) Governments' sources • Conditional transfer from the then Ministry of Agriculture, Forestry, Cooperatives, and Rural Development, GRSS • State revenue sources 2) External sources (DPs/NGOs) • e.g. UNEP 5,500USD in 2011 in Eastern Equatoria State • e.g. NPA 92,000SSD in 2011 in Eastern Equatoria State	• License and permit fees • Rates on forestry products • Sale of forestry products • Sale of tree seedling and agricultural crops

Source: CAMP Task Team

Table 12-7: Conditional transfers from GRSS to state ministries of agriculture

States \ Budget items	Personnel	Conditional transfers in SSP				Conditional transfers in USD at 3SSP/USD				
		Salaries (SSP)	Operating (SSP)	Capital (SSP)	Total (SSP)	Salaries /month /staff (USD)		Operating (USD)	Capital (USD)	Total (USD)
Ministry of Agriculture, Forestry, Cooperatives and Rural Development										
General Administration										
Ministers Office, admin and finance (Agriculture and forestry)										
Upper Nile			219,646	409,937	629,583			73,215	136,646	209,861
Jonglei	12	208,956	219,646	409,937	838,539	69,652	484	73,215	136,646	279,513
Unity	63	832,115	219,646	409,937	1,461,698	277,372	367	73,215	136,646	487,233
Warrap	14	206,220	219,646	409,937	835,803	68,740	409	73,215	136,646	278,601
Northern Bahr El-Ghazal	97	1,441,716	219,646	409,937	2,071,299	480,572	413	73,215	136,646	690,433
Western Bahr El-Ghazal	2	40,920	219,646	409,937	670,503	13,640	568	73,215	136,646	223,501
Lakes	7	134,086	219,646	409,937	763,669	44,695	532	73,215	136,646	254,556
Western Equatoria	116	964,656	219,646	409,937	1,594,239	321,552	231	73,215	136,646	531,413
Central Equatoria	327	2,945,439	219,646	409,937	3,575,022	981,813	250	73,215	136,646	1,191,674
Eastern Equatoria	38	490,812	219,646	409,937	1,120,395	163,604	359	73,215	136,646	373,465
Total	676	7,264,920	2,196,460	4,099,370	13,560,750	2,421,640	401	732,153	1,366,457	4,520,250

Source: Republic of South Sudan. 2012. Approved budget 2012/13. Juba: Republic of South Sudan. p. 37.

However, due to the limited capacity and mobility of forestry officers, fee collection is assumed to be sporadic and inefficient with room for evasion, and so, not fair. It should be considered that the forest revenue system is unworkable, despite the fact that the 2004 Timber Utilization Act and the 2004 Forestry Commission Act were enacted to ensure the forest fiscal system was efficient and effective. The reasons contributing to this deplorable state include: (a) low collection capacity; (b) poor accounting and failure by revenue collection staff to remit what little is collected to the GRSS or state treasury; (c) confusion about who actually has responsibility for revenue collection; (d) lack of coordination among the collection entities; (e) unrealistically low prices, fees, and rate levels that were set and that failed to consider the cost elements related to management, production/protection, transportation, and product processing; and (f) the lack of clarity on how revenues were to be shared among the actors[492].

Interviews with producers, traders, timber dealers, wholesalers, and retailers indicate that they do not receive any public services nor experience a better business environment as a result of their fee payments. Their perception of poor accountability by the government, unfair rates and fee collection, and an excessive list of items for fee collection are likely to hamper development of productive, fair and competitive forest products industries and markets.

Table 12-8: Rates schedule for forestry products in Western Equatoria State

Category	Range of rate
1. Building pole	
1.1 Teak pole (small to heavy)	6 to 12 SSP/pole
1.2 Pole of various tree species (small to heavy)	3 to 10 SSP/pole
2. Fencing pole	
2.1 Fencing pole of teak (light to heavy)	4 to 8 SSP/pole
2.2 Fencing pole of cassia (light heavy)	4 to 8 SSP/pole
2.3 Fencing pole of various tree species (light to heavy)	3 to 6 SSP/pole
3. Forked pole	
3.1 Forked pole of various tree species (Light to heavy)	5 to 8 SSP/pole
4. Charcoal and fuelwood	
4.1 Charcoal (bag)	2 SSP/bag
4.2 Fuelwood (bundle to full lorry)	1 to 60 SSP/bundle to full lorry
5. Furniture	
5.1 Table (tea table to large tables)	1 to 15 SSP/piece
5.2 Chair (reclining chair to executive chair)	3 to 30 SSP/piece
5.3 Bed (local bed to double bed)	5 to 25 SSP/piece
5.5 Cupboard (single to double cupboard)	10 to 20 SSP/piece

[492] World Bank. 2010. A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note. Washington DC: World Bank.

Category	Range of rate
5.6 Door and window frame	10 to 15 SSP/piece
5.7 Other locally manufactured wood products (cloth stands, mortars, bee hives, wooden bowls, etc.)	1 to 10 SSP/piece
6. Timber	
6.1 Timber to be transported within the State	2 to 4 SSP/piece
6.2 Timber to be transported out of the State	3 to 5 SSP/piece
7. Non-wood products	
7.1 Natural honey	1 to 15 SSP/bottle to jerry can
7.2 Lulu (shea butter)	1 to 20 SSP/bottle to jerry can
7.3 Palm oil	1 to 5 SSP/bottle to jerry can
7.4 Bamboo	2 SSP/10 pieces
7.5 Wild fruit, basket, mats, reed, roofing, papyrus, etc.	1 to 2 SSP/unit
8. Installation of sawmills	
8.1 Registration for sawmills	2,000 SSP/sawmill
8.2 Renewal fees every year	1,000 SSP/sawmill
9. Acquisition of chainsaw	
9.1 Registration for chainsaw	1,000 SSP/chainsaw
9.2 Renewal fee every year	500 SSP/chainsaw

Source: Directorate of Forest, West Equatoria State Government. 2013.

12.6 Public forest reserves

12.6.1 Categories of public forest reserves

Currently two categories of public forest reserves are recognized: Central Forest Reserves (CFRs) formerly owned and managed by the Government of Republic of the Sudan (GRS) before CPA; and Provincial Forest Reserves (PFRs) formerly owned and managed by the provincial governments of the Republic of the Sudan before CPA. The establishment and management of CFRs and PFRs are determined by Central Forests Act 1932 and Provincial Forests Act 1932, respectively. However, the Forest Policy 2013 of the GRSS introduced a new decentralized system of public forest reserve management, and legislation relevant to the Policy for the operationalization of the new system are expected to be approved by the GRSS and state governments soon.

The Forest Policy 2013 provides ownership and management responsibilities of public forest reserves throughout South Sudan. As shown in Table 12-9 four categories of permanent forest estates (PFEs) publicly owned and managed are recognized as public forest reserves by the Policy in addition to privately held forests. The Policy determines the conversion of all previously determined Central Forest Reserves (CFRs) and Provisional Forest Reserves (PFRs) to National Forest reserves (NFRs) owned by GRSS and State Forest Reserves (SFRs) owned by state governments. The Policy also grants power to establish County Forest Reserves (new CFRs) to counties and Community Forests (CFs) to payams and bomas. GRSS, state governments, counties, payams, and bomas are able to delineate and gazette forests as NFRs, SFRs, CFRs and CFs to achieve 20% of land area being covered by forests.[493]

Table 12-9: Categories of permanent forest estates (PFEs)

No.	Current category	New categories of PFEs recognized by Forest Policy 2013	
		New category	Delineation, ownership and management
1	Central Forest Reserve (CFR)	National Forest Reserve (NFRs)	• Previously gazetted CFRs will be converted to NFRs. • NFRs are to be delineated, gazetted and owned by GRSS. • NFRs can be spread across state boundaries. • NFRs are to be managed by GRSS in partnership with State governments and other stakeholders.
2	Provincial Forest Reserves	State Forest Reserve (SFR)	• Previously gazetted PFRs will be converted to SFRs. • SFRs are to be delineated, gazetted and owned by state governments. • SFRs are to be managed by state governments with technical support

[493] MAFCRD. 2013. Forest Policy 2013. Juba: GRSS. p. 31.

No.	Current category	New categories of PFEs recognized by Forest Policy 2013	
		New category	Delineation, ownership and management
	(PFR)		and supervision by GRSS. • State governments have responsibility for implementing the relevant policy, legal and regulatory frameworks of SFRs.
3	does not exist	County Forest Reserve (new CFR)	• New CFRs are to be delineated, gazetted and owned by county councils. • New CFRs are to be managed by county councils with technical support, capacity building and supervision from state governments and GRSS • State governments will set forest policy for new CFRs to be administered by county councils.
4	does not exist	Community Forest (CF)	• Communities will delineate and gazette forest in their communal land to be managed as CFs at the boma and payam levels of governemnt. • Designation will be done pursuant to the requirements of the Land Act 2009 for designating community lands including lands for forestry, agriculture and other uses. • CFs are to be managed by communities with technical support and supervision from state governments and GRSS. • GRSS will develop the policy framework and regulations governing CFs. • State governments will have the primary responsibility of enforcement of laws and regulations governing CFs.
5	Privately held forests	Privately held forests	• Privately held forests shall be governed by legislation and regulations set by the state government. • State governments will have primary responsibility to enforce conservation requirements and other standards applying to privately held forests.

Source: MAFCRD. 2013. Forest Policy 2013. Juba: GRSS. pp. 32-33.

12.6.2 Community Forests (CFs) and enabling legal environment for their establishment

Designation of Community Forests (CFs) can be done following the requirements provided in the Land Act 2009. According to the provisions of the Land Act 2009, traditional authorities[494] and rural communities are given rights to claim ownership of land which is less than 250 feddans (105 ha) whereas for land larger than 250 feddans the administrative authorities are given to the state governments. However, until 2012 no claim by states, traditional authorities or rural communities was made. A USAID supported project, implemented in Western Equatoria began campaigning to notify communities that such rights existed. According to a lawyer[495] one of the challenging issues for drafting related legislations for the establishment and management of CFs, is the multiple levels of government authorities involved. Since there are six government and administrative layers, the establishment of appropriate mechanisms to handle CFs requires careful assessment of the social, economic, and cultural dimensions of South Sudan. It was also noted by the CAMP Task Team that the fundamental legal challenges is the way the Transitional Constitution defines the devolution of power to the state governments; therefore, the GRSS is considering constitutional amendments to address this and is hoping to have an new policy by 2015.[496]

12.6.3 Central Forest Reserves

Currently CFRs and PFRs are existing categories of publicly owned permanent forest estates (PFEs). Due to better availability of primary and secondary information on CFRs than PFRs, results of the situation analysis on CFRs are presented in this report. Since records and accounts regarding PFRs are scarce at GRSS, state and local government levels, further investigation on PFRs is needed.

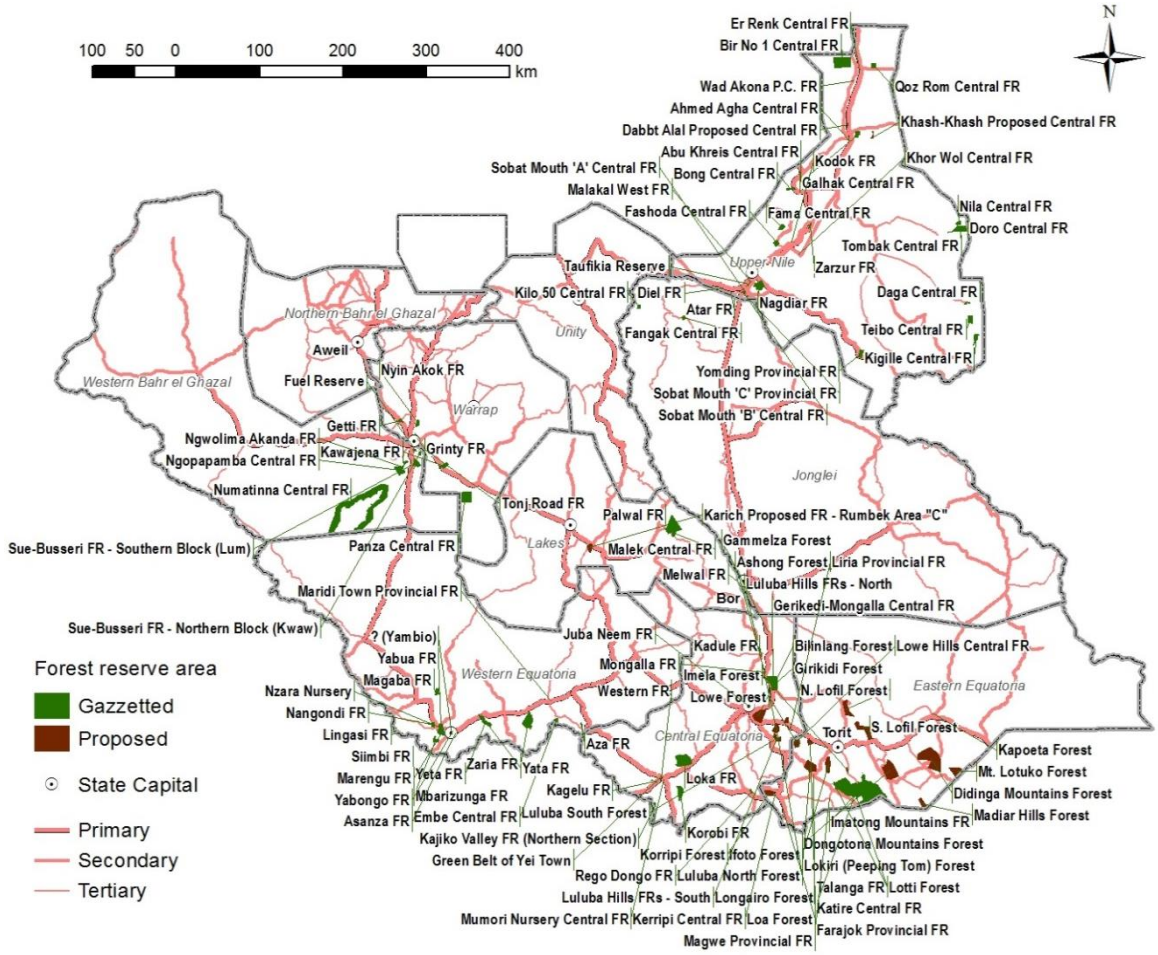
[494] "Traditional Authority" means a body of traditional community with administrative jurisdiction within which customary powers are exercised by traditional leaders on behalf of the community as stipulated in Articles 166 and 167 of the Transitional Constitution of the Republic of South Sudan.

[495] Interview conducted during the CAMP Situation Analysis

[496] Based on an interview held with a land lawyer in September 2012.

All public forest reserves were gazetted by the governments of Anglo-Egyptian Sudan (1899 - 1955) and the Republic of the Sudan (1956 - 2005) before the signing of the CPA. The first public reserve forest was gazetted in 1918.[497] To understand the current situation of the CFRs, the lists of CFRs and forest plantations found in the annexes of the Forest Policy 2013, and the preliminary inventory information in the form of the geographical information system (GIS) dataset obtained from the Land Resource Survey and Information Centre (LRSIC), were examined. Based on the dataset Figure 12-3 was constructed to indicate the locations of the CFRs. Field visits to selected CFRs and plantations by CAMP TT team contributed to understanding the seriously depleted resource base and lack of management of CFRs.

Figure 12-3: Locations of Central Forest Reserves in South Sudan



Source: Land Resource Survey and Information Centre (LRSIC), MAFCRD. 2013. GIS dataset. Juba: GRSS.

[497] Interview with officials of Kagelu Forestry Training Centre. September 2012.

Table 12-10: Reserved Forests within the category of Central Forest Reserve

State / County	Name of forest reserves (FRs)[*1]	Gazetted date	Gazette number	Area (Feddan)	Area (Ha)	Note
Upper Nile						
Renk	Ahmed Agaha (Ahmed Agha Central FR)[*5]	(TBC)	(TBC)	1,242	522	
Renk	Renk C.R. (Er Renk Central FR)	15/11/1957	914	234	98	
Renk	Goz-Rom (Qoz Rom Central FR)	18/06/1968	914	234	98	
Manyo	Bir C.R. (Bir No 1 Central FR)	(TBC)	970	59,499	24,990	
Manyo	Wad Akona (Wad Akona P.C. FR)	15/11/1957	980	627	263	
Fashoda	Kodok C.R. (Kodok FR)	15/02/1963	980	123	52	
Melut	Abu Khries (Abu Khreis Central FR)	(TBC)	(TBC)	3,356	1,410	
Melut	Zar-zur C.R. (Zarzur FR)	15/08/1950	819	3,874	1,627	
Maban	Khor Tumbak (Tombak Central FR)	15/01/1953	1004	22,500	9,450	
Baliet	Khor-wol (Khor Wol Central FR)	15/05/1959	433	12,800	5,376	
Panyikang	Malakal West (Malakal West FR)	15/01/1953	851	250	105	
Panyikang	Tawfigia (Taufikia Reserve)[*5]	15/01/1953	851	2,365	993	
FRs count	12		Sub-total	107,104	44,984	
Jonglei						
Canal (Khor Fulus)	Atar C.R. (Atar FR)	15/01/1953	851	238	100	
Canal (Khor Fulus)	Diel C.R. (Diel FR)	15/11/1957	851	254	107	
Canal (Khor Fulus)	Sobat (A) (Sobat Mouth 'A' Central FR)	15/12/1957	815	156	66	
Canal (Khor Fulus)	Sobat (B) (Sobat Mouth 'B' Central FR)	15/12/1957	913	3,224	1,354	
Canal (Khor Fulus)	Sobat (C) (Sobat Mouth 'C' Provincial FR)	05/02/1961	(TBC)	4,170	1,751	
FRs count	5		Sub-total	8,042	3,378	
Unity (no record identified)						
Warrap (no record identified)						
Northern Bahr el Ghazal (no record identified)						
Western Bahr el Ghazal						
Jur River	Gette (Getti FR)[*5]	15/10/1950	821	5,289	2,221	
Jur River	Khor-Abong[*5]	15/03/1951	827	11,888	4,993	
Jur River	Khor-Grinty (Grinty FR)	15/10/1950	821	8,285	3,480	
Jur River	Kuajena (Kawajena FR)	12/12/1955	889	10,869	4,565	
Jur River	Nyin-Akok (Nyin Akok FR)[*5]	15/10/1950	821	8,485	3,564	
Jur River	Tonj No.1 (Tonj Road FR)[*5]	15/12/1951	837	3,225	1,355	
Bagave	Dokorongo[*5]	12/12/1954	873	4,100	1,722	
Bagave	Namatina (Numatinna Central FR)	15/06/1953	856	610,236	256,299	
Bagave	Ngohalima/Akanda (Ngwolima Akanda FR)	15/10/1930	811	10,645	4,471	
Bagave	Nyalero[*5]	15/12/1954	873	17,300	7,266	
FRs count	10		Sub-total	690,322	289,935	
Lakes (no record identified)						
Western Equtoria						
Tambura	Riwa- 1	(TBC)	(TBC)	848	356	
Tambura	Riwa- 2	(TBC)	(TBC)	(TBC)	(TBC)	
Nzara	Ringasi (Lingasi FR)	15/10/1953	847	6,700	2,814	ETC (2012)[*3]
Nzara	Magada (Magaba FR)	15/10/1950	821	5,564	2,337	ETC (2012)[*3]
Nzara	Mbari-zunga (Mbarizunga FR)	15/03/1951	837	19,900	8,358	ETC (2012)[*3]
Nzara	Nangundi (Nangondi FR)	15/10/1952	947	(TBC)	(TBC)	ETC (2012)[*3]
Nzara	Nzara (Nzara Nursery)	15/10/1950	821	10,020	4,208	
Nzara	Simbi (Siimbi FR)	15/10/1952	847	17,700	7,434	
Nzara	Yabua (Yabua FR)[*5]	15/12/1950	824	10,189	4,279	ETC (2012)[*3]
Ezo	Bangangai	(TBC)	(TBC)	(TBC)	(TBC)	
Ezo	Marunyo	(TBC)	(TBC)	1,040	437	
Yambio	Asanza.C. (Asanza FR)[*5]	15/10/1950	821	497	209	BLL (2009)[*4]

Table 12-10: Reserved Forests within the category of Central Forest Reserve (cont.)

State / County	Name of forest reserves (FRs)[*1]	Gazetted date	Gazette number	Area (Feddan)	Area (Ha)	Note
Yambio	Marangu (Marengu FR)	15/10/1950	847	13,550	5,691	
Yambio	Yabongo.C. (Yabongo FR)[*5]	15/12/1950	824	843	354	BLL (2009)[*4]
Yambio	Yatta.C. (Yata FR)[*5]	15/03/1953	851	19,500	8,190	
Ibba	Zaria (Zaria FR)[*5]	15/12/1950	824	41,774	17,545	BLL (2009)[*4]
Ibba	Zumbi	(TBC)	14774	14,774	6,205	SEL (2009)[*2]
Maridi	Azza (Aza FR)	15/03/1950	811	1,763	740	
Maridi	Embe (Embe Central FR)[*5]	10/02/1959	(TBC)	8,270	3,473	
FRs count	19		Sub-total	172,932	72,631	
Central Equatoria						
Terekeka	Kadule (Kadule FR)	15/11/1951	(TBC)	335	141	
Juba	Girikidi (Girikidi Forest)[*5]	(TBC)	(TBC)	20,680	8,686	
Juba	Jebel Korok	15/02/1964	(TBC)	250	105	
Juba	Lulubo North (Luluba Hills FRs - North)	15/10/1956	(TBC)	10,768	4,523	
Juba	Lulubo South (Luluba Hills FRs - South)	15/10/1956	(TBC)	10,200	4,284	
Juba	Mangalla (Mongalla FR)	15/11/1948	(TBC)	1,134	476	
Juba	Rejaf East	(TBC)	(TBC)	10	4	
Lainya	Loka West (Loka FR)[*5]	15/01/1950	(TBC)	54,078	22,713	CETC (2008)[*6]
Yei	Kagelu (Kagelu FR)[*5]	15/01/1950	(TBC)	2,305	968	
Yei	Kajiko North (Kajiko Valley FR)[*5]	15/12/1953	862	11,678	4,905	CETC (2008)[*6]
Yei	Korobe (Korobi FR)[*5]	(TBC)	(TBC)	5,055	2,123	CETC (2008)[*5]
Yei	Momury (Mumori FR)[*5]	15/07/1952	844	220	92	
Morobo	Kajiko South[*5]	15/04/1965	862	13,340	5,603	
Kajo Keji	Kajo Kaji (Kajo-Keji FR)[*5]			4,660	1,957	
FRs count	14		Sub-total	134,713	56,579	
Eastern Equatoria						
Torit	Immella (Imela FR)[*5]	15/08/1955	3150	884	371	
Torit	Lerwa (Lowe Forest)		176	(TBC)	(TBC)	
Ikotos	Imatong/Gilo (Imatong Mountains FR)[*5]	15/03/1952	304-207	840	353	
Ikotos	Katire (Katire Central FR)[*5]	15/08/1951	31	833	350	
Magwi	Kereppi (Kerripi Central FR)	(TBC)	500	713	299	
Magwi	Palwak	(TBC)	182	(TBC)	(TBC)	
Magwi	Shukole (Shukoli FR)[*5]	(TBC)	2447	(TBC)	(TBC)	
Magwi	Vukadi	(TBC)	25	(TBC)	(TBC)	
FRs count	**8**		**Sub-total**	**3,270**	**1,373**	
Total FRs count	**68**		**Total area**	**1,116,383**	**468,881**	

Note: 1) Forest reserve names indicated in the Forest Policy are presented, and names in parentheses are used by Land Resource Survey and Information Centre (LRSIC), Directorate of Forestry, MAFCRD. 2) Concession on teak plantation management was granted to Sercham Equatorial Limited (SEL) in 2009. 3) Concession on teak plantation management was granted to Equatoria Teak Company (ETC) in 2012. 4) Concession on teak plantation management was granted to Blue Lakes Limited (BLL) in 2009. 5) Visited by CAMP forestry subsector team during situation analysis. 6) Concession on teak plantation management was granted to Central Equatoria Teak Company (CETC) in 2008. 6) Land Resource Survey and Information Centre (LRSIC), Directorate of Forestry, MAFCRD.

Source: Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2009. *Forest Policy 2013*. Juba: GRSS and LRSIC. 2013. GIS dataset. Juba: GRSS.

Table 12-11: Under Reservation forests within the category of Central Forest Reserve

State / County	Name of forest reserves (FRs)[*1]	Gazetted date	Gazette number	Indicative area[*1] (Feddan)	Indicative area[*1] (Ha)	Note
Upper Nile						
Renk	Dabbt Alal Proposed Central FR	proposed		1,767	742	
Renk	Galhak Central FR			10,999	4,620	
Renk	Khash-Khash Proposed Central FR	proposed		4,654	1,955	
Manyo	Bong Central FR			7,266	3,052	
Fashoda	Fama Central FR			11,248	4,724	
Fashoda	Fashoda Central FR			9,169	3,851	
Maban	Doro Central FR			1,502	631	
Maban	Nila Central FR			7,065	2,967	
Maiwut	Kigille Central FR			11,404	4,790	
Maiwut	Teibo Central FR			13,461	5,654	
Longochuk	Daga Central FR			4,553	1,912	
Ulang	Yomding Provincial FR			11,813	4,961	
Panyikang	Nagdiar FR			22,767	9,562	
FRs count	13		Sub-total	117,668	49,421	
Jonglei						
Fangak	Fangak Central FR			4,644	1,951	
Fangak	Kilo 50 Central FR			5,269	2,213	
Bor South	Melwal FR			343	144	
FRs count	3		Sub-total	10,257	4,308	
Unity (no record identified)						
Warrap						
Tonj South	Panza Central FR			48,300	20,286	
FRs count	1		Sub-total	48,300	20,286	
Northern Bahr el Ghazal (no record identified)						
Western Bahr el Ghazal						
Jur River	Sue-Busseri FR - Northern Block (Kwaw)			3,858	1,620	
Jur River	Sue-Busseri FR - Southern Block (Lum)			14,738	6,190	
Wau	Fuel Reserve			3,041	1,277	
Wau	Ngopapamba Central FR			20,167	8,470	
FRs count	4		Sub-total	41,804	17,558	
Lakes						
Rumbek East	Karich Proposed FR - Rumbek Area "C"	proposed		13,157	5,526	
Yirol East	Malek Central FR			7,672	3,222	
Yirol East	Palwal FR			58,260	24,469	
FRs count	3		Sub-total	79,090	33,218	
Western Equtoria						
Yambio	? (Yambio)			254	107	
Yambio	Yeta FR			20,214	8,490	
Maridi	Maridi Town Provincial FR			644	270	
FRs count	3		Sub-total	21,111	8,867	
Central Equatoria						
Terekeka	Gammelza Forest	proposed		976	410	
Juba	Ashong Forest	proposed		848	356	
Juba	Bilinlang Forest	proposed		42,020	17,648	
Juba	Gerikedi-Mongalla Central FR			40,110	16,846	
Juba	Juba Neem FR			322	135	
Juba	Liria Forest	proposed		432	182	
Juba	Liria Provincial FR			172	72	
Juba	Luluba North Forest	proposed		15,398	6,467	
Juba	Luluba South Forest	proposed		13,090	5,498	
Juba	Malogan Forest	proposed		7,821	3,285	

Table 12-11: Under Reservation forests within the category of Central Forest Reserve **(cont.)**

State / County	Name of forest reserves (FRs)[*1]	Gazetted date	Gazette number	Indicative area[*1] (Feddan)	Indicative area[*1] (Ha)	Note
Yei	Eastern FR			607	255	
Yei	Green Belt of Yei Town			305	128	
Yei	Mumori Nursery Central FR			229	96	
Yei	Western FR			643	270	
Kajo Keji	Rego Dongo FR			4,969	2,087	
FRs count	15		Sub-total	127,943	53,736	
Eastern Equatoria						
Torit	Ifoto Forest	proposed		22,757	9,558	
Torit	Imela Forest	proposed		2,991	1,256	
Torit	Lokiri (Peeping Tom) Forest	proposed		35,759	15,019	
Torit	Longairo Forest	proposed		9,097	3,821	
Torit	Lowe Hills Central FR			15,853	6,658	
Torit	S. Lofil Forest	proposed		38,343	16,104	
Torit	Talanga FR			11,691	4,910	
Torit	Torit Town FRs			540	227	
Lopa	N. Lofil Forest	proposed		31,694	13,311	
Kapoeta South	Kapoeta Forest	proposed		199	84	
Budi	Didinga Mountains Forest	proposed		114,392	48,044	
Budi	Mt. Lotuko Forest	proposed		32,009	13,444	
Ikotos	Dongotona Mountains Forest	proposed		68,628	28,824	
Ikotos	Madiar Hills Forest	proposed		18,200	7,644	
Magwi	Farajok Provincial FR			86	36	
Magwi	Korripi Forest	proposed		16,699	7,014	
Magwi	Loa Forest	proposed		311	130	
Magwi	Lotti Forest			4,251	1,785	
Magwi	Magwe Forest	proposed		357	150	
Magwi	Magwe Provincial FR			80	34	
FRs count	20		Sub-total	423,936	178,053	
Total FRs count	**62**		**Total area**	**870,109**	**365,446**	

Note: 1) Areas of forest reserves are calculated from polygon data and are not accurate measurements.

According to the Forest Policy 2013 there are 121 CFRs with a total area of 1,205,686 ha. CFRs include 72 Reserved Forests and 49 Under Reservation forests with a total area of 726,778 ha and 442,908 ha, respectively.[498] Reserved Forests and Under Reservation are the sub-categories of CFRs. Details of Reserved Forests are shown in Table 12-10 and those of Under Reservation are presented in Table 12-11. Against the numbers mentioned in the Forest Policy 2013, 72 Reserved Forests and 49 Under Reservation forests, 68 of the former and 62 of the latter were identified from the sources from LRSIC. There are one proposed CFR in the category of Reserved Forest and 24 proposed CFRs in the category of Under Reservation forest.

Examination of such information sources indicates the inconsistency and incompleteness of the CFR inventories maintained by MAFCRD. It was noted that access to the inventories of forest reserves in South Sudan maintained by the Government of the Republic of the Sudan (GRS) was limited. Inconsistencies and missing information, such as the name of CFRs, gazetted dates and numbers, precise locations and areas, and detailed descriptions of each CFR were partly consequences of the limited access to the reserve forest inventories kept by the GRS.

[498] Total number of Reserved Forests and Under Reservation forests cited in the Forest Policy is 76 and 49, respectively, whereas the identified total numbers of Reserved Forest shown in Table 12-10 and Under Reservation forests shown in Table 12-11 are 68 and 62, respectively. These totals are not reconciled and therefore further collection of and examination on information regarding CRFs will be required.

12.6.4 Forest plantations in Central Forest Reserves

Table 12-12 summarizes forest plantations occurring in South Sudan. The main references used to construct this table are the annexes of the Forest Policy 2013 which also identifies teak (*Tectona grandis*) as a major plantation species. By cross checking with other information sources, errors identified in the annexes were corrected. The Policy indicates that the total teak plantation area is 70,160 ha of which 20,000 ha is considered to be good quality. In contrast, the cross checked data presented in the table provides the total teak plantation area as 36,548 ha. Because the forest plantation inventory dataset seems to be prone to errors, further verification of the dataset is recommended to establish a consistent, complete and accurate set of information representing the current situation of forest plantations.

12.6.4.1 Brief historical background and breakdown of CFR management

The establishment of teak plantations began in 1945[499] by the Anglo-Egyptian administration in Sudan. Plantation development was continued by the government forestry administration, and by the mid-1970s, plantations totalled around 16,000 ha of hardwoods and 500 to 600 ha of softwoods in the Republic of the Sudan. Most of the remaining plantations are found in Central, Eastern and Western Equatoria States in South Sudan. Main plantation species are teak plus coniferous species in the higher elevations of the Imatong Mountains.[500]

In the 1980s management of teak plantation in Southern Sudan had deteriorated due to the escalation of the Second Sudanese Civil War. For example, a GIZ (then GTZ) supported forestry project managing the teak plantations in Yei River County was shut down in 1987 due to the intensification of the civil war. During the civil war, all of the teak plantations were subject to uncontrolled felling and export to Uganda. It was said that the entire process was managed in the informal market by foreign-owned logging companies.[501] The management of CFRs, as well as the forest plantations in the CFRs severely deteriorated; the forests and plantations became subject to illegal harvesting and charcoal production, encroachment, and deforestation. As shown in Table 12-12 most of CFRs in Western Bahr el Ghazal were destroyed and encroached.

With the establishment of the Ministry of Agriculture and Forestry, GOSS, the ministry ordered a review of commercial logging activities. The review committee found that all of the issued contracts were illegal and that logging companies did not conform to best forestry practices. This prompted the ministry to issue a decree annulling all the contracts and banning logging in both the teak plantations and natural forests. This ban did not hold beyond 2006 due to the need for foreign currency and construction timber in (then) Southern Sudan.[502]

Despite the efforts made, since independence, by GRSS and state and local governments to control illegal logging in teak plantations and natural forests, these activities are still difficult to contain due to the limited forest management capacity of these governments. For example, in June 2013, the authority of Yei River County issued an order banning all illegal timber dealings in the county. Under the ban companies found logging or exporting timber without proper documents will have their timber confiscated and pay the same taxes and charges that legal businesses pay.[503] However, the Forestry Subsector CAMP Task Team members, who visited Yei River County in April 2013 assessed that county-wide uniform application of this ban requires a significant number of forestry officers and forest guards, and close collaboration with revenue authorities; and that, actual implementation of the ban

[499] Interview with officials of Kagelu Forestry Training Centre. September 2012.
[500] UNEP. 2007. Sudan post-conflict environmental assessment. Nairobi: UNEP. pp. 198-199.
[501] UNEP. 2007. Sudan post-conflict environmental assessment. Nairobi: UNEP. pp. 198-199.
[502] UNEP. 2007. Sudan post-conflict environmental assessment. Nairobi: UNEP. pp. 198-199.
[503] http://www.radiomiraya.org/news-202/south-sudan/11447-yei-authorities-ban-illegal-logging.html#gsc.tab=0

would be sporadic and ineffective in controlling widespread illegal activities due to the limited implementation capacity of the county.

Table 12-12: Forest plantations established in the Central Forest Reserves

State / County	Name of forest reserves (FRs)[*1]	Gazetted date	Gazette	FR area (Ha)	Plantation area: Species planted	Plantation area: Area (Ha)	Note
Upper Nile (no record identified)							
Jonglei (no record identified)							
Unity (no record identified)							
Warrap (no record identified)							
Northern Bahr el Ghazal (no record identified)							
Western Bahr el Ghazal							
(county TBC)	Kpanza[*7]	1964	(TBC)	20,700	T. grandis	210	
(county TBC)	Pongo Nuer[*7]	(TBC)	(TBC)	13,440	T. grandis	575	100% destroyed
(county TBC)	Gette Extention[*7]	(TBC)	(TBC)	20,160	T. grandis	(TBC)	100% destroyed
(county TBC)	Wau Town[*7]	1953	(TBC)	1,121	T. grandis	(TBC)	100% destroyed
Jur River	Gette (Getti FR)[*5]	15/10/1950	821	2,221	T. grandis	1,428	100% destroyed
Jur River	Khor Abong[*5*7]	1951	(TBC)	793	T. grandis	793	100% destroyed
Jur River	Khor-Grinty (Grinty FR)	15/10/1950	821	3,480	T. grandis	1,504	100% destroyed
Jur River	Kuajena (Kawajena FR)	12/12/1955	889	4,565	T. grandis	1,377	
Jur River	Nyin-Akok (Nyin Akok FR)[*5]	15/10/1950	821	3,564	T. grandis	1,512	50% destroyed
Jur River	Tonj No.1 (Tonj Road FR)[*5]	15/12/1951	837	1,355	T. grandis	1,354	50% destroyed
Bagave	Dokorongo[*5*7]	1954	(TBC)	1,722	T. grandis	1,377	100% destroyed
Bagave	Ngohalima/Akanda (Ngwolima Akanda FR)	15/10/1930	811	4,471	T. grandis	2,932	100% destroyed
Bagave	Namatina (Numatinna Central FR)	15/06/1953	856	256,299	T. grandis	1,377	50% destroyed
Bagave	Nyalero[*5*7]	1954	(TBC)	7,266	T. grandis	1,377	100% destroyed
					Sub-total	**14,439**	
Lakes (no record identified)							
Western Equtoria							
Tambura	Banambiro[*7]	(TBC)	(TBC)	(TBC)	T. grandis	4	
Tambura	Riwa I & II[*7]	(TBC)	(TBC)	(TBC)	T. grandis	404	
Tambura	Zangia[*7]	(TBC)	(TBC)	(TBC)	T. grandis	2	
Najro	Bakiri[*7]	(TBC)	(TBC)	(TBC)	T. grandis	1	
Najro	Duma[*7]	(TBC)	(TBC)	(TBC)	T. grandis	2	
Najro	Mapiso[*7]	(TBC)	(TBC)	(TBC)	T. grandis	5	
Nzara	Ringasi (Lingasi FR)	15/10/1953	847	2,814	T. grandis, etc.	647	ETC (2012)[*3]
Nzara	Magada (Magaba FR)	15/10/1950	821	2,337	T. grandis, etc.	383	ETC (2012)[*3]
Nzara	Mbari-zunga (Mbarizunga FR)	15/03/1951	837	8,358	T. grandis, etc.	375	ETC (2012)[*3]
Nzara	Nangundi (Nangondi FR)	15/10/1952	947	(TBC)	T. grandis, etc.	251	ETC (2012)[*3]
Nzara	Nzara (Nzara Nursery)	15/10/1950	821	4,208			
Nzara	Simbi (Siimbi FR)	15/10/1952	847	7,434	T. grandis	7,125	
Nzara	Yabua (Yabua FR)[*5]	15/12/1950	824	4,279	T. grandis, etc.	208	ETC (2012)[*3]
Ezo	Bangangai	(TBC)	(TBC)	(TBC)	T. grandis	640	
Ezo	Marunyo	(TBC)	(TBC)	437	Mixed spp.	520	
Ezo	Nagbagi[*7]	(TBC)	(TBC)		T. grandis	20	
Yambio	Asanza.C. (Asanza FR)[*5]	15/10/1950	821	209	T. grandis	185	BLL (2009)[*4]
Yambio	Marangu (Marengu FR)	15/10/1950	847	5,691			
Yambio	Saura Council[*7]	(TBC)	(TBC)		T. grandis	5	
Yambio	Yabongo.C. (Yabongo FR)[*5]	15/12/1950	824	354	T. grandis	316	BLL (2009)[*4]
Yambio	Yatta.C. (Yata FR)[*5]	15/03/1953	851	8,190	T. grandis	325	Area corrected
Ibba	Zaria (Zaria FR)[*5]	15/12/1950	824	17,545	T. grandis	640	BLL (2009)[*4]
Ibba	Zumbi	(TBC)	14774	6,205	T. grandis	10	SEL (2009)[*2]
Maridi	Azza (Aza FR)	15/03/1950	811	740	T. grandis	2	
Maridi	Embe (Embe Central FR)[*5]	10/02/1959	(TBC)	3,473	T. grandis	510	
Maridi	Maridi[*7]	(TBC)	(TBC)		T. grandis	50	
Maridi	Gazan[*5*7]	(TBC)	(TBC)		T. grandis	2	
					Sub-total	**12,632**	

Table 12-12: Forest plantations established in the Central Forest Reserves (cont.)

State / County	Name of forest reserves (FRs)[*1]	Gazetted date	Gazette	FR area (Ha)	Plantation area: Species planted	Plantation area: Area (Ha)	Note
Central Equatoria							
Terekeka	Kadule (Kadule FR)[*5]	15/11/1951	(TBC)	141	Cassia, etc.	141	
Juba	Girikidi (Girikidi Forest)	(TBC)	(TBC)	8,686	T. grandis, etc.	8,272	
Juba	Jebel Korok	15/02/1964	(TBC)	105			
Juba	Lulubo North (Luluba Hills FRs - North)	15/10/1956	(TBC)	4,523	T. grandis	4,523	
Juba	Lulubo South (Luluba Hills FRs - South)	15/10/1956	(TBC)	4,284	T. grandis	4,284	
Juba	Mangalla (Mongalla FR)	15/11/1948	(TBC)	476	T. grandis, etc.	476	
Juba	Rejaf East	(TBC)	(TBC)	4	T. grandis, etc.	4	
Lainya	Loka West (Loka FR)[*5]	15/01/1950	(TBC)	22,713	T. grandis	1,045	CETC (2008)[*6]
Yei	Kagelu (Kagelu FR)[*5]	15/01/1950	(TBC)	968	T. grandis	918	
Yei	Kajiko North (Kajiko Valley FR)[*5]	15/12/1953	862	4,905	T. grandis	750	CETC (2008)[*6]
Yei	Korobe (Korobi FR)	(TBC)	(TBC)	2,123	T. grandis	50	CETC (2008)[*5]
Yei	Momury (Mumori FR)	15/07/1952	844	92	T. grandis	30	
Yei	Yei Council[*5*7]	(TBC)	(TBC)		T. grandis	2	
Morobo	Kajiko South[*5]	15/04/1965	862	5,603	T. grandis	90	
Kajo Keji	Kajo Kaji (Kajo-Keji FR)[*5]	(TBC)	(TBC)	1,957	T. grandis	1,957	
					Sub-total	**22,542**	
Eastern Equatoria							
Torit	Immella (Imela FR)[*5]	15/08/1955	3150	371			
Torit	Katire (Katire Central FR)[*5]	15/08/1951	31	350			
Torit	Lerwa (Lowe Forest)[*5]	proposed	176	(TBC)			
Ikotos	Kateri[*7]	(TBC)	(TBC)		T. grandis	350	
Ikotos	Imatong/Gilo (Imatong Mountains FR)	15/03/1952	304-207	353	T. grandis	353	
Ikotos	Immella[*5*7]	(TBC)	(TBC)		T. grandis	371	
Magwi	Kereppi (Kerripi Central FR)	(TBC)	500	299	T. grandis	299	
Magwi	Palwak[*5]	(TBC)	182	(TBC)			
Magwi	Shukole (Shukoli FR)[*5]	(TBC)	2447	(TBC)			
Magwi	Vukadi[*5]	(TBC)	25	(TBC)			
					Sub-total	**1,373**	
Total area[*8]						**50,987**	
Total Teak (T. grandis) plantation[*8]						**36,548**	
Estimated area of teak plantation with good quality						**20,000**	

Note: 1) Forest reserve names indicated in the Forest Policy are used and names in parentheses are used by Land Resource Survey and Information Centre (LRSIC), Directorate of Forestry, MAFCRD. 2) Concession on teak plantation management was granted to Sercham Equatorial Limited (SEL) in 2009. 3) Concession on teak plantation management was granted to Equatoria Teak Company (ETC) in 2012. The areas of teak plantations underlined are adjusted figures based on an environmental assessment document prepared by ETC. 4) Concession on teak plantation management was granted to Blue Lakes Limited (BLL) in 2009. 5) Visited by CAMP forestry subsector team during situation analysis. 6) Concession on teak plantation management was granted to Central Equatoria Teak Company (CETC) in 2008. 7) Forest reserves not listed in Table 1 through 6 of Annex 1 of the Forest Policy. 8) Totals do not match with the totals indicated in the Forest Policy 2013.

12.6.5 Field observations of Central Forest Reserves and forest plantations

Twenty nine Central Forest Reserves (CFRs) indicated in Table 12-10 and in Table 12-12 five states were visited by the forestry subsector CAMP TT. The current state of the CFRs is disastrous. A major effort is needed to restore law and order and proper CFR management regimes in conformity with the Forest Policy 2013, which emphasizes decentralized forest management, and subsequent establishment of necessary legislation and its implementation. It was confirmed that there was/is: 1) low presence of GRSS and state governments at the CFRs, 2) inadequate CFR management capacity for proper management at all levels of government, 3) encroachment and land grabbing of CFR areas by governments, farmers, and local elites, 4) overexploitation of plantation forests particularly those of teak during the civil wars, 5) continuing illegal logging and unsustainable harvest of forest resources, and 6) very limited investment in forest plantation establishment and maintenance.

The CFRs visited can be categorised into two groups: a group of in the Greater Upper Nile and Greater Bahr el Ghazal regions, and another group in the Greater Equatoria region. The first group (or Northern CFR Group) was severely affected by the second civil war. I is

located in a semi-arid climate receiving annual average rainfall of less than 1,000mm. the second group (or Southern CFR Group) is in higher elevation areas with the annual average rainfall of more than 1,000mm. This group is located in an area better suited for forestry than the Northern CFR Group.

Table 12-13 summarises the observations from the visits to the 2 groups. Based on information collected through interviews and comparisons between the two groups, the Southern CFR Group has better institutional capacity, although the capacity of both Groups is still far below the level it is supposed to be. Officers of both Groups believe that formally approved national and state policies, and laws and regulations are non-existence. Since the new Forest Policy 2013 was only approved by the Assembly recently (July 2013), and Forest Law is not yet approved, this belief reflects the serious status of institutional arrangements for the management of CFRs.

The Assistant Commissioner of Forestry at Yei River County said that there is no adequate legislation to control, manage, and impose levies on forestry activities and products. He said that to manage this legal vacuum, laws and regulations adopted during the pre-CPA and the Southern Sudan Autonomous Region are improvised to administer forestry activities in their jurisdiction. Day-to-day duties can also be regulated by issuing administrative orders at the county level. However, if it comes to a prosecution of a person allegedly committing an offence, the legitimacy of the legal arrangement becomes an issue, which makes prosecution difficult in the local court.

County forest officers (i.e. Assistant Commissioner in charge of forestry) of both CFR Groups consider the involvement of the GRSS in forest administration very limited. Currently management responsibility for CFRs is given to the state Directorates of Forestry; there is limited communication between the national Directorate of Forestry, (former) MAFCRD and the state directorates. The Southern CFR Group is slightly better endowed with financial, human and physical resources and equipment. However, with respect to their responsibilities, allocated resources are far from sufficient. There are almost no management and extension activities carried out by the Northern CFR Group, whereas low-level forestry and extension activities are carried out by the Southern CFR Group. Partly due to weak CFR management capacity in the Northern CFR Group, traditional authorities play an important role in controlling illegal cutting and encroachment of CFRs in some areas.

In South Sudan teak is the major, and most productive and valuable plantation species. There are other species such as eucalyptus, acacia, cassia, coniferous species, and bamboos that are planted but on a limited scale. Teak plantations in the Northern CFR Group were heavily harvested during the second civil war and most of the good teak plantations were lost.

Although heavily harvested during the war, most of the remaining teak plantations are found in the Southern CFR Group. These plantations were illegally logged even after the CPA and this continues. There has been inadequate silvicultural treatment of young and mature teak plantations resulting in stagnant growth rates in mature teak plantation older than 30 years. Silvicultural treatment of coppice stands established on the stumps of logged teak trees also needs improvement to achieve better quality and growth of teak.

Agroforestry is widely practised among farmers on the fringes of the Southern CFR Group. In this area, so-called "out-growers," who are farmers or private investors growing mainly teak on their own land, are commonly observed.

Table 12-13: Management status of Northern and Southern CFR Groups visited

Group	Northern CFR Group	Southern CFR Group
Regions	Central Forest Reserves in Grater Upper Nile and Grater Bahr el Ghazal Regions	Central Forest Reserves in Greater Equatoria Region
Name of CFRs visited during field study	• Nagdiar CFR, Panyikang C., UNS • Tawfigia CFR, Panyikang C., UNS • Khor Abong CFR, Jur River C., WBGS • Nyin Akok CFR, Jur River C., WBGS • Karich CFR, Rumbek East C., LKS[*1]	• Embe CFR, Maridi C., WES • Yatta CFR, Yambio C., WES • Zaira CFR, Ibba C., WES • Kadule CFR, Telekeka C., CES • Kajo Keji CFR, Kajo Keji C., CES • Katire CFR, Torit C., EES
1. County forest office responsible of management of CFRs		
(1) Overall organizational capacity and presence	• Very limited capacity and limited presence	• Relatively fair capacity and fair to good presence
1.1 Policy, legal framework, and reporting		
(1) National and state policies, and laws and regulations	• Not existing	• Not existing
(2) Involvement of GRSS and its coordination function	• Very limited	• Limited; it was said that GRSS is not aware of a concession arrangement for management of Yatta CFR granted by the State Government.
(3) Annual, monthly, and other reports	• Two out of five (40%) CFRs produced terminal reports	• Three out of six (50%) CFRs produced terminal reports
1.2 Financial resources		
(1) Investment and operation budget	• No allocation and execution	• Limited
(2) Tax and fee collection	• Ad hoc forestry related fee collection	• Ad hoc collection of taxes and fees are carried out by forestry officials; limited investigation capacity over allegedly illegal forestry activities
1.3 Human resources	•	
(1) Overall status of human resources	• Very limited	• Limited but better than the capacity of northern states
(2) Number of officers	• 1 to 3 officers	• 1 to 3 officers
(3) Number of temporary workers	• 0 to 7 workers	• 8 to 76 workers
(4) Staff capacity/labour issues	• Very limited/salary arrears	• Limited capacity and training received
1.4 Physical resources and equipment		
(1) Office, accommodation and storage facility	• Inadequate condition	• Dilapidated to moderate condition; sometime temporary office structures without accommodation facilities
(2) Transportation	• Not owned	• Not owned
(3) Equipment, machinery, and tools	• Not owned	• Not owned
1.5 Forestry activities		
(1) Management of Central Forest Reserves	• Almost no management of CFRs by GRSS and state government. • In the areas where traditional authority (chief) is responsible for management of a CFR illegal cutting and encroachment are somewhat contained.	• Moderate; operation of state owned sawmills, small-scale teak plantation establishment, tending, and other forest management activities are sporadically practiced whenever funds are available from revenue collection activities.
(2) Tree nursery operations	• Low level of tree nursery operation due to no funding and high cost of animal problems	• Small scale tree nursery operations are common for tree seedling production, distribution, and sale.
(3) Agroforestry extension activities	• No activities	• No extension activities. Out-growers are rarely visited by forestry officials.

Table 11-13: Management status of Central Forest Reserves visited (cont.)

Group	Northern CFR Group	Southern CFR Group
2. Status of Central Forest Reserves		
2.1 Status and technical issues of plantation forest		
• Access to CFR	• Poor to good, dependent on location of CFR	• Poor to good dependent on the condition of roads and bridges.
• Staff deployment, office and equipment at CFR site	• Approximately 0 to 1 forest guards • No office facilities or dilapidated office	• Approximately 2 to 4 technical staff deployed • Few forest guard deployed • Approximately 2 to more than 50 casual labour employed • Old or new office building without accommodation
• Main plantation species	• Teak, acacia, cassia, neem for timber and fuel	• Teak dominating, and eucalyptus, pines, bamboo, and other species planted on small-scale.
• Quality of plantation forest	• Teak plantations have been heavily logged and no good quality plantations left	• Severely logged to good condition
• Technical issues regarding planting and tending	• Coppiced teak is continuously harvested for pole production • Re-demarcation of reserve forest needed	• No silvicultural treatment of teak plantation • Over mature teak plantation with small annual growth rate • Poor quality teak stands in the logged areas • Coppiced teak is cut continuously for pole production
• Disease, pest, animal browsing and other problems	• Frequent forest fires	• Some diseases and pests for teak plantations are recognized
2.2 Illegal activities in and around CFRs		
• Illegal felling of trees in and around CFR	• Heavy logging of teak plantations during the second civil war by soldiers • Heavy tree felling for timber and charcoal production	• Heavy logging of teak plantation by SPLA during the second civil war period • Severe illegal logging of teak plantations for timber production and natural forest for timber and charcoal production
• Encroachment and/or land grabbing	• Heavily encroached by state authorities, communities, IDP, and people from Darfur • Alleged land grabbing by local elites is common	• Limited degree of encroachment for agricultural production by communities and by county authorities. In some areas local elites are alleged to carry out land grabbing.
3. Community and farmers		
• Agroforestry	• Timber production through agroforestry practice is not common.	• Widely practiced with teak for timber production. • Exotic tree species are introduced for agroforestry practices.
• Willingness to be involved in CFR management	• In most cases CFRs are not recognized and appreciated by local communities	• Communities are interested to become involved in CFR management through, for example, concession agreement between government and company concerned. If such agreement fails, the communities are likely to carry out illegal harvesting activities
• Social and economic factors	• Some settlers are well-organized under their chief	• Some communities fled to town due to Lord's Resistance Army in 2009.

Note: 1) Karich Central Forest Reserve is a proposed Central Forest Reserve

12.7 Concession forest management

Since 2008 three concessions have been granted to the Central Equatoria Teak Company (CETC), Equatoria Teak Company (ETC), and Blue Lake Limited (BLL). Table 12-14 shows the CFRs and teak plantation areas where the three companies have responsibility for timber production, re-afforestation and protection. ETC is responsible for managing five CFRs in Western Equatoria State. The total areas managed are more than 17,000 ha of CFRs and 1,864 ha of plantations. Also in western Equatoria State, BLL is responsible for the management of three CFRs with a total area of 18,000 ha and plantation of 1,141 ha. Due to unknown reasons, CETC halted its forestry management operations in 2009 immediately after the concession to manage three CFRs and plantations in Central Equatoria State was granted by the GRSS and the Government of Central Equatoria State[504]. Another company which may be granted a concession to manage Zaira CFR and its teak plantation is Sercham Equatorial Limited. However, Zaira CFR is currently under the concession of BLL which needs clarification.

Table 12-14: Concessionaires and CFRs and plantations under their management

State / Cocessionaire name / County	Name of Central Forest Reserves (CFRs)[*1]	Gazetted date	CFR area (Ha)	Plantation area: Species planted	Plantation area: Area (Ha)
Western Equatoria State					
Equatoria Teak Company (ETC)/Maris Capital (Concession was granted in 2012)					
Nzara	Ringasi (Lingasi FR)	15/10/1953	2,814	T. grandis, etc.	647
Nzara	Magada (Magaba FR)	15/10/1950	2,337	T. grandis, etc.	383
Nzara	Mbari-zunga (Mbarizunga FR)	15/03/1951	8,358	T. grandis, etc.	375
Nzara	Nangundi (Nangondi FR)	15/10/1952	(TBC)	T. grandis, etc.	251
Nzara	Yabua (Yabua FR)[*2]	15/12/1950	4,279	T. grandis, etc.	208
Total area			17,788		1,864
Blue Lakes Limited (BLL)/Sercham Equatorial Limited (SEL) (Concession was granted in 2009)					
Yambio	Asanza.C. (Asanza FR)[*2]	15/10/1950	209	T. grandis	185
Yambio	Yabongo.C. (Yabongo FR)[*2]	15/12/1950	354	T. grandis	316
Ibba	Zaria (Zaria FR)[*2]	15/12/1950	17,545	T. grandis	640
Ibba	Zumbi	(TBC)	6,205	T. grandis	10
Total area			24,313		1,151
Central Equatoria State					
Central Equatoria Teak Company (CETC) (Concession on CFRs was granted in 2008)					
Lainya	Loka West (Loka FR)[*2]	15/01/1950	22,713	T. grandis	1,045
Yei	Kajiko North (Kajiko Valley FR)[*2]	15/12/1953	4,905	T. grandis	750
Yei	Korobe (Korobi FR)	(TBC)	2,123	T. grandis	50
Total area			29,741		1,845
Grand total area			**71,842**		**4,860**

Note: 1) Forest reserve names indicated in the Forest Policy are used and names in parentheses are used by Land Resource Survey and Information Centre (LRSIC), Directorate of Forestry, MAFCRD. 2) Visited by CAMP forestry subsector team during situation analysis. 3) Currently Zaira CFR is under the concession granted to BLL. The current status of SEL concession needs to be confirmed.
Source: CAMP TT Team

Management of the CFRs by concessions was introduced after the CPA and still is considered to be in the process of improvement. From the point of view of investors, the business environment in South Sudan is still risky. There is no clarity in property rights or in the rights of forest fringe communities; transportation, equipment and maintenance costs are high; plus there are multiple taxes and fees, and weak public services. All this can negatively affect business operations. Thus, only production and marketing of commodities, like teak wood, which are able to fetch a high price in the international market and assure returns, can

[504] An concession agreement was signed by GRSS and the concerned state government and the concessionaire.

be considered for private sector investment. In this section operations of the two existing concessionaires are described for further discussion on development of forest products industries.

12.7.1 Equatoria Teak Company

According to the plantation management and development agreement dated 28 June 2006, Equatoria Teak Company (ETC) undertakes the management of five CFRs, namely Magada, Mbari-zunga, Nangundi, Ringasi, and Yabua in Western Equatoria State for 32 years from August 2006.[505] ETC's investment capital is about 5 million USD. Although the concession agreement was reached in 2006, ETC only began its logging, sawmilling and plantation development operations recently. Sawmilling and timber processing plants were recently installed.

ETC has three departments and employs 130 staff members. Names of the departments, employees' job titles, numbers, and level of qualification in terms of recruitment in the international or local labour markets are indicated in Table 12-15. In terms of employment creation in the local labour market, this size of forestry industry investment would create over 100 permanent and casual jobs. Casual workers are all recruited from the area of operation. There are 12 highly skilled positions kept for international recruitment. It is envisaged that these positions can be filled with locally recruited specialists in the future as the local labour markets develop and mature.

ETC's sawmill plant began timber production in June 2013. ETC installed generators (about 500kW capacity) which supply power to run the plant consisting of band-saws, wood dry kilns, timber yards and storage, grab wood machines, trucks and cars. All workers are provided with protective gear.

[505] Equatoria Teak Company (ETC) in 2006 entered into a management and development agreement with the GOSs, ministry of Agriculture and Forestry, GOSS, and Ministry of Agriculture, Environment and rural Development, Government of Western Equatoria State. The concession is managed in accordance with the law of Sough Sudan and the provisions of the agreement. (Source: Equatoria Teak Company. 2012. Forest Management Plan. section 1.1.3)

Table 12-15: Organization and staffing of Equatoria Teak Company (ETC)

Department	Qualification level		
	International	Local	Total
1. Managing Director	1		1
2. Finance Administration			
Finance and administration	1	3	4
General worker		3	3
Sub-total	1	6	7
3. Forestry and Nursery			
Lead forester	1		1
Forest worker		10	10
Security		14	14
Nursery		5	5
Casual worker		25	25
Sub-total	1	54	55
4. Sawmill and Engineering			
Operations engineer	1		1
Saw doctor	1		1
Mechanic	1	3	4
Heavy equipment driver	6		6
Sawmill supervisor		1	1
Security		4	4
Casual worker		50	50
Sub-total	9	58	67
Total	12	118	130

Source: Equatoria Teak Company. 2013. Nzara

12.7.1.1 Processing demands and log supplies

Forestry operation relies on existing and future growth; productive stocks of tree stands need to be established through plantation and tending activities. An estimation of current volume and value of the teak plantations managed by ETC would indicate an approximate yield for sustainable forest management. Because teak is mature for harvest after 28 to 32 years (much faster than other indigenous timber species in natural forests), teak and other fast growing tree species can be considered for plantation establishment by ETC.

ETC's sawmill is designed to process 1,000 logs/day. Based on the following estimation, this installed capacity must be too large to source logs only from the teak plantations under ETC's management in a sustainable manner. To operate the sawmill with full capacity, ETC must also source teak logs form out-growers. However, the future prospect of supplies from out-growers seems to be limited ETC may need to consider significant investment to establish large-scale teak plantations in its CFRs.

As shown in Table 12-16 the total volume of teak plantations managed by ETC is about 275,000m^3. Assuming that volume recovery rate of sawn timber from log is 30%[506] and that sawn timber would fetch 500USD/m^3 at Kampala in Uganda, the value of the teak plantation measured at the price in Kampala is about 41 million USD as shown in

Table 12-17. Further assuming that, on average, the annual growth rate of the teak plantation were 2%, which should be conservative growth rate for such teak plantations, the

[506] Equatoria Teak Company. 2012. Forest Management Plan. Section 7.2. Recovery rate of 30% is considered to be low. It can be improved by introduction of better and efficient milling operation and marketing.

annual allowable harvest is about 5,500m^3 of log equivalent. This means that annually 24ha of clear cutting of teak plantation needs to be done to process 1,651m^3 of timber valuing 825,000 USD at Kampala. If ETC operates 200 days a year, daily sawn volume of logs harvested from their teak plantation would be 28m^3 which produces 8m^3 of timber valued 4,000 USD at Kampala price.

ETC's sawmill is designed to process 1,000 logs/day which is equivalent to 140m^3/day of logs ETC expects about 40m^3 to 50m^3/day of sawn timber volume recovery rate of about 30%. At the time of the field visit in July 2013, ETC was processing 600 logs/day (87m^3/day) to produce 20m^3 of sawn timber, which is a yield 23%, lower than the 30% expected by ETC. ETC's target is to process 140m^3/day of logs whereas the estimated allowable daily log harvest from the ETC managed teak plantation in the CFRs is 28m^3. For sustainable forestry, the balance of 112m^3/day must come from outside the plantations. Although the estimate of allowable daily harvest from the plantations is conservative, to meet this balance logs need to be sourced from teak plantations established by out-growers. Under the current concession, logs from out-growers are needed to sustain this size of wood processing businesses. However, whether the log supply of 112m^3/day from out-growers in the surrounding areas is sustainable is unknown. Further study is needed to determine whether the supply of teak wood to the sawmill is sustainable.

Table 12-16: Volume and average height and diameter in teak plantations managed by ETC

Teak plantation	Ha (ha)	Average volume/ha (m^3/ha)	Total stand volume (m^3)	Average height (m)	Average diameter (cm)
Yabua	593.0	199.5	118,309	20.7	22.2
Mborizanga	280.5	279.7	78,450	23.8	23.9
Nangondi	316.6	205.3	64,992	21.4	22.1
Magaba	23.5	285.7	6,714	20.3	21.7
Ringazi	35.0	189.9	6,645	19.0	21.0
Total/average	1,248.6	232.0	275,111	21.0	22.2

Source: Equatoria Teak Company. 2013. Nzara.

Table 12-17: Estimated allowable production from teak plantations managed by ETC

Estimation items	Estimated values	
Estimation of the total value of teak plantations at 500USD/m^3 Kampala price		
a) Timber equivalent of total stand volume at recovery rate of 30% (a=275,111*30%)	82,533	m^3
b) Value of teak plantation (b=a*500)	41,266,643	USD
Estimation of annual allowable harvest at 500USD/m^3 Kampala price		
c) Annual growth at annual growth rate of 2% (c=275,111*2%)	5,502	m^3
d) Annual average harvesting area (d=c/232)	24	ha
e) Timber equivalent of annual growth at 30% recovery rate (e=c*30%)	1,651	m^3
f) Value of timber equivalent of annual growth (f=e*500)	825,333	USD
Estimation of daily allowable harvest at 200day/year operation at 500USD/m^3 Kampala price		
g) Daily allowable volume of log harvest (g=c/200)	28	m^3
h) Daily allowable timber production at 30% recovery rate (h=g*30%)	8	m^3
i) Value of daily allowable timber production (i=h*500)	4,127	USD

Source: Equatoria Teak Company. 2013. Nzara. and CAMP TT

12.7.1.2 Teak plantation establishment and Forest Stewardship Certificate

New teak plantations are to be established annually to secure future timber supplies in a sustainable manner. ETC is managing a tree seedling nursery to establish 38 ha of new teak plantation. It is planned that 24,700 teak seedlings will be raised to establish 38 ha of new plantation with 2 by 2 meter spacing (i.e. 650 teak/ha). The plantation establishment is the investment part of forest management necessary to manage forests in a sustainable manner. Due partly to the plantation activities, ETC recently obtained the Forest Stewardship Certificate (FSC)[507] for sustainable forest management, providing ETC with international recognition when exporting their products.

12.7.1.3 Challenges

It was recognized by ETC that there are a number of challenges for its operation to be sustainable and profitable. They are: 1) issues of security, 2) poor infrastructure particularly roads, and 3) competition between timber dealers and ETC for the purchase of logs from out-growers. Due to security reasons, ETC conducts logging operation within confined areas of the CFRs. Locations with widespread illegal operations are dangerous to log as the illegal loggers and timber dealers are armed. The GRSS and state governments are doing very little to stop these illegal operations even if they are reported to them. The governments have no forest laws to prosecute these illegal activities. The number of governments forest guards is limited and not adequately armed. Lack of good road infrastructure for exporting products is another major constraint, for example, the cost of transporting timbers from ETC's sawmill in Nzara to Kampala is ten times higher than from Kampala to Mombasa, Kenya.

12.7.2 Blue Lakes Limited

Blue Lakes Limited (BLL) was established in 2008 and became operational in 2011. According to the concession agreement between the GRSS, the Government of Western Equatoria State and BLL, BLL was given the concession to manage Asanza CFR and Yabongo CFR in Yambio County, and Zaria CFR in Ibba County. The latter CFR is not managed by BLL yet. The concession agreement specifies the responsibility of BLL for the development of a forest management plan which is subject to review every 5 years. It also specifies management of the CFRs for 30 years and the need to annually establish teak plantations of 38 ha. BLL is about to obtain the Forest Stewardship Certificate (FSC) for management of Asanza CFR and Yabongo CFR. The sawmill uses teak logs produced from the CFRs and out-growers in and around Yambio, and produces block teak timbers for export.

12.7.2.1 Community participation

Community participation in forest management is stipulated in the concession agreement. The forest fringe communities near Asanza CFR and Yabongo CFR were asked to form community forest associations. BLL offers job opportunities to the communities which are also allowed free access to forest resources in the CFRs. The community associations are given 200,000 USD to implement community works such as building community centres and schools. The company employs approximately 80 staff members, of which 16 and 20 are permanent staff members from South Sudan and Kenya. The rest of the employees, over 40 workers or 60% of the total, are casual labourers recruited from the local communities. BLL

[507] Forest Stewardship Certificate (FSC) is a system allows certificate holders to market their products and services as the
result of environmentally appropriate, socially beneficial and economically viable forest management. The certificate can be granted to any management unit involving forest management if the criteria under the following ten principles set by FSC are met: 1) compliance with laws, 2) workers' rights and employment conditions, 3) indigenous peoples' rights, 4) community relations, 5) benefits from the forest, 6) environmental values and impacts, 7) management planning, 8) monitoring and assessment, 9) high conservation values, and 10) implementation of management activities.

also provides scholarships to selected community members to Kagelu Forestry Training Centre for diploma and certificate courses.

12.7.2.2 Timber export, conservation, plantation activities

The export price of teak timber in Kampala, Uganda is approximately 500 USD/m^3. The rate varies depending on the quality of the timber, market conditions and destination of consignments. The best market is Europe and America where FSC certification is required for teak timber imports. China and India are bulk export destinations but the prices are relatively low. BLL pays 100USD/m^3 to the Western Equatoria State Government and 10 USD/m^3 to the communities for timber export. BLL is mandated to protect endangered species such as African mahogany, and biodiversity in high conservation areas in its CFRs. Since 2011 BLL has established managing units or compartments and planted 75 ha of teak plantations in Yabongo CFR.

12.7.2.3 Challenges

One of the problems is very poor road conditions which makes operations costly. High costs of transportation are not only a result of time- and fuel-consuming transportation, but also of the frequent occurrence of traffic accidents involving casualties and damages to consignments. In addition, frequent tax collections en route add to the high cost of transportation. Additionally, costs of operation are also high. For example, obtaining sawmill spare parts is costly because there is no supplier in South Sudan and spare parts are obtained from foreign dealers.

The future supply of logs from the CFRs and out-growers is of concern; it is felt that reforestation activities by out-growers are rare after mature teak trees are harvested from their plantations. They also do not manage coppicing properly, diminishing the future value of their teak plantations. To manage this situation, BLL is planning establish new teak plantations of 208 ha and 354 ha of teak in Asanza CFR and Yabongo CFR.

Currently BLL is operating in Yabongo CFR but not in Asanza CFR due to insecurity caused by armed illegal loggers and log dealers. BLL believes that this problem of illegal activities must be handled carefully because the governments do not have an adequate legal framework and law enforcement capacity to control and prosecute such activities[508]. In addition to the insecurity BLL reported that they were competing with timber dealers who did not have proper offices, were difficult to trace and came with cash to make on the spot deals for teak logs. They also said that the high market value of teak logs increased illegal logging with the aim of getting quick money.

12.7.3 Central Equatoria Teak Company - legal problem

Central Equatoria Teak Company (CETC) was a company owned by a South African who made a concession agreement in 2008 with both the GRSS and the state governments to manage CFRs for thirty two years. The original concession agreement included seven CFRs: Loka CFR, Kajiko North CFR, and Korobe CFR in Central Equatoria State, and Magada CFR, Nangundi CFR, Yabua CFR, and Yata CFR in Western Equatoria State. Because of the absence of forest laws and regulations the governments concerned had no authority to clarify the transfer of ownership to the company leading to the non-performance of the concession agreement as described below.

In the three CFRs in Central Equatoria State CETC did not start operations as it encountered problems with the local communities. The GRSS had to intervene forming a committee to

[508] Without approved forest laws there are no illegal activities. However, according to the government official perception, activities are illegal with respect to previous laws and regulations adopted by the previous governments of Sudan and Southern Sudan.

review the agreement and progress made by the company with respect to the provisions of the agreement. The provisions included CETC's obligation to support the communities in establishing schools and community centres, and in providing employment opportunities. The South African owner of CETC sold the company to a London-based British investment company. It is not known when this deal took place; according to an official the deal was alleged to be illegal and carried out without the knowledge of the GRSS. Details of the CETC ownership transfer and subsequent establishment of ETC as responsible for the management of five CFRs in Western Equatoria State as the successor to CETC is unknown to the GRSS.

The 32 year concession was granted to Central Equatoria Teak Company (CETC) in 2008 for the management of Loka CFR, Kajiko North CFR, and Korbe CFR in Central Equatoria State. Based on the concession agreement, CETC constructed a community centre and primary health care centre, and renovated the forest management office near Loka CFR with revenues from its teak harvest and sales. However, it was reported that CETC no longer managed these CFRs for unknown reasons, and that operations by CETC, particularly those of teak plantation management in the three CFRs, were halted in 2009. Currently there is no CETC presence at the site of the CFRs. Workers once employed by the government, who became employees of CETC at the time of the concession agreement, are still staying in the CFRs as they are unsure about their employment status. The forest fringe communities, which are part of the stakeholders identified in the agreement, blame the GRSS for not doing enough to force CETC to adhere to the agreement, which includes profit sharing with the communities. It was reported that teak plantations as well as natural forests in Loka CFR were severely logged by disgruntled community members, and that cancellation of the concession is under consideration.

12.8 Forestry and agroforestry by out-growers

Common farming practices in South Sudan are usually associated with tree stands and temporary or permanent patches of forest and/or shrub land with a low density of tree cover. There are also communally managed forests reserved for agriculture use or production of forest products under the auspices of the traditional authorities. This is likely a natural socioeconomic consequence of the agricultural production system, in a place like South Sudan, characterised by low population density, non-mechanised agriculture and more land available for agriculture than people can farm. However, the cases introduced here are slightly different from the production system described above, partly because the farmers involved understand the economic returns of tree plantations, if they invest. In this case they select trees according to future returns, either tree species with a relatively long maturity period but with high market value (e.g. teak), or with a relatively short maturity period with low market value (e.g. eucalyptus). In this sense agroforestry practice done by out-growers is best considered as commercial plantation forestry. Particularly in Greater Equatoria Region, farmers and other investors have adopted agroforestry or plantation forestry with teak for its high economic potential. If there were more public support more farmers will practise it and generate more value. In the northern areas of the country, teak may be substituted by eucalyptus to meet demand for charcoal, fuelwood, and timber and avoid further rapid forest degradation.

Some positive impacts by the out-growers were, 1) they secured their land for teak plantations through inheritance, 2) loans can be obtained using the teak plantation as collateral, and 3) out-growers gained popularity through establishing plantations.

Box 12-1: A case of out-growers in Yei River County

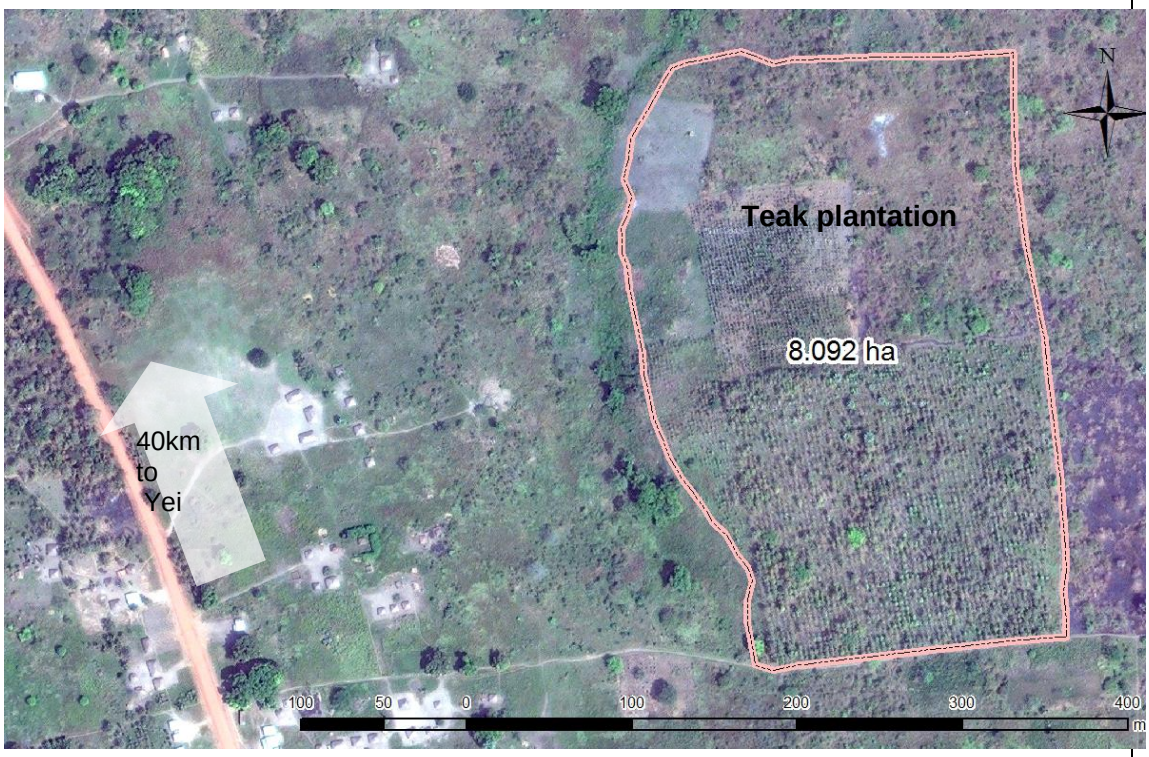
In 1988, an out-grower began establishing a teak plantation shown in Figure 12-4 in Yari

Boma, Mugwo Payam, Yei River County. The out-grower owns a hotel and shops in the outskirts of Yei town. Profits from these businesses have been used to invest in the teak plantation. He said that hotel business was declining due to the paved Juba-Nimule road (i.e. Juba-Yei road lost its importance). According to the Assistant Commissioner of Forestry in Yei River County, there are about 45 out-growers in the county.

The plantation is situated between two clans and the land serve as a buffer zone between the two clans. The land is considered no-one's land, and thus it was given to him by the elders of the two clans. The out-grower has never experienced conflict with others over his use of the land. The first teak planting was carried out in 1998 applying 3x3m spacing. The management objective was to produce teak logs. The second planting was conducted in 2003 with the spacing of 2x2m, and the last planting was in 2010 with the same spacing. In the same year a pine species (*Pinus petula*) was also planted, but failed due to termite attack and diseases. Currently his total plantation area is 8ha.

He used to purchase seedlings from a government nursery. For the 2010 planting he produced teak stamps from naturally regenerated seedlings in his plantation. Most of his labour for planting and tending work were Ugandans living in Uganda. Quality of labour from Uganda is better and payments to them are lower than those to locals. He spends 2,000SSP to 3,000SSp per year for labour. The reason that he became an out-grower was the influence of other out-growers in his boma.

Figure 12-4: Teak plantation established by an out-grower in Yei River County



A number of technical issues were observed regarding the plantation. For example, the plantation is lacking silvicultural operations; thinning is required in a part of the plantation to boost annual volume growth and secure income from sales of thinned trees. Also the spacing for the first plantation is too large (3m) to conduct thinning operation when it is necessary to do so. Fungal infections to young teaks at the edges of the plantation are evident and finally inadequate technical support to improve the capacity of the farmer and the quality of his plantation. He also says that there is no teak log market due to no vehicles and the long distance to Yei Town. However, no illegal logging was observed.

Another out-grower, who is a farmer, established plantations approximately 1.5 km south of the first out-grower. This farmer posesses two plantation plots with areas of approximately 2.2

ha and 1.0 ha. The larger plantation is a mixture of teak and pine, and the smaller is mixed species of *Gravillia robust*, *Cacia siamia*, and *Tectona grandis.* According to him these plantations are established in his ancestral land and there were no land conflicts. Planting began in 2004. He knows that, although the forest business needs a long time to obtain return on investment, planting right the species and exercising good management should yield sustainable income flows in the future.

He expects the governments to offer him a long-term loan to promote plantation development in their area, and to provide technical support and training in the field of forestry through NGOs and projects. He also hopes that government officials often visit out-growers, and that his plantation activities will contribute to the mitigation of climate change. Particularly for him as a farmer, unlike the first out-grower, the initial cost of land preparation and planting was difficult to obtain, and that financial support is essential to expand his plantations. He has used family labour to plant teak seedlings, and he said that capital and labour were the only constraints for the utilization of the large amount of land available for forest plantations.

Source: Google and CAMP TT

12.9 Forest products market, trade, and consumption

12.9.1 Forest products and food security, poverty reduction, and income growth

Based on the results of field studies a summary of characteristics of major forest products from the point of view of contribution to food security, economic growth, and agriculture sector transformation is presented in Table 12-18.

In the table characterization of the major forest products are conducted by identifying their extent of markets indicated by assumed length of value chains and spatial extent of movement of goods and products. The extent of market comprises of the following five categories: (1) subsistence production; (2) local market (rural-rural transaction); (3) domestic market (rural-urban transaction); (4) regional market; and (5) global market.

Because the most of major forest products are not edible and do not contribute directly to food security, it is assumed that their contribution is coming from value added through market transactions in their value chains. The existence of their markets and consideration of opportunity costs secure that value added is equivalent to a creation of additional money income which can be used to purchase additional foodstuffs if markets of such foodstuffs exit. This discussion implies that if we are able to observe or infer the existence of markets of the major forest products in the areas having experienced food insecurity in the past it can be said that enhancement of the markets would yield positive impacts on food security of the areas. However, an examination of opportunity cost needs to be done to complement this hypothesis. The results of the filed study indicate that markets of the major forest products are in existence and functioning, but are with significant room for improvement in their efficiency.

Table 12-18: Forest products and food security, poverty reduction, and income growth

Extent of market	Forest products (FPs)							Characteristics of value chain and value added[*2]	Expected impact on food security by value transfers through value chain, economic growth (poverty reduction and income growth) through labour productivity increase and increase in capital returns[*3], and agriculture sector transformation[*4] through capital accumulation, commercialization and industrialisation
	Fuelwood	Charcoal	Teak logs	Teak products	Gum acacia	Shea butter[*1]	Minor local FPs		
(1) Subsistence production	++					+	++	• No value chain • Intra	• No significant effect on food security except substitute effects on availability of food items

Extent of market	Forest products (FPs)							Characteristics of value chain and value added[*2]	Expected impact on food security by value transfers through value chain, economic growth (poverty reduction and income growth) through labour productivity increase and increase in capital returns[*3], and agriculture sector transformation[*4] through capital accumulation, commercialization and industrialisation
	Fuelwood	Charcoal	Teak logs	Teak products	Gum acacia	Shea butter[*1]	Minor local FPs		
								household value transfer • Substitution of market goods by own production	• Labour productivity diminishes as population density increases due to closed economy. Limited room to increase labour productivity. • Little or no capital accumulation by the informal sector and no room to increase capital returns.
(2) Local market (rural-rural transaction)	+		++	+		+	++	• Short value chain with small value added • Inter household value transfer within a locality	• Household-wide food insecurity can be addressed through inter household value transfers. • Labour productivity can be increased by education. • Small-scale capital accumulation mainly by the informal sector, and limited room to increase capital returns.
(3) Domestic market (rural-urban transaction)	+	++	+	+	+	+	+	• Medium value chain with medium value added • Inter local value transfer within South Sudan	• Local-wide food insecurity can be addressed through domestic value transfers. • Labour productivity can be increased by education and technology investment from accumulated capital. • Medium-scale capital accumulation mainly by the formal sector and increase in capital returns through adoption of advanced technologies.
(4) Regional market	+	++	+	++	++			• Long value chain with high value added • International value transfer in the region	• Nation-wide food insecurity can be addressed through regional value transfers. • Labour productivity can be increased by education and technology investment from accumulated capital. • Large-scale capital accumulation by the formal sector and increase in capital returns though adoption of advanced technologies and scale of economy.
(5) Global market			+	++				• Long value chain with high value added • International value transfer in the world	• Region-wide food insecurity can be addressed through global value transfers. • Labour productivity can be increased by education and technology investment from accumulated capital. • Large-scale capital accumulation by the formal sector and increase in capital returns though adoption of advanced technologies and scale of economy.
Current market	(1) (2)	(3) (4)	(2) (3) (4) (5)	(4) (5)	(4)		(1) (2)		
Future target market[*4]	(2) (4)	(3) (4)	(2) (3)	(4) (5)	(4) (5)	(5)	(3)		

Notes: 1) Production and consumption of shea butter (lulu in the South Sudanese language) are observed to be very small compared to those in West African countries such as Nigeria. 2) Opportunity costs for capital and labour inputs should be accounted for the estimation of value added. 3) Labour productivity and returns of capital

input should be accounted for in measurement of increase in the productivity and returns. 4) Definition of agriculture sector transformation is given in Section 1.4.1

Based on the field observations and secondary source information the domestic actors involved in the value chains of the major forest products are summarised in Table 12-19. In terms of the perceived current extent of market and the actors involved, forestry products are roughly categorized into the following three groups.

(1) Forest products with regional and global extent of market: Teak logs
Teak products
Gum acacia
Shea products
(2) Forest products with domestic and regional extent of market: Charcoal
(3) Forest products with subsistence and local extent of market: Fuelwood
Minor local forest products

12.9.2 Forest products with regional and global markets

Teak logs, teak products and gum acacia are products with regional and global market potential. If future potential markets are considered, shea products can be included in this group. Teak logs, teak products and gum acacia have been marketed globally with buyers from South Sudan, Uganda, Kenya, India, China, Europa and North America reported. In the case of gum acacia, the access to the global market is mainly done through buyers from Sudan[509], and confirmed by a trader interviewed in Northern Bahr el Ghazal[510]. Regarding the future target markets, teak logs should be processed to produce teak products within South Sudan and future target market should be local and domestic markets. Whereas the target markets of teak products should continue to be regional and global markets. Although shea nuts and its derivatives such as shea butter, soup and cooking oil are not commonly observed in the local market, the potential for finding regional and global markets for these products is high. Production and international marketing done by NGOs and private entities are reported. (Further descriptions on teak logs, teak products, and gum acacia to be added)

Table 12-19: Major domestic actors for production and trade of forest products

Major domestic actors	Forest products (FPs)						
	Fuelwood	Charcoal	Teak logs	Teak products	Gum acacia	Shea butter	Minor local FPs
Public sector							
Forest departments	Rate collection	Rate collection	Rate collection	Rate collection	Rate collection	Rate collection	Rate collection
Central Forest Reserves			Supervision	Supervision			
Private sector							
Concessionaires			Log production	Milling			
Small-scale sawmills and wood products manufacturers			Milling Production	Milling Production			
Log and timber traders			Trading	Trading			
Log and timber retailers			Retailing	Retailing			
Small-scale producers/farmers	Production Consumption	Charcoal production	Log production		Gum production	Butter production	Production Consumption
Charcoal traders		Trading					

[509] Multi Donor Trust Fund-National Technical Secretariat. 2007. MDTF-National Sector Policy Note Export marketing of Sudanese Gum Arabic. Khartoum: World Bank. and USAID. 2011. Gum acacia assessment phase I report. p.5.
[510] CAMP situation analysis.

Major domestic actors	Forest products (FPs)						
	Fuelwood	Charcoal	Teak logs	Teak products	Gum acacia	Shea butter	Minor local FPs
Charcoal retailers		Retailing					
Fuelwood traders	Trading						
Fuelwood retailers	Retailing						
Other traders					Trading	Trading	Trading
Other retailers						Retailing	Retailing

Source: CAMP TT

12.9.3 Forest products with domestic and regional market

Based on NBS data analysis and field observations, charcoal is determined to be a member of the forest product group with domestic and regional markets. Estimated per state, urban and rural, and household annual charcoal consumption in 2009 is shown in Table 12-20. Average charcoal prices by state, urban and rural areas are indicated in Table 12-21.

It is estimated that a total of 107,537 tonnes of charcoal is consumed annually in South Sudan. Seventy nine percent of this total was consumed in urban areas whereas 21% was consumed in rural areas, which indicates that charcoal is the major energy source for urban populations. The urban areas of Central Equatoria State (i.e. Juba and surrounding areas) consumed 45% of the national total followed by the urban areas of Upper Nile State (i.e. Malakal areas) which consumed 14%. These two sets of areas also show the highest per household charcoal annual consumption of 854kg and 461kg. Although charcoal is considered the main energy source for urban populations, 11% of the national total was consumed in the rural areas of Upper Nile State where per household annual consumption was 106kg which is exceptionally high among rural areas. During the period of May-June in 2009 87%, 64%, 68% of urban households in Upper Nile State, Western Bahr el Ghazal State, and Central Equatoria State, respectively consumed charcoal when the national average was 55%. In the same period 25% of households in rural areas of Upper Nile State consumed charcoal when their national average was 4%. Since 2009, when the household survey was carried out, it should be assumed that consumption of charcoal particularly in urban areas, has increased due to the rapid increase in population in some areas.

Table 12-20: Estimated annual charcoal consumption in urban and rural areas in 2009

State	Per state and rural and urban consumption						Per household consumption		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	All
	(ton/year)			(% to national total)			(kg/year)		
Upper Nile	15,495	11,517	27,012	14%	11%	25%	461	106	190
Jonglei	2,504	1,836	4,340	2%	2%	4%	161	10	23
Unity	1,049	1,172	2,222	1%	1%	2%	87	20	31
Warrap	2,673	485	3,158	2%	0%	3%	205	3	19
Northern Bahr el Ghazal	2,169	4	2,172	2%	0%	2%	263	0	16
Western Bahr el Ghazal	8,692	1,966	10,658	8%	2%	10%	335	60	182
Lakes	858	3,118	3,976	1%	3%	4%	132	36	43
Western Equatoria	1,990	1,351	3,341	2%	1%	3%	130	13	29
Central Equatoria	48,104	450	48,554	45%	0%	45%	854	4	271
Eastern Equatoria	1,869	235	2,104	2%	0%	2%	143	2	14
Total/average	85,404	22,133	107,537	79%	21%	100%	428	20	82

Note: Consumption values are estimated from 30-day consumption information obtained from sampled households during the period of May - June 2009.
Source: National Bureau of Statistics and CAMP TT

In these high charcoal consumption areas charcoal prices are moderate or relatively low. For example in urban areas of Upper Nile State and Central Equatoria State the estimated average prices of charcoal are in the moderate range of 108% and 112%. These moderate

prices in the large consumption areas may be attributed to well-established production and market mechanisms which will be confirmed by field observations. (TBD) On the other hand, the estimated average price in the urban areas of Western Bahr el Ghazal is 80% of the national average. This could be attributed to well-established production and market mechanisms including large charcoal production forests nearby. However, according to accounts from interviewees conducted during the situation analysis, these areas have experienced widespread, uncontrolled, and illegal charcoal production and this could also be a reason for the situation. Urban areas in Warrap State and Lakes State, and rural areas of Jonglei State have high charcoal prices. This may be caused by costly transportation due to bad road conditions at the time of survey in 2009. Examinations of the field observations are needed to explain this. (TBD)

Table 12-21: Average charcoal prices by state and urban and rural areas

State	Average price			% to all national average price		
	Urban	Rural	All	Urban	Rural	All
	(SDG/kg)			(%)		
Upper Nile	0.79	0.68	0.76	108%	94%	104%
Jonglei	0.59	1.00	0.60	81%	137%	83%
Unity	0.87	0.80	0.85	119%	111%	117%
Warrap	1.24	0.30	1.11	170%	42%	152%
Northern Bahr el Ghazal	0.57	1.00	0.58	79%	137%	80%
Western Bahr el Ghazal	0.58	0.20	0.58	80%	27%	79%
Lakes	0.98	0.83	0.95	134%	114%	131%
Western Equtoria	0.51	0.45	0.50	70%	62%	69%
Central Equatoria	0.81	0.61	0.81	112%	84%	111%
Eastern Equatoria	0.76	0.55	0.75	105%	76%	103%
National average	0.74	0.67	0.73	101%	92%	100%

Note: 1) Prices are estimated from 30-day consumption information obtained from sampled households during the period of May - June 2009. 2) Sampled locations without charcoal price information are marked with black triangles.
Source: National Bureau of Statistics and CAMP TT

12.9.4 Forest products with subsistence and local markets

Fuelwood and other minor local forest products belong in this group. Based on the results of National Baseline Household Survey data analysis, fuelwood is produced and consumed by the same households, and also marketed locally.

12.9.4.1 Fuelwood consumption

Fuelwood consumption and sources in urban and rural areas in the period of May-June 2009 are presented in Table 12-22. In contrast to charcoal, fuelwood is mainly used in rural areas where fuelwood is collected mainly by the users[511]. Sixty two percent (62%) of rural households (approximately 687,000 households) in the country used fuelwood as a source of energy during the period of May-June 2009. On the other hand 39% of urban households (77,000 households) consumed fuelwood in the same period. On average 83% of rural households consumed fuelwood collected by them. In contrast 50% of urban households consumed fuelwood collected by them. Although in both urban and rural areas the ratios of household consumed fuelwood vary location by location, generally the more wood resources are available, the more fuelwood is collected by users, particularly in rural areas of Western Bahr el Ghazal, Western Equatoria, and Eastern Equatoria states. If cash is scarce and the

[511] Fuelwood collection can be done by less skilled labour than labour necessary to produce charcoal. Often a charcoal producer is considered as an occupation which requires knowhow and skills to produce charcoal with quality and quantity, whereas fuelwood collection is considered the unskilled task of women and children.

opportunity cost of collecting fuelwood is low in rural areas, then self-collection saves scarce money to be used otherwise.

Table 12-22: Fuelwood consumption and sources in urban and rural areas in May-June 2009

State	Fuelwood consumption in urban areas						Fuelwood consumption in rural areas					
	Sources of fuelwood consumed			Fuel-wood not consumed	Households (HHs) total		Sources of fuelwood consumed			Fuel-wood not consumed	Households (HHs) total	
	Collected	Purchased	HHs Sub-total				Collected	Purchased	HHs Sub-total[*1]			
Upper Nile	7%	38%	45%	55%	100%	33,613	49%	21%	70%	30%	100%	108,825
Jonglei	31%	16%	47%	53%	100%	15,565	53%	5%	58%	42%	100%	176,859
Unity	54%	16%	70%	30%	100%	12,120	67%	14%	80%	20%	100%	59,994
Warrap	15%	15%	30%	70%	100%	13,070	32%	22%	54%	46%	100%	156,435
Northern Bahr el Ghazal[*2]	5%	26%	31%	69%	100%	8,255	5%	5%	10%	90%	100%	125,308
Western Bahr el Ghazal	9%	19%	28%	72%	100%	25,932	86%	10%	97%	3%	100%	32,759
Lakes[*2]	0%	0%	0%	100%	100%	6,476	28%	7%	35%	65%	100%	85,847
Western Equtoria	57%	17%	73%	27%	100%	15,280	71%	1%	73%	27%	100%	101,056
Central Equatoria	14%	12%	26%	74%	100%	56,357	63%	18%	81%	19%	100%	122,714
Eastern Equatoria	29%	20%	49%	51%	100%	13,072	88%	4%	92%	8%	100%	140,779
% to total	19%	19%	39%	61%	100%	199,740	51%	11%	62%	38%	100%	1,110,576
Total % to sub-total	50%	50%	100%				83%	17%	100%			

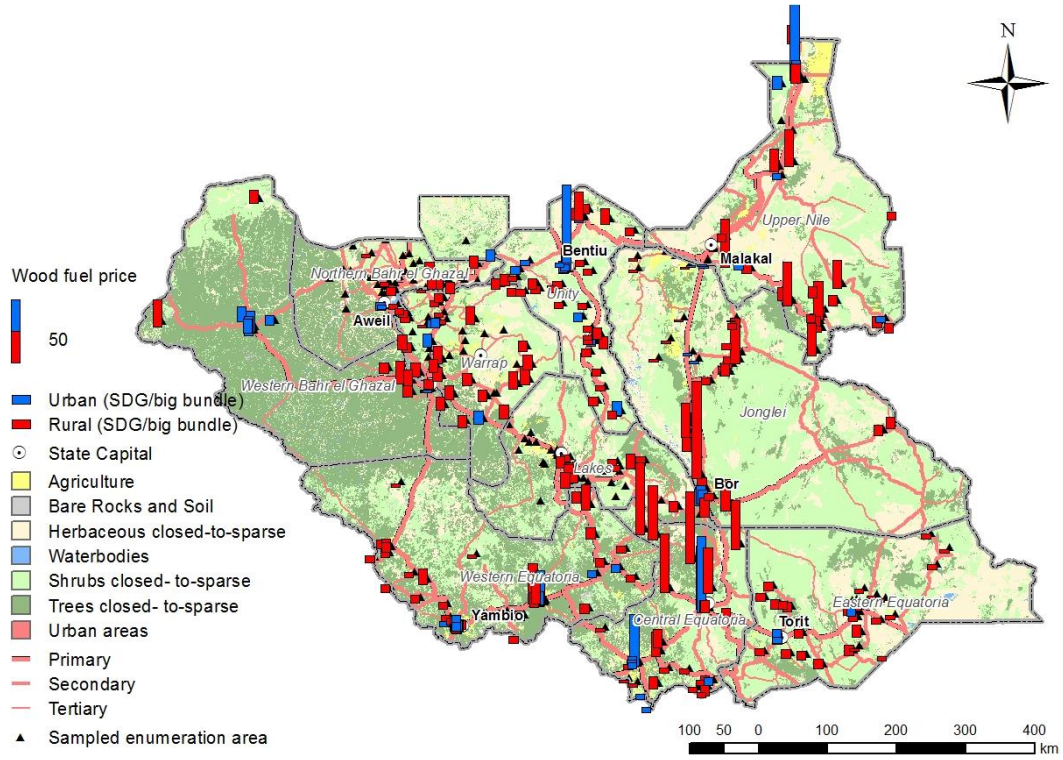
Note: 1) Numbers of households consumed fuelwood past 30 days in rural areas seem to be under estimated. 2) Fuelwood consumption in rural areas in Northern Bahr el Ghazal State and urban areas in Lakes State may be underestimated. 3) Consumption values are estimated from 30-day consumption information obtained from sampled households during the period of May - June 2009.
Source: National Bureau of Statistics and CAMP TT

12.9.4.2 Fuelwood production and deforestation

The spatial distribution of prices of fuelwood estimated by participants in the National Baseline Household Survey in the period May-June 2009 is shown in Figure 12-5. During this period, high prices of fuelwood were observed in the localities of Upper Nile, Jonglei, a part of Unity, Lakes, and Central Equatoria states. Since the extent of the fuelwood market is considered to be local (or subsistence), the market price of a particular locality likely signals supply and demand in the locality; therefore, observed prices varied depending on local market conditions. In the areas showing high fuelwood prices, a high demand for fuelwood, including for the production of charcoal in relation to other locations can be assumed. Although it requires further verification with data and accounts collected from the field, the higher prices may also indicate a higher rate of forest degradation and deforestation. According to an estimate, the per capita annual consumption fuelwood in Sudanese area is approximately 0.68 m^3 [512]. Since the population in 2009 in South Sudan was 8.26 million, the total fuelwood consumption could annually be 5.6 million m^3 (4.3m^3/household) including the wood equivalent to make charcoal (verification needed). This required consumption is large with respect to scarce forest resources particularly in semi-arid zones. Due to this assumed large demand for fuelwood in South Sudan as well as a large demand from Sudan, the deforestation and degradation of natural and plantation forests has been steady increased in South Sudan for many decades[513].

[512] United Nations Environment Programme. 2007. Sudan post-conflict environmental assessment. Nairobi: UNEP. p. 201.
[513] United Nations Environment Programme. 2007. Sudan post-conflict environmental assessment. Nairobi: UNEP. Chapter 9.

Figure 12-5: Spatial distribution of perceived fuelwood prices in May-June 2009



Note: Prices are estimated from 30-day consumption information obtained from sampled households during the period of May - June 2009. Surveyed prices were perceived prices by subjects of the survey and were not prices actually realised at the time of market transaction.
Source: National Bureau of Statistics and CAMP TT

12.10 Forestry education, research, training, and extension

For enhancement of economic and environmental services provided by the forestry subsector long-term investment for human resource development, and knowledge creation and dissemination is the key. Currently, Kagelu Forestry Training Centre, the Faculty of Forestry of Juba University and Upper Nile University (TBD) are institutions involving such activities.

12.10.1 Kagelu Forestry Training Centre

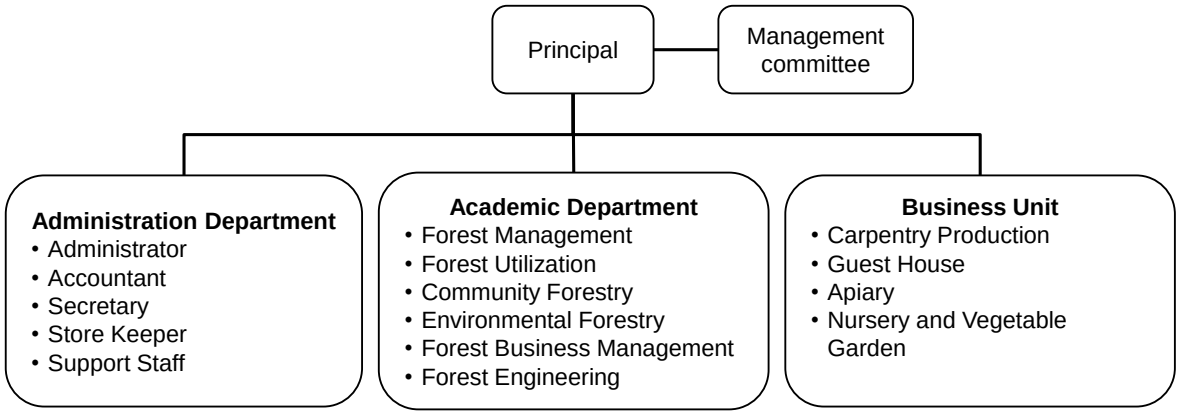
Background

Kagelu Forestry Training Centre (KFTC) was established in 2003 by the SPLM Secretariat for Agriculture and Animal Resources (now MAFCRD) to provide practical training to the forestry sector. It is located at Kagelu in Yei River County in Central Equatoria State. Its mandate is to serve the training needs of the forestry subsector in Southern Sudan as a whole. The Centre was established through the Forestry Training Centre Act 2004 with functions and mandates clearly specified in the Act along with institutional arrangements, management set-up and other arrangements for management of the Centre.

12.10.1.1 Organization and teaching facilities

KFTC at the national level falls under the direct supervision of the Directorate of Training and Research of MAFCRD. As shown in Figure 12-6, KFTC comprises the Principal, Management Committee, Administration Department, Academic Department and Business Units. Although the curriculum requires 14 teaching staff with different qualifications, there are currently nine teaching staff consisting of the principal, six tutors and two assistant tutors.

Figure 12-6: Organization of Kagelu Forestry Training Centre



Source: Kagelu Forestry Training Centre

The capacity of KFTC in terms of annual intake of students is 20. There is a dining room for 60 students, three classrooms (2 for the certificate course and one for the diploma course), and 3 dormitories and 1 flat where a total of 100 students can be accommodated.

Table 12-23: Expenditure and budget of KFTC for fiscal year 2010/11 and 2011/12

Budget item	2010/11 out turns		2011/12 budget	
	(SSP)	(%)	(SSP)	(%)
Income				
Carryover from 2006/7	33,153	12%	33,439	15%
Grants for core expenses (USAID, STEP and others)	99,981	36%	0	0%
Training Fees from MAF/States for certificate training	57,691	21%	60,000	26%
Training Fees from MAF for refresher training	0	0%	10,000	4%
Other training fees (private sector self sponsoring)	0	0%	5,000	2%
Income from guest rooms and conference	5,294	2%	5,000	2%
Income from consultancy contracts	3,182	1%	3,000	1%
Carpentry Production Unit revenue	17,766	6%	17,000	7%
Other income	186	0%	2,000	1%
MAF Salaries	62,338	22%	92,435	41%
Total Income	**279,592**	**100%**	**227,874**	**100%**
Expenditure				
Vehicle Expenses	28,689	12%	20,000	9%
Administration Costs	49,527	20%	45,000	20%
Travel Expenses	6,405	3%	6,500	3%
Personnel Costs	92,435	38%	92,000	40%
Training Expense	29,849	12%	30,000	13%
Board Expenses	10,166	4%	10,000	4%
Carpentry Unit	16,695	7%	17,000	7%
Bank charges	2,061	1%	2,061	1%
Fixed assets procurement	10,118	4%	5,000	2%
Total Expenditure	**245,944**	**100%**	**227,561**	**100%**
Balance	**33,648**		**313**	

Source: Kagelu Forestry Training Centre

12.10.1.2 Budget

In Table 12-23, KFTC's expenditures and budget for fiscal years 2010/11and 2011/12, amounts of incomes and expenditures are presented. The amount of income generated by KFTC itself in each of the two fiscal years was less than 20% of the total income. The amount was generated by the business unit of the training centre. The core budget of the

centre was expected from MAFCRD and DPs. Funding from USAID as the main donor ended in 2008 and MAFCRD was to lobby DPs to support the centre. The operation of KFTC is not easy work and the identification of financial resources to maintain training activities is challenging.

12.10.1.3 Training courses and other services

Under the Southern Sudan Agricultural Revitalization Program (SSARP) supported by USAID KFTC developed and provided training courses in: 1) tree seedling production, 2) business skill development, 3) beekeeping, 4) agroforestry, and 5) carpentry and joinery targeting community members. Before the termination of SSARP in 2008, the curriculums for a two-year forestry certificate course and a one-year forestry diploma course for forest professionals, and short courses (2 weeks, one month, three months, six months and nine months) of refresher training for forestry and extension officers were developed. These courses commenced in 2006 except the diploma course which began in 2013.

The two-year certificate course was attended by government officials who were sponsored by the central government for two years. This sponsorship lasted for three years to finance the training costs of two batches of trainees, and thereafter, the sponsorship became the responsibility of state governments. However, due to the tight fiscal condition of state governments, the current course attendants sponsor themselves. There were eight first-year and four second-year students attending the forestry certificate course in 2012. The curriculum for the two-year diploma course includes 42 training modules in the fields of: 1) Forest management, 2) Forest utilization, 3) Community forestry, 4) Environmental forestry, 5) Forest engineering, and 6) Business management.

KFTC provides training, facilitation, consultancy, and research services to various clients including FAO, Southern Sudan Program of the Norwegian Peoples Aid (NPA), MDTF, RIPS (JICA), GIZ, GOAL Ireland, Mercy Corps (an international NGO), USAID, Sudan Traditional Environmental Program (STEP), United States Development Agency (USDA), ZOA (Netherlands NGO), and other NGOs. Apart from training, KFTC provides teak seeds and seedlings obtained from plus trees, and stamps from natural regenerations are provided to farmers in and around Yei free of charge to enhance private and community forestry and agroforestry in order to reduce human pressure on plantation and natural forests.

12.10.1.4 Challenges

It was reported that the fluctuation in the number of students and trainees, the limited budget from the government, and deteriorating laboratory facilities are some of the challenges that need to be addressed. Other needs include training of teaching staff; establishment of science and computer laboratories, a library and an arboretum; and strengthening of transportation facilities.

12.11 Activities of development partners and NGOs

Not many activities of development partners (DPs) and NGOs in the forestry subsector are recognized. An NGO promotes shea butter production and distribution in support of a women's group. A small-scale nursery operation by the Assistant Commissioner of Forestry in Yei River County, and a county in Eastern Equatoria State were supported by international and local NGOs. As mentioned before, Kagelu Forestry Training Centre (KFTC) has been in collaboration with USAID, GIZ, and other DPs and NGOs. A number of studies on forest resources and products were financed by FAO, UNEP, and USAID but all before the independence of South Sudan. Among these activities, the establishment and operationalization of the Land Resource Survey and Information Centre (LRSIC), through technical cooperation between the GRSS, the Government of Norway and the Norwegian Forest Group is the most significant example.

LRSIC was established in 2007 within the Directorate of Forestry of the Ministry of Agriculture and Forestry under the Southern Sudan Forest Sector Program started in 2007 for three years. The program was supported by the Government of Norway and the Norwegian Forest Group (a group of private sector forestry businesses), and was extended by a year until 2011. The total budget allocated by the Government of Norway is reported to be USD 4.3 million. The objective of program was to establish LRSIC for the management of forest resource data to contribute to the rehabilitation and sustainable management of the forest resources in the country. The program consisted of four components: 1) GIS database development, 2) forest resources assessment, 3) forest conservation to develop guidelines and a template agreement between the government and private sector, and 4) capacity building of national and state government forest officers.

12.12 Investment

Private investment in the forestry subsector is still in the early stage of development. Significant investment has been made by the two concession holders in West Equatoria State, in the order of a few million US dollars in each case. There have been investments to begin and run micro- and small-scale forestry products businesses by numerous formal and informal entrepreneurs. However, almost all forestry products small-scale businesses recognised the need for obtaining loans from formal sources but that it was difficult. A war veteran we interviewed in Awail town market is an example of emerging entrepreneurs of such businesses. The war veteran invested his retirement money in his timber and forest products retail business at a market enclosure managed by the State Government. In the case of out-growers interviewed, major sources of their investment in teak plantations was from surplus yielded from, for instance, hotel and retail businesses or sales of crops. The field study reveals that the major sources of initial capital and investment for forestry and forestry products businesses are still people's own money or from informal sources.

13. Fisheries

13.1 Overview

The most significant feature of the fisheries of South Sudan is that there is very little accurate data on any aspect of them. Most figures for production or trade are based on subjective observation or conjecture and cannot be regarded as reliable.

South Sudan has a significant capture fishery in its major rivers and wetlands, concentrated on the Sudd swamps (between Malakal and Bor). They lie between 6°N and 9°30′N, and from 30°W to 32°E, with a maximum water surface area in excess of 30,000 km² during the rainy season. Other floodplains and riverine systems also contribute in areas away from the main Nile and Sudd wetland areas.

The fishery is largely undocumented. CAMP has attempted to clarify what is happening and using ANLA and NBS data has calculated that the consumption of fish in South Sudan is far higher than generally recognised at about 17kg/person/year, comparable with neighbouring countries. To supply this consumption level the catch must be in the order of 140,000 tonnes. More than 1.7 million people depend directly on fisheries for livelihood, food security or income, far more than previously thought and many more through consumption of purchased fish products.

The potential catches for the country are unknown, and estimates vary widely. It is impossible at this time to accurately predict the Maximum Sustainable Yield that might be possible from the capture fisheries, but it probably exceeds 200,000 tonnes/annum, worth at current Juba market prices at least USD800 million.

For all intents and purposes the wild fishery in South Sudan is an open access one, with no controls on numbers of fishers or entry. Open entry is an undesirable management regime, and always leads eventually to overfishing and the collapse of fish stocks.

Aquaculture has great potential, but currently there is little aquaculture being undertaken in the country. Areas for commercial and subsistence level aquaculture of significant size are available, but they have not been accurately mapped and assessed. Other constraints to aquaculture development include land tenure uncertainty, a lack of hatcheries, no feed mills and a shortage of skills. Technology and skills transfer from neighbouring countries such as Uganda and Kenya is probably the best way to advance the sector in the short term, though Integrated Agriculture Aquaculture is very appropriate for village level introduction, as is already happening in parts of the Green Belt, but in the future development efforts will have to be more targeted with support to clusters of entrepreneurial farmers operating around towns.

Much of the catch is dried, despite the demand for fresh fish being high. This is because there is no ice availability in most of the country and also the transport system is not well developed. Dried fish is however a very appropriate product when the consumers lack refrigeration in their homes, it keeps well and does not need rapid transport from the landing site to the consumer. Smoked fish is also produced in areas where there is sufficient firewood, and feeds an ever increasing urban population.

Large amounts of fish are being imported to South Sudan from Uganda, mostly in smoked form, and some fresh Tilapia and Nile Perch is also coming up from Lake Victoria. Small pelagic fish from eastern Uganda are also an important import. Previously, there existed a significant export of fresh fish from Jonglei, Lakes, Unity and Upper Nile States of fresh fish to Khartoum (this has practically ceased with the closure of the border).

The Directorate of Fisheries and Aquaculture Development (DoFAD) in MARF is the national government directorate responsible for fisheries, but under the Constitution, management of the fishery in the States is delegated to the states. The financial, management and skills capacity of the states at all levels of the administrations continues to be very weak in fisheries, and indeed DoFAD is itself institutionally weak. Efforts in the short term will have to be made on building capacity and strengthening institutions throughout the sector, in national government, the states and the private sector. Only once the skills necessary have been acquired, the institutions created or strengthened, the staff recruited and the necessary recurrent and development budgets allocated, will it be possible to fully realise the potential of the sector. This may take some considerable time.

It is the responsibility of the government to manage the exploitation of renewable natural resources properly, so that future generations will be able to enjoy their benefits as do those now charged with their husbandry. For this reason DoFAD will have to diligently apply the FAO Code of Conduct for Responsible Fisheries in which is contained the "Precautionary Approach" to the development of capture fisheries. This will include management of the resources of the country through: 1) involving those that use the resources in a participatory manner (co-management), 2) monitoring and enforcing regulations, and 3) ensuring compliance with conservation and management measures agreed with the resource users.

Similarly the development of Aquaculture is also covered by the FAO Code of Conduct for Responsible Fisheries, as are Post Harvest Practices and Trade, and again DoFAD will have to follow the FAO Codes of Practice for Aquaculture and other guidelines laid down, until its own laws, codes of practice and guidelines can be prepared.

13.2 Key issues and challenges

Key issues and challenges are all too apparent from the survey work done by the CAMP fisheries subsector Task Team.

These issues and challenges can be divided into two broad areas "Management" and "Production and Marketing". Broadly "Management" is the responsibility of the government at national and state levels, and "Production and Marketing" is the responsibility of the private sector, though of course under regulations and oversight of government.

For government, the key issue to be tackled is the lack of skills, coordination and finance within the administrations involved in fisheries. Currently most government bodies involved in fisheries are not sufficiently active, and do not contribute to the good management nor development of fisheries in South Sudan. Until this lack of capacity is addressed, it will be difficult for the government to carry out its role, and bring in necessary legal and regulatory management measures, as recognised in its own policies and strategies.

The private sector is quite capable of improving production and post harvest in fisheries by itself, without government assistance (but necessarily under government regulatory supervision). The private sector however faces several challenges, greatest amongst them being poor transport and communications, the high cost of energy and utilities, a lack of skills and informal taxation.[514] All of these could be alleviated by direct government interventions.

[514] Formal taxation is an involuntary fee backed up by some form of legal sanction, whereas informal taxation is any tax or tax-like payment collected outside of statutory legal frameworks. In other words informal taxes are illegal payments. In South Sudan informal taxes are generally collected by government employees and include: the part of taxes kept for their own use by tax collectors and administrators, sometimes by means of false receipts; payments to avoid formal taxation; unauthorised charges for services, such as inspection services, passing through a checkpoint etc.

Major cross cutting issues not only affecting fisheries are also important, such as general health provision, education in fishing communities and poor security. As an example, the looming HIV epidemic is a hidden threat to fisheries and will hit the sector badly unless action is taken quickly.

13.3 Policy framework

The Constitution[515] is the overarching policy document for South Sudan. The constitution places emphasis on the sustainable use of the natural resources of South Sudan, wise environmental management and involvement of local communities in decision making on the exploitation of natural resources in their areas. The Constitution also gives significant powers to the states to manage their natural resources.

Traditional authority is recognised in the constitution in matters affecting local communities, which would presumably include management of local fisheries.

There are available a series of other high level planning documents, including the Vision 2040; South Sudan Development Plan 2011-2013; the South Sudan Development Initiative (SSDI) 2012; and the Millennium Development Goals, though these provide no specific guidance on fisheries.

13.3.1 MARF Policy Framework and Strategic Plans 2012-2016

The MARF Policy Framework and Strategic Plan is a document produced in May 2012 by MARF to fill the policy gap that had become apparent since Independence. The document covers all directorates in MARF.

The structure gives a preface and introduction which explains the origins and need for the document and an organogram of MARF is given. A summary budget precedes Policy Frameworks and Strategic Plans for each of the 9 directorates of the ministry.

Each directorate section contains an Introduction, indicating the primary responsibilities of the directorate, a Vision, derived in each case from the Vision of MARF and a mission statement. The Functions and Responsibilities of the directorate are then laid out.

Each department in each directorate is then listed, each with its goal and functions.

Each directorate has a Strategic Planning and Implementation Matrix, with Strategies, Activities, Indicators and Outputs given for each Strategic Objective. It is not clear in some cases exactly from where the individual strategic objectives are derived for they do not necessarily follow on in a logical manner from the preceding sections.

At the beginning of the policy document there is a caveat which states that *"The "MARF Policy Framework and Strategic Plans 2012-2016", is intended to be the reference MARF document, upon which the MARF policies will be further reviewed and developed, and Directorate and Departmental Annual Work Plans elaborated".* Although the policy notes the Paris Declaration on Aid Effectiveness, the Accra Agenda for Action and the Comprehensive Africa Agriculture Development Programme (CAADP) of the New Partnership for Africa's Development (NEPAD) there are many other international and regional agreements, protocols and treaties which are not included, even in the texts of policies of the individual departments. Despite this, HIV, gender issues and the environment are covered in the document, even if not related to regional or international agreements which bind the GRSS and the Ministry.

[515] GRSS. 2011. *The Transitional Constitution of the Republic of South Sudan, 2011*

The contents of the Constitution are noted, at least in that the responsibility for the management and development of the livestock and fisheries resources is acknowledged to lie with the States, but the document itself only pays lip service to this important principle.

It is safe to say that the document resembles a series of strategies more than a policy framework. This is acknowledged in the name of the document: That said, very few of the objectives or strategies in the document are SMART.[516] Even those with measurable indicators or quantified objectives often lack a statement of the present situation or starting point. Objectives and strategies presented are mainly just vague goals.

Overall the MARF policy is sufficient for short term planning purposes, but needs to be sharpened up by the various directorates as time goes on, so that it better reflects international, regional and internal overarching policy in animal resources and fisheries. Each of the strategies mentioned need to have an implementation plan for the activities under it, in far greater detail that given in the document. Additionally some fisheries related areas, such as research, training, aquaculture and capture fisheries need to have master plans of their own; the ones in the MARF Policy Framework for research and training cover the whole of MARF.

In fisheries the document is specifically aimed at the commercial sector, indeed the Executive Summary states that the overall goals are aimed at *"transforming the livestock and fisheries sectors into vibrant productive and commercialised sectors".* Most of South Sudan's fisheries is subsistence level, and this is not sufficiently addressed.

The document launches the concept of SUDAFISH, a parastatal organisation which it is hoped would attract private sector investment. This parastatal is not mentioned in the subsequent Strategic Planning and Implementation Matrix, nor in the budget, so it can be assumed to be currently unfunded. Canning factories, mentioned elsewhere in MARF presentations as an investment possibility, do not appear in the MARF Policy Document.

In general this policy needs to be realigned with international obligations, realities in the field, and subsistence fisheries should be emphasised more. A budget for aquaculture would also be a useful addition.

13.3.2 Fisheries and Aquaculture Policy 2012-2017

The policy, written at the beginning of 2012, is generally complete in that it covers everything that ought to be in a fisheries policy, though it is constrained in its scope as it does not go beyond identifying strategies derived from the objectives given in the policy.

The overarching principles contained in the FAO Code of Conduct for Responsible Fisheries permeate the document, including the precautionary principle and ecosystems approach to fisheries management. This is a response to the limited data available on the fisheries of South Sudan.

The policy is generally compliant in that it is aligned with overarching policy and international and regional fisheries agreements, which are identified. The principles and policies derived from overarching documents from the GRSS, such as the Transitional Constitution, Vision 2040 and South Sudan Development Plan 2011-2013, are included. The policy includes sections on:

- the need to manage natural resources sustainably;
- involving communities in decisions relating to the exploitation of natural resources; and

[516] An acronym for - Specific, Measurable, Achievable/attainable, Realistic, and Time bound

- emphasis on the development of the private sector.

The document identifies shortcomings in background data on fisheries in South Sudan and proposes that the "Precautionary approach" should be followed until such time as more data is collected; it also acknowledges the need for further development of master plans in training, research, capture fisheries and aquaculture.

The policy itself is not particularly useful if the ideas in it are not bought to the next stage of implementation, with sensible budgets, detailed work plans, and milestones. This is the next challenge, which is acknowledged in the document, and is covered to some extent in the MARF Policy Framework and Strategic Plans 2012-2016 [517].

13.3.3 Legal framework

The constitution is the highest legal document which mentions natural resources. The constitution lays down some important overarching guidance on management of natural resources and delegates much power for their management to the states.

The law in South Sudan regarding fisheries is completely lacking. Currently the "law" as it is, is that of the Sudan, and was enacted many years ago[518]. This is barely useful, being out of date, covering what is now a different country, and which in itself has serious shortcomings partly because it does not acknowledge the rights of the users of the resources to manage the resources, a plank of modern fisheries management. This law is still being used as a basis for control of the fishery, particularly by the states' extension officers, since there is no other. Regulations were also promulgated under this law, and like the law, are in urgent need of revision to bring them up to date. A new law[519] is in preparation, issued in draft as the 2012 version (but is only a draft 2006 version with the date changed). This draft is completely unsuitable for a whole host of reasons and must be abandoned. Efforts are being made by DoFAD to obtain technical assistance to draft a completely new law, incorporating the ecosystems approach, the precautionary approach and other important principles of fisheries management. The sooner this is done the better; as there is a danger that the states will begin to develop their own legislation and regulations, as has already happened in Jonglei State, and it is essential that these state laws and regulations are consistent with those of GRSS.

13.4 Fisheries Institutions

13.4.1 GRSS MARF

The GRSS Ministry of Animal Resources and Fisheries (MARF) is the organisation charged with the development of the sector in South Sudan. According to the policy of the MARF[520]

"The role of the Ministry of Animal Resources and Fisheries in the Republic of South Sudan is to guide, regulate, promote, facilitate and document sustainable increases in production and productivity in the livestock and fisheries sectors through the provision of services to livestock producers and fisher-folk, encouraging increased commercialization of livestock and fisheries enterprises, promoting improved quality and value addition to livestock and fisheries products, facilitating access to credit and local and international markets, with the aim of harnessing the vast wealth of livestock and fisheries resources in the Republic of

[517] See above Section 12.3.1

[518] Republic of Sudan 1954 *The Freshwater Fisheries Act 1954.* Vol 4 Chapter 54 of the Laws of the Republic ofSudan

[519] GRSS MARF. 2012. *The Laws of South Sudan The Fisheries and Aquaculture Development Bill 2012* (DRAFT)

[520] GRSS. 2012. *The Ministry of Animal Resources and Fisheries. Policy Framework and Strategic Plans 2012 - 2016.*Juba: MARF 2012

South Sudan to support improved food security, poverty alleviation and socio-economic development of the people of South Sudan."

The approved budget for MARF in 2012-2013 was SSP27,581,541.

13.4.2 Areas of competencies

The MARF is divided into 9 directorates as below

(i) Directorate of Planning, Statistics and Documentation (DoPSD), with departments of Planning and Policy Analysis, Statistics and Documentation, and Gender Analysis and Mainstreaming
(ii) Directorate of States and Special Projects Coordination (DoSaSP) with two departments, State Affairs and Special Projects
(iii) Directorate of Finance and Human Resource Development with departments of Administration, Finance, Procurement and Human Resources Development
(iv) Directorate of Investment, Marketing and Supplies. Departments of Investment, Marketing and Supplies
(v) Directorate of Animal Production and Range Management (DAPRM).Departments of Animal Production and Range Management
(vi) Directorate of Fisheries and Aquaculture Development, with departments of Capture Fisheries and Aquaculture
(vii) Directorate of Veterinary Services (DVS) with 6 departments
- Veterinary Public Health and Food Safety
- Disease and Vector Control
- Epidemiology and Disease Information System
- Diagnostic Laboratories
- Wildlife and Aquatic Diseases
- Livestock Production and Range Management

(viii) Directorate of Livestock and Fisheries Extension (DoLFE) with the departments of Veterinary Extension and Fisheries and Aquaculture Extension
(ix) Directorate of Animal and Fisheries Research and Development (DAFRD) with 4 departments, Central Research Laboratory, Livestock Research Centre/Station, Fisheries Research Centre/Station and Satellite Laboratories

13.4.3 Organisation

The directorates with responsibility for fisheries include the administrative ones, Directorate of Planning, Statistics and Documentation and Directorate of Finance and Human Resource Development who look after administration, with Fisheries and Aquaculture Development leading the development activities, though with training, research and extension being the responsibility of other directorates or departments. This is a very cumbersome and illogical way of organising the delivery of services, with all of finance, planning, extension, training and research not being part of, and under the direct control of, the DoFAD. Even the relationships between the various directorates in MARF are unclear, with overlapping responsibilities and needs. The whole system seems designed to create barriers to the smooth delivery of services to the sector.

13.4.4 GRSS MARF Directorate of Fisheries and Aquaculture Development

The Directorate of Fisheries and Aquaculture development is "responsible for the overall coordination, provision of policy and regulatory framework, aimed at creating a conducive environment for fisheries sector growth and investment in the country".

The approved programme budget for DoFAD for 2012 - 2013 was SSP1,543,935. This is 5.6% of the MARF budget for 2012 - 2013.

The directorate claims competency in the following areas:

- Management and conservation of fishery resources.
- Promotion of aquaculture development.
- Promotion of fish quality control and preservation techniques.
- Enhancing good fish marketing.
- Development and enforcement of fisheries laws and regulation.
- Development of research, training and extension services.
- Strengthening the institutional framework.
- Conducting surveys on fisheries stocks and potential and sharing data on production.
- Supporting the States in institutional and human resources development (training and provision of fishing gear and equipment).
- Formation of strong linkages with states governments to ensure effective management of fisheries resources.

Unfortunately there is neither long term nor day to day plans of activities. This means that the staff come to work without an assignment for the day, week or month ahead, and what plans have been made receive inadequate funding, so cannot be implemented.

As a general rule it can be said that the staff are under qualified to carry out their assigned roles, have no equipment, have recently received no budget, and are, unsurprisingly, unmotivated as a result.

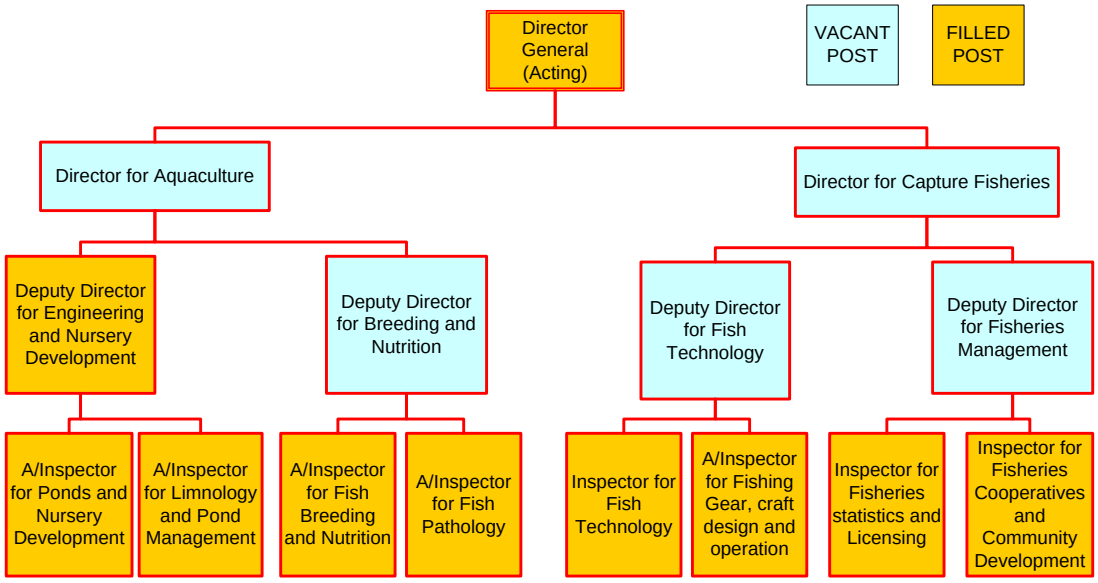
13.4.5 Organisation, staffing, and facilities

The staff structure of DoFAD is in the organogram (Figure 13-1). Of the 15 posts, 5 are vacant (33%).

Apart from the office space at MARF Gudele[521] office the directorate has no facilities. There is no research station, field station nor any vehicle with budget assigned to the directorate. No operating budget is provided to the directorate for day-to-day activities nor development work; though salaries are paid regularly, and most of the staff usually attend the office on working days. Needless to say this situation is demoralising for the staff. The one long term DP funded project, the EU funded SPCRP, which included the Fisheries Production and Marketing Project (FDMP), finished in 2012. No other long term fisheries DP funded projects are being implemented out of MARF, except for the CAMP formulation project, which covers Fisheries and Livestock planning only.

[521] A suburb to the west of Juba

Figure 13-1: Organogram of the Directorate of Fisheries and Aquaculture Development



13.4.6 Fisheries training

The directorate responsible for human resources in MARF is the Directorate of Finance and Human Resource Development. Nearly all other directorates in MARF have training roles (as stated in the MARF Policy), and both the Directorate of Livestock and Fisheries Extension and the Directorate of Fisheries and Aquaculture Development have responsibility for developing fisheries training.

In the past the MARF training plan was to categorise the staff into four categories related to the specialisation of the individual and so as to respond to the needs of the MARF. Medium and long term courses plus management courses were arranged, and there were arrangements with higher institutions in foreign countries for professional and management courses. This was all stopped by executive decision and training was not given priority. For the last 3 years there has been no budget in MARF for training activities. As a result there is no operative mechanism within MARF for proper in-service training for the staff.

The Padak Fisheries Training Centre, near Bor in Jonglei State, is the institution where most fisheries training is carried out. The centre used to be controlled by MARF but the facilities have now been passed over to the Dr John Garang University of Science and Technology. The training centre has 5 senior staff, 16 support staff, and one part-time staff. The staff, previously on the MARF payroll, have had problems getting paid since the transfer of ownership of the Padak Fisheries Training Centre to the University, due to a confusion as to who is responsible, the University or MARF, which has affected the staffs' morale and effectiveness in 2012 and 2013.

Reconstruction and repairs to the Padak centre have recently been funded by a variety of donors, including the Texas A&M University (USA) and through USAID and courses have been funded by AECOM, Sudan Bridge, World Vision and Catholic Relief Services. Unfortunately the centre still has no net loft, no laboratory, no library and no staff dining hall.

The last course run at the centre in 2013 ended in June 2013 and there is no money for any more courses. The centre cannot afford to run the generators and in effect is becoming moribund due to lack of funding and support from donors.

Some training in aquaculture has been done in Yei Agricultural Training Centre and in Yambio on an ad-hoc basis, funded by FAO, MARF, the erstwhile SPCRP and NGOs.

Some DPs and NGOs run training courses in the states, often without any direct inputs from DoFAD, and sometimes without reference to them at all. The fisheries inputs to much of this training and development activity is normally justified under non-fisheries grounds, such as conflict resolution, food security, or livelihoods. As examples: UNIDO has an extensive training programme in Upper Nile State (UNS) which includes fisheries, justified as part of the Sustainable Food Security and Water Harvesting Project; Oxfam in UNS also undertook fisheries training as part of the Food Security and Livelihood Project 2011-2012 in Malakal town, UNS; AECOM in 2012 and 2013 ran a fisheries development project with a lot of training in Jonglei and UNS for conflict resolution purposes, rather than as a fisheries project.

Despite a dramatic skills shortage within the fishing industry and in aquaculture, within State Ministries of Animal Resources and Fisheries (SMARFs) and in the GRSS MARF itself, there is no long term program of staff development training at Padak (or elsewhere) for MARF or SMARF fisheries workers, nor to respond to the needs of the private sector. Additionally there is no master plan for staff development in the MARF Fisheries Department, nor in the Directorate of Finance and Human Resource Development, which is responsible for Human Resource Development in MARF. There is no recurrent funding available for any staff development at Padak, nor in MARF, nor the States.

Many of the MARF Fisheries Directorate staff have benefited from overseas training in a variety of institutions[522].Unfortunately, beneficial as this type of training is to the individual, the process of selection and choice of course is often not ideal, and certainly does not fit in to any long term plan (no long term plan exists). The courses are offered on an ad-hoc basis by donors or institutions, and people are often sent on the courses for all the wrong reasons (patronage, length of service, next in queue, only one available at the time, “needs the per diems”, etc.). Almost never are staff sent on an overseas course because the course is what is needed for them and the country and they are the right candidates for it. This approach to staff development does not have a significant effect on the overall performance of the directorate.

The fact that these is no fisheries training officer, responsible for overall management and planning of staff development in DoFAD is a telling one.

To summarise - the training of the government staff, and that available to the private sector, is not enough and insufficiently planned. This is a serious constraint to overcoming the challenges ahead in the sector.

13.4.7 Fisheries research

Research is the responsibility of the MARF Directorate of Animal and Fisheries Research and Development (DAFRD).

Much research needs to be done, on both capture fisheries and on aquaculture. There is no dedicated research centre for either capture fisheries or aquaculture. Unfortunately there is no funding for research being made available, and indeed there are no properly qualified staff available to do the research that is required. Currently, there is no needs assessment in the area of fisheries research to guide the MARF and DoFAD.

[522] See section on DPs interventions Section 12.7.1

As a result of the above there is no research currently being carried out in the sector, despite the desperate needs.

13.4.8 Fisheries planning

The MARF Directorate of Planning, Statistics and Documentation (DoPSD) is responsible for planning in the ministry.

DoFAD does not have a proper long term plan. The plans, such as they are, are contained in the MARF Policy Framework and Strategic Plans[523], and the Fisheries Policy[524]. Neither of these are complete documents. They do however give a generalised framework for the future which is very useful and gives guidance as to how the MARF intends to proceed. Neither take the generalised plans to a detailed implementation stage, with specific budgets, logical frameworks, time frames and milestones.

13.4.9 Fisheries extension

Fisheries Extension is the responsibility of the Directorate of Livestock and Fisheries Extension (DoLFE).The Directorate has no separate plan for fisheries. No fisheries extension work is done by the directorate. The directorate hopes to produce a National Extension Policy.

35 extension officers, 10 of them from fisheries departments (2 each form Lakes, WBGS, NBGS, WES and WS), were trained in 2012 under the SPCRP project. The directorate wishes to expand this to the 5 remaining states whose extension officers did not receive training under the SPCRP. 30 extension officers from Livestock and Fisheries were been trained in 2009-2010 jointly with the Animal Health and Livestock Directorates funded by the MTDF. Although the directorate has plans for the future the big problem is apparently funds.

Although 10 extension workers have been trained recently, the CAMP survey did not show any extension work being done in the 8 states visited, which included 4 of the 5 states where extension workers were trained. The Fisheries Department itself does some extension work in aquaculture, and the staff travel to states to provide advice and assistance to SMARFs. The staff also travel to the field to support individual projects and programmes in fisheries if funds are made available.

13.4.10 Investment and marketing

The Department of Investment and Marketing is responsible for investment in the sector. It has produced a guide to investment in the livestock and fisheries sectors in South Sudan[525].In fisheries three major priority areas are identified:

A. A fishing parastatal called SUDAFISH, which will "strive to increase out of fish catches in a sustainable manner by taking measures such as manufacture of better boats, canoes and nets that enable sustainable fishing practice and construction of landing sites, ice plants and cold storage and processing facilities for fish in the main production sites. SUDAFISH will also establish a fleet of refrigerated boats and refrigerated lorries/vans to enable correct preservation and transportation of fresh fish to major market centres throughout South Sudan".

[523] GRSS. 2012. *The Ministry of Animal Resources and Fisheries. Policy Framework and Strategic Plans 2012 - 2016.*Juba: MARF 2012

[524] Prepared with assistance from EU ACP Fish II

[525] GRSS. 2012. *Investment Opportunities in Livestock and Fisheries Sectors in South Sudan*. MARF, Department of Investment and Marketing.

B. Investment in a fish canning factory, to be located either in Bor or Malakal. Canning is suggested because it is a "… good way to preserve fish".

C. Investment in aquaculture, which is not elaborated on in great detail.

There is no justification given for establishing SUDAFISH except "profitable exploitation of the fisheries resources of South Sudan", and that its establishment will persuade the private sector and cooperative fishing groups to "come on board". This is insufficient justification for the establishment of SUDAFISH. The whole concept of a state run corporation exploiting fisheries resources as presented requires rethinking. The private sector in South Sudan is very adept and could easily do everything that SUDAFISH is intended to do. The government should address the reasons why the private sector are not doing these activities, rather than supporting the establishment of a subsidised state competitor to the private sector.

Canning is not an option for fish preservation in South Sudan. There are considerable technical and financial constraints that have not been considered. In that the private sector is expected to do the investment, and has specific technical knowledge, it is reasonably certain that this development will not happen.

Aquaculture is a different matter, but the greatest short term opportunity in aquaculture is probably Integrated Agriculture Aquaculture (IAA) which is aimed at entrepreneural cultivators and farmers, clustered around towns and is not a "commercial" opportunity for outside investors.

Large scale commercial aquaculture, although superficially attractive, is unlikely to be initiated in the short term, partly because of land issues, but also due to the necessity to import all inputs. The example of aquaculture in Uganda is pertinent, where production remains at less than 15,000 tonnes/year after many years of effort, and the industry is only now starting to develop rapidly.

13.4.11 States

States' MARFs (SMARFs) are similar in structure to GRSS MARF, though in some cases the overall structure of the SMARF is slightly different, and they tend to have fewer directorates. The fisheries departments and/or directorates in SMARFs are usually small and reflect the states' limited financial and human resources.

The states' fisheries departments responsibilities are similar to those of GRSS MARF but usually not so well elucidated.

As an example in Northern Bahr el Ghazal the ministerial mandate for fisheries[526] is shown in Box 13-1.

Box 13-1: Ministerial mandate for fisheries in Northern Bahr el Ghazal

The ministry is responsible for production of policies for the sustainable utilisation of water bone resources and fisheries in consultation with authorities responsible for natural resource and environment protection and maintenance of ecological balance.

The ministry is responsible for the issuance of licenses for the commercial harvesting of fish and other water bone resources

[526] Council of Ministers NBG State Aweil, signed by the Governor dated 18 July 2012

The ministry is responsible for production of regulations to control stream bank cultivation and other forms of human activity that increases siltation of rivers and in the end kill marine resources

The ministry is also responsible for the non-consumptive utilisation of rivers in Warrap[527] State for recreation and tourism

The Ministry is responsible for the control of pollution of rivers and waters in the state as this is detrimental to water bone resources

This gives the Aweil based NBGS Fisheries Directorate a very wide brief, to control and manage the fisheries of the state, including some powers over tourism, crops and pollution. Interestingly the mandate does not specifically cover aquaculture.

Box 13-2: CAMP Fisheries Report on Field trip to Upper Nile State

The director has two deputies and each of them have 2 deputy directors, under whom are fisheries inspectors. Further staffs are deployed in the counties. Additionally in Upper Nile State, there are a very large number of people on the payroll who are not "employed" by fisheries, but exist to receive their salaries. The number of these supernumeraries is unknown, but it exceeds 300.
Despite the majority of the effective staff being present, and being paid, no development or even much routine work is actually being carried out. Although budgets are prepared annually the State does not release any funds to fisheries department for operational costs, nor for development work, and without vehicles for transport, fuel and other materials nothing at all gets done.
The department collects taxes, but the taxes deposited with the Finance Ministry (as opposed to the taxes collected) do not cover the costs of the salaries paid to staff to collect them. Even when deposited the taxes raised do not go to fisheries work. Development efforts by NGOs or DPs are nominally supported by the fisheries department, but not financially.

13.4.12 Areas of competencies

SMARFs are longer established than GRSS MARF, and some of the staff have long experience in their positions. However, the capabilities of the states to run and administer fisheries development projects are insufficient, since very few of the states have managed to implement any development programmes on their own since the CPA. There are many reasons for this but a complete lack of development funding provided to the states' fisheries departments is the main reason, coupled closely with staff inadequately trained to do any development work, a lack of vision from the top of the management tree in the states and no tools of the trade - vehicles, boats, equipment or institutions suitable for extension work. These failings were noted by the CAMP fisheries subsector team in nearly all states visited. Without serious overhaul of the organisations throughout the states, from top to bottom and right across their mandates and staff lists, it is difficult to see how they can possibly be made effective.

Additionally the CAMP subsector team found during visits that most SMARFs tend to rely almost completely on NGOs and some international donors to not only fund all development activities that occur, but to initiate the programmes too; indicating a failure in forward planning and design of development inputs. Only in Jonglei State was the state actively

[527] This is presumably meant to say "Northern Bahr el Ghazal"

involved in initiating and funding development activities, and the effectiveness of some of these inputs was not as great as hoped.[528]

13.4.13 Organisation, staffing, and facilities

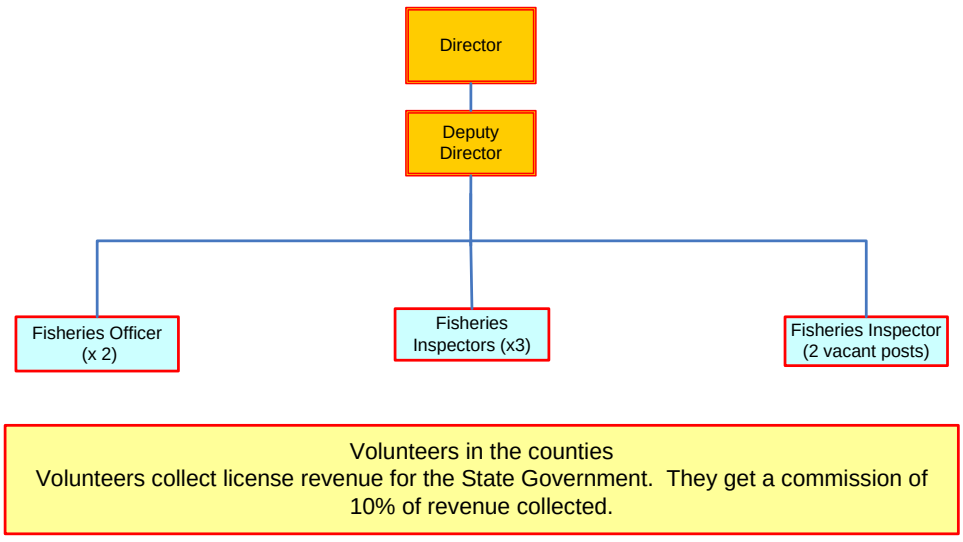
Directorates of Fisheries in the states have simple but easily understandable staff structures. Generally the small number of staff employed is appropriate to the size of the state and the amount of fisheries activity that should be going on in the state.

A Director of Fisheries usually has one or two deputies and beneath them either deputy directors or fisheries inspectors. Typically both aquaculture and capture fisheries will have a deputy director and inspectors and assistant inspectors. Post harvest issues are generally not graced with any staff at all.

In the counties there are county level fisheries staff, usually one for each county, though in many areas the country staff are in the state capital or absent from post. These are appointed by the counties. Furthermore there may be other officers at payam level. No real control from the centre is applied to these lower officers and they are normally used only for tax collection; not fisheries development or extension work.The training of staff in the states fisheries departments is typically insufficient, with the staff completely lacking in the basic technical skills necessary for them to carry out their jobs. The CAMP subsector team was unable to find a realistic human resources development plan in any fisheries department in the states. Many departments did not seem to have an up to date list of all training undertaken by all the staff on the payroll.

Figure 13-2 is the structure of Aweil State [529] Fisheries Department

Figure 13-2: Organogram of the Fisheries Department, Northern Bahr el Ghazal State



The Department also has unclassified 8 staff;
1 labourer, 2 fish guards, 2 messengers and 2 cleaners

13.4.14 Sectoral development

The states' fisheries directorates are generally starved of any funds and equipment. Although budgets may be prepared and basic development plans created there are no financial means to carry them to fruition. In recent years only in one state has substantial

[528] See Section 12.8
[529] Kindly provided to CAMP by the Director of Fisheries in Aweil State.

state funding been made available for development activities and these were seriously ill-advised, due to a lack of technical skill to plan and carry the projects to fruition. Even some of the donor funded programmes have suffered from inappropriate inputs and poor quality training.

13.4.15 Fisheries management

There is no active fisheries management carried out by the states' governments. There is no biological or catch data robust enough to form a basis for management decisions, and the Code of Conduct for Responsible Fisheries, including the precautionary approach to fisheries and the ecosystems approach, as promulgated by the FAO, are not widely known or understood.

Some fisheries management based on local traditions and taboos is enforced in some fishing communities. Examples are the banning of small mesh nets and the enforcement of closed areas. On occasion the basis for these measures is misguided, but it does show a local knowledge that resources must be protected for future generations and that overfishing is a bad thing. It also shows a sense of ownership and guardianship of the resources; so is a base to build upon when introducing community based management schemes. On occasion local ownership disputes cause conflict within fishing communities.

13.4.16 Fisheries Investment by states

Only one state, Jonglei, has made any significant state investments into fisheries initiated by the Fisheries Department, though many states have benefited from donor largesse to build fisheries centres to a larger or smaller degree (three Fisheries Centres, with associated buildings, were constructed by the SPCRP in Terakeka, CES; Nyang, Lakes State; and Adok, Unity State). Several states have constructed fish markets, separate from or designated for fish, in towns and landing sites.[530] Municipalities have also constructed dry fish markets in the larger towns of some states.

Jonglei has purchased a chill store (with no associated generators) which is in Bor town, and a cold store on a barge, which has recently been re-configured. The intention was to move fish to Juba. The barge is supposed to be operated by a private sector investor, with a share of the profits going to the state government. Neither of these are working as intended and the project is severely delayed. Some fish is now being moved to Juba through these interventions (August 2013). Meanwhile the private sector continues to move large amounts of fresh fish on ice and dried fish from Jonglei to Juba by boat and road.

13.4.17 Fisheries associations and co-operatives

In general fisheries associations exist where there is a reason for them to be formed, usually to access aid in one form or another. In many other areas fishermen have formed associations, only for the structure to either collapse or become moribund, in the light of no material benefit being forthcoming.

Where DPs or NGOs have operated or continue to operate, there are large numbers of associations and in some cases co-operatives. The fishing communities at Terekeka in CES are a good example: close to Juba, so accessible and thus popular with DPs and MARF staff. Over the years a large number of associations and two co-operatives have been set up or established themselves. The SPCRP/GIZ project (2009 - 2012) was instrumental in much of this activity and set up (or strengthened) 25 associations in the 4 locations where it operated.

[530] See Section12.8

Table 13-1: Number of fisheries associations set up by the site (2009-2013)

Location[531]	No. associations	No. members
1. Terakeka	7	305
2. Shambe	7	207
3.Yirol/Payii	2	135
4. Adok	11	515
Totals	25	1,162

Source: GIZ unpublished report 2012

Since the GIZ project ceased much of the activities of the associations listed above has slowed down, except in Terekeka, which continues to receive significant DP assistance and where associations remain a useful conduit for skills enhancement and general development activities. DPs and NGOs like working through fisheries associations and co-operatives, so they have a raison-d'être in these situations.

Elsewhere in the country (UNS and Jonglei State for example) the CAMP subsector team came across co-ops, associations or formalised fishing groups in several locations, but the lack of reported benefits from being a member was a constant reminder that fisheries associations or cooperatives cannot thrive in a vacuum, and will wither and die without a clearly defined purpose and benefits for their members. Co-operatives have generally not been a success in fisheries in South Sudan. One in Terekeka, held up initially as a model, has tended to be plagued by disputes. It is not successful in its main objectives. Another in Terekeka has functionally collapsed, though is being revitalised.

13.5 Production

It must be understood that all the statistics for catches, resources, consumption and trade in fish in South Sudan are in considerable doubt and it is unwise to place too much reliance on them.

13.5.1 Capture fisheries

The catch from South Sudan waters is imprecisely known but may be as much as 143,381 tonnes per annum[532], worth at least USD510 million at today's' retail prices. Fish are sold fresh, dried and salted throughout the country in retail markets in towns and villages. The numbers of fishermen is unknown, but is probably in the order of 220,000, most of these subsistence, with possibly 12,000 "commercial" fishermen, though nearly all of these commercial fishermen have alternative sources of income.[533] Possibly 1,731,208 individuals in South Sudan are living in households where someone fishes, and are thus directly dependent in some way (livelihood, income or food security) on the capture fisheries of the country. The role of fish in food security has generally been greatly underestimated and CAMP data indicates that per capita consumption of fish is estimated at 17kg/year (fresh fish equivalent) in South Sudan.[534]

Much of the fish produced is dried as it is impossible to get the fish to market fresh, due to low availability of ice and poor roads and transport. Dried fish is distributed throughout the whole country. It is a robust product and can be kept for long periods without special storage, and is popular with consumers.[535] There are serious problems with beetle infestations on dried fish which has been stored for too long, reducing nutritional value and retail price. Smoked fish tends to suffer less, and there have been repeated attempts to

[531] Data from unpublished records of the GIZ Fisheries Production and Marketing Project (2012)

[532] See section 12.5.5

[533] See Fisheries appendix 9 where the results of a household survey by CAMP are given in detail.

[534] Data from the NBS National Baseline Household Survey 2009. Analysed by NBS / CAMP Task Team.

[535] Fisheries appendix 5 lists the preserved types of fish found in South Sudan

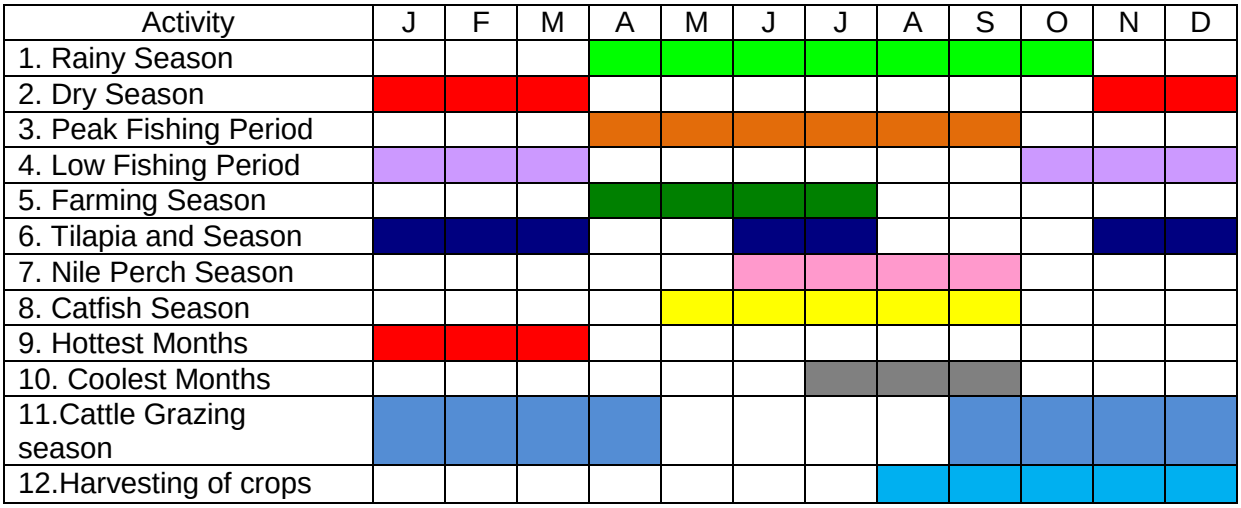
introduce Chokor fish smokers to fishing communities. Large amounts of smoked fish are imported from Uganda.

The main fishing gear is the gill net, with cast nets, spears, cover pots and long lines common, depending on the area being fished.[536]A variety of boats and canoes are involved in fishing and transport of fisheries products, though un-motorised planked and dugout canoes are the most common, powered either by paddles or poles, depending on the locations.[537]Outboard motors are rare for fishing but extensively used to transport fresh and dried fish.[538]

Most fishing households do not fish as a full time activity, and they are also involved in animal husbandry and farming. This influences the fishing activities through the year. Generally speaking the best fishing season in flowing waters is the wet season and immediately afterwards, when the "toic"[539] is flooded and it is during this period that people living near the Nile and its associated rivers fish the most and catch the most. In the dry season, people fishing the static waters, oxbow and lakes, are at their most active (having been planting during the wet season).

Seasonality of fishing and other major activities is given in Figure 13-3[540].

Figure 13-3: Fishing season of South Sudan



Source: GIZ unpublished reports (2012). See also GRSS 2011 *Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA). Technical Assistance on fisheries assessment.* Report prepared for the Government of South Sudan by The Food and Agriculture Organization of the United Nations, Juba 2011; which gives detailed seasonality information for individual fish species.

13.5.2 Resources

There is no reliable estimate of the fisheries resources of the South Sudan. FAO on its website[541] gives between 75,000 - 140,000 (Max) tonnes/year as the possible size of the

[536] Fisheries appendix 2 gives a list of all fishing gears found by CAMP during surveys in 2012 and 2013.

[537] Fisheries appendix 1 gives a list of the types of boats likely to be encountered in fisheries in South Sudan

[538] See also GRSS 2011 *Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA). Technical Assistance on fisheries Assessment.* Report prepared for the Government of South Sudan by The Food and Agriculture Organization of the United Nations, Juba 2011. This gives the result of frame surveys carried out in 2009 in Terekeka and elsewhere.

[539] Toic = the area that floods during the wet season but in the dry season retains enough water to provide pasture for livestock. A Dinka word.

[540] Table from GIZ Fisheries Production and Marketing Project (unpublished) 2012

potential fisheries resources of the "Sudd region and adjacent areas". Assuming[542] another 60,000 tonnes/year for those areas outside the "Sudd and adjacent areas" a Maximum sustainable Yield (MSY) of about 200,000 tonnes/year is probably realistic.[543]

A widely quoted figure for the potential maximum sustainable yield from the fisheries of South Sudan is 100,000 tonnes - 300,000 tonnes per year[544].This is apparently contained in an FAO document somewhere, but exactly where is not ever elucidated, nor how the total was reached. Earlier FAO work indicated an MSY of 92,000Tonnes -128,000 tonnes for the Sudd.[545]

Often only the maximum of 300,000 tonnes/year is quoted, as a definite potential MSY in the future. This form of misrepresentation of the resource potential is unprofessional, reckless in the extreme and very unhelpful for planning in fisheries, since it gives the impression:

(i) That the potential yield is known with accuracy, which it is not,

(ii) That 300,000 T/yr is a target that can be aimed at with safety, which is certainly untrue, due to lack of data on the stocks,

(iii) That great opportunities are being missed by not immediately capitalising fisheries to achieve it - which is certainly not proved.

In any case there are major problems with using a single potential yield figure for the whole country for planning purposes:

(i) The management structures that will be put in place for the fisheries of the country will be based on local decision making by local management groups. Each area will be distinct from the next. A country-wide Maximum Sustainable Yield is not a good management tool for local management systems, even for stocks extending over several management areas. Monitoring and reacting to Catch Per Unit Effort (CPUE) changes is more appropriate; but this requires regular data collection.

(ii) There is no proper biological information on many of the species in the catch. Life cycles, growth rates, age at maturity, age the species enters the fishery, etc. are just not known. Nobody can know how the target species will react to increasing fishing pressure. Some may be resilient to fishing, while stocks of other species may collapse rapidly.

(iii) The South Sudan Fishery is a multispecies one. Complex interactions between species and between fish and the ecosystems in which they live are not known.

(iv) The country is constrained by the constitution, its own policy, and the FAO Code of Practice for Responsible Fisheries[546] to manage the fisheries responsibly, giving decisions to the users of the resources and, in the case of the FAO code, through

---

[541] FAO. © 2004-2013. Fishery and Aquaculture Country profiles. Sudan. Fishery and Aquaculture Country Profiles. In: *FAO Fisheries and Aquaculture Department* [online]. Rome. Updated 1 February 2008. http://www.fao.org/fishery/countrysector/FI-CP_SD/en

[542] By the CAMP Fisheries Specialist, based on subjective opinion influenced by observations and data collected by CAMP, GIZ, NBS and others

[543] This is the figure that CAMP has used in the absence of alternative figures (which are universally based on little more than wild guesswork).

[544] A 2012 FAO report on the fish trade included an estimate that the potential from Capture Fisheries was 350,000 - 450,000 tonnes/year; this based on conductivity of samples of Nile water from the Sudan. Another 150,000 to 250,000 tonnes was expected from Aquaculture.

[545] R.G. Bailey, 1989. *An appraisal of the fisheries of the Sudd wetlands, River Nile, southern Sudan.* Aquaculture and Fisheries Management 20 (1): 79-89.

[546] FAO. 2012. *Code of Conduct for Responsible Fisheries (and accompanying guideline*s) http://www.fao.org/docrep/005/v9878e/v9878e00.HTM

applying both the "Precautionary Approach" and the "Ecosystems Approach". This precludes a "generalised" approach to exploitation of multispecies stocks.

(v) The fishery in some areas is for juvenile and immature fish, which does not fit into a MSY management regime.

(vi) The size of the largest water body, the Sudd and surrounding wetlands, varies considerably from year to year and also in response to long term rainfall patterns.

Box 13-3: Example of a misconception about fisheries in South Sudan

"It is estimated that South Sudan has a potential freshwater fish production capacity of about 300,000 MT annually, of which currently only 40,000 MT are being harvested."
"If exploited optimally, this is a premium export revenue earners [sic] for the economy considering the immense global demand…."
Example of hyperbole about fisheries potential, based on unsubstantiated estimates of potential and current yields, and optimistic returns; this time from the GRSS 2013 *Annual Needs and Livelihood Analysis 2012/2013*

It is therefore necessary to proceed with extreme caution when developing fisheries in South Sudan.
Methods for monitoring catches, biological parameters of the stocks and species, and the state of the environment need to be established before any large scale investments are made or licensed.

13.5.3 Existing fishing areas and catches

The catch in South Sudan is unknown. The estimates of catch seem to rely on what is known about the commercial fisheries, and this is generally quoted as being about 30,000 tonnes (from FAO Country Profile for 2006, but actually from much earlier work), but nobody is counting the fish, nor has anyone for many years, or possibly ever.

GRSS recently (2011) stated in a project newsletter[547] that "fish production", (though in reality this refers to the commercial catch), in South Sudan was:

"at present, fish production in South Sudan is estimated at some 30,000 MT. With perhaps one-third of this going to North Sudan, some 20,000 MT remain for markets in the South."

However, the final report of the project[548] did not attempt to make any estimation for the whole country's catches, concentrating on areas where the project had worked, and even then noting that survey work was difficult due to informal taxation making the fishermen unwilling to answer survey questions.[549] The subsistence sector, probably the largest part of fisheries in South Sudan was not covered at all in this data.

This is similarly the case with the numbers of fishermen. The GIZ project again gives some information, but it only covers commercial fishermen and does not give proper distributions, and its provenance is unknown. This concludes that there are somewhere near 12,000 "fishermen" in the country, presumably commercial ones.

[547] GOSS. 2011. *Newsletter of the Government of South Sudan (GOSS) Department of Fisheries Ministry of Animal Resources and Fisheries,* GOSS. Assisted by GIZ Fisheries Production and Marketing Project, Juba, South Sudan. Technical Note#2 February 2011
[548] GIZ 2012 *Fisheries Production and Marketing Report. Final technical and financial report. 29 March 2008 – 28 September 2012* STABEX-SPCRP 02 Livestock/03 Irrigation/04 Fisheries. Programme Coordination Office Juba. September 2012
[549] CAMP also encountered a reluctance to answer surveys or be interviewed.

CAMP has used secondary sources of data to try to assess numbers of fishermen and catches. The Annual Needs and Livelihood Analysis (ANLA)[550] carried out between UN agencies and GRSS covers numbers of households reporting as fishing, and the numerous SPCRP/GIZ technical reports on fish catches, coupled with some informed guesswork, allows an assessment of possible numbers of fishermen and catches including the subsistence sector. [551] It must be acknowledged that the assumptions are somewhat speculative. This gives a total fishing population, including commercial and subsistence, based on one fishing person per household[552] that reports itself as "fishing" to the ANLA, as 221,782 individuals.

Taking figures from SPCRP/GIZ for fish catches per commercial fishing unit, along with an assumed figure for catch per subsistence fisherman, the total catch is calculated to be 86,485 tonnes/year. Assuming a potential for the whole country of about 200,000 tonnes/annum (140,000 tonnes for Sudd region and adjacent areas and plus an estimate of 60,000 tonnes/annum for areas outside the Sudd and adjacent areas), this particular estimate of catches indicates that the fishery is capable of more than a doubling of total catches over the whole country.

Even using these figures, the catch from the subsistence sector may well be seriously underestimated, and the CAMP household survey data on its own was insufficiently comprehensive to provide accurate figures on annual catches. It is possible, however, extrapolating from the ANLA database (2012), to derive that 1,731,208 individuals in South Sudan are living in households where someone fishes, and is thus directly dependant in some way (livelihood, income or food security) on the wild fisheries of the country. This out of a population of about 10 million (17.3%)[553].The importance of the sector, when looked at this way, is far greater than generally acknowledged. Many more are dependent on the products of fisheries as a food source, through commercial trade.

13.5.4 Fish consumption and food security

FAO gives the supply of fish in Sudan per capita in 2003 (pre South Sudan independence) as 1.7kg/person/year. This figure is surprisingly low, even by the standards of North African countries with similar climates, and it would appear that the consumption of fish in the southern part of pre-separation Sudan was not measured accurately at that time.

The NBS database (2009)[554] which was analysed by CAMP in 2013, gives figures which indicate that consumption of fish in the country is far greater than assumed, and derived from the consumption figure, that the catch itself is probably far more than generally recorded.

The NBS database indicates that consumption of fresh fish in South Sudan is 59,031 tonnes for the whole country, based on a population of 8,262,647, or 7.145kg per capita/year. Additionally the NBS database gives consumption figures of 4,616 tonnes of Feeshi'ck (a wet salted product) and 19,933 tonnes of dried (79,732 tonnes fresh fish equivalent). Together the dried and fresh consumption adds up to 143,381 tonnes per year or 17.36kg/capita/year.

[550] GRSS 2012 *Annual Needs and Livelihoods Analysis 2011/2012*

[551] in Fisheries appendix 4

[552] CAMP Data would indicate that often more than 1 person per household fishes but the dataset is very small.

[553] Estimate in the ANLA report

[554] Data from the NBS National Baseline Household Survey 2009. Analysed by NBS / CAMP Task Team.

Table 13-2: Fish consumption South Sudan

Product	Tonnes	Kg/year/cap	Comment
Feeshi'ck	4,618	0.56	Feeshi'ck is a wet salted product
Dried fish	79,732	9.65	as wet fish equivalent
Fresh fish	59.031	7.15	
Total	143,381	17.36	

Source: Data from the NBS National Baseline Household Survey 2009. Analysed by NBS / CAMP Task Team.

This is higher than the regional norms of 8 - 14 kg per capita/year[555], and high compared to most of inland Africa, but in line with global norms. Given that fish is one of the primary sources of protein in the diet in South Sudan, there is a lot of water in South Sudan, fish is cheaper than alternatives, and is widely available (dried without the need for refrigeration) this figure is not necessarily surprising, and what is surprising is that the lower figure has not been questioned earlier.

Assuming that the imports of dried and salted fish into the southern part of South Sudan (from Uganda, DRC and CAR) are roughly equivalent (in fresh weight) to the exports of fish out of the northern part of South Sudan (to Sudan and Ethiopia) then this leaves a fish production and consumption figure for South Sudan of 143,381 tonnes per year, already more than 75% of the estimated MSY (200,000 tonnes/year) suggested by CAMP based on estimates from FAO (2006).[556]

To summarise,

- The potential catch is unknown but probably in the order of 200,000 tonnes/year and also the present catch is unknown, partly because much of it is subsistence and thus difficult to measure.
- Estimates of catch by the erstwhile SPCRP project of 30,000 tonnes are an underestimate because they concentrate on the "commercial" fisheries only. The subsistence sector is far larger.
- Estimates made by CAMP using data extrapolated from the 2012 ANLA give a catch of about 86,485 tonnes, with 1,731,208 individuals in South Sudan living in households where someone fishes.
- Estimates made by CAMP using the NBS (2009) data indicate that the total consumption of fisheries products may be as much as 143,381 tonnes with an annual per capita consumption of fish and fisheries products of 17.36kg.

13.5.5 Potential for the development of fisheries

The potential of development of fisheries is significant, though not in the way that many anticipate. Suggestions for development have been put forward in a variety of documents, including the MARF Policy 2012-2017. These proposals are almost always based on the supposition that the resources are vastly underexploited, that the MSY is 300,000 tonnes or more[557], that the country is missing out on a huge economic benefit in exports and that there

[555] FAO (2008) *The State of World Fisheries and Aquaculture 2008*.FAO Fisheries and Aquaculture Department, Rome, 2009

[556] The repercussions of this finding are significant, and the application of the precautionary principle to all fisheries development in South Sudan is thus paramount.

[557] The largest potential future yields in the literature are 350,000-450,000 tonnes/year from capture fisheries with another 150,000- 250,000 tonnes/year to come from Aquaculture, a potential maximum of 700,000 tonnes/year. In: FAO (2012) *Country Report Juba, South Sudan.* Regional Trade on fish and Fish Products Project TCP/RAF/3308.

is no downside to a rush to commercialise the fishery. It also assumes that the business would be profitable, which has not been proved.

MARF has suggested a parastatal, SUDAFISH, to commercialise fisheries, based on the several landing areas on the Nile river, with processing, freezing and chilling facilities, exporting to Juba and overseas. No detailed economic justification has been presented. Investors are being sought to bring this venture to fruition. Similarly suggestions to build two or three canneries have been mooted.

It is likely that the catch can be increased from its present levels. There is no reason why increasing the catch should not be a long term objective of the MARF Fisheries Directorate and the States' Governments. However the following are constraints to large scale commercialisation of the fishery:-

Table 13-3: Constraint and effect of fisheries commercialisation

Constraint	Effect
The obligation to manage the resources in a participatory manner, involving communities in the management of the natural resources they currently exploit	The national government cannot implement countrywide commercial private/public investments without the go-ahead from all stakeholders, states, counties, payams, bomas and the present users of the resources.
The obligation to manage the resources in a precautionary manner and observe the ecosystem approach to fisheries management	Until systems are set up in MARF and elsewhere, it will be impossible to comply with these obligations. The lack of data on fisheries is the first great hurdle, and means that a precautionary approach must be implemented. (Most commentators do not currently know what a precautionary approach is).
There is no legal framework for fisheries in South Sudan	The allocation of use-rights must take place within a legal framework (this includes licenses to fish). There is no legal framework for monitoring control and surveillance of the fishery. There are no regulations for the control of the fishery
The traditional authority of the people has to be respected (from the constitution)	Historic rights and economic dependencies on fisheries resources must be respected.
Already at least 17%[558] of the population is in some way dependant directly on fishing for livelihood, food security or income. This is likely to increase as time passes due to better security, increased population and better transport links.	Commercialisation of the fisheries resources of the country will adversely affect the large proportion of the population that relies on fisheries for livelihood, food security or employment. These people will not take kindly to their resources being exploited by and taken away by commercial interests.[559]

Source: CAMP Situation Analysis.

13.5.6 Economic considerations for fisheries development

The economics of the exploitation of the fisheries resources of South Sudan is a topic not widely examined in the literature.

Beyond the hyperbole found in some proposals, little thought has been given to the economics of actually commercialising the fishery, or even of getting the local subsistence fishermen to increase their catches. Commercial efforts assisted by government have been limited to a single EU funded development programme (SPCRP/GIZ) with a fisheries component, and some limited commercial investments by the state government in Bor, Jonglei State, neither of which have managed to reach planned targets of production.

[558] "It is estimated that some 15-25 percent of the population depends on fishery products as part of their nutritional needs". GOSS (2013) ANLA

[559] They also have automatic weapons so are formidable opponents if there is an argument

MARF supported SUDAFISH, a parastatal has been suggested without a detailed economic analysis, merely with the assumption of large profits, which is unfortunate.

There is a constant stream of plans for commercial investment in fisheries in South Sudan, in CES, Lakes State and Jonglei State. To date these have proved to be merely ideas and nothing has happened.

No figures from the private sector exist except those collected by CAMP[560], which are from small and medium scale fish traders. These show that the private sector can and does invest if a profitable activity is available. The large numbers of private traders, (some with a large investment in Bor, Shambe and Juba, moving fish, dried and fresh, from the producing areas to the consuming areas) shows the willingness of the private sector to take advantage of opportunities that present themselves.

Since the private sector is ultimately going to be the engine for growth in fisheries and aquaculture in South Sudan, it is perhaps advisable if the government decides early on that it will not involve itself in the commercial production side of fisheries and aquaculture. The private sector can then make its own commercially based decisions as to whether to invest or not.

13.5.7 Aquaculture

Aquaculture is a subsector that is said to have huge potential, though this potential has singularly failed to be realised in recent years. The principle argument to support the claims of great potential is that the "Greenbelt"[561] has year round water supplies, suitable terrain (many clay soil areas and gravity fed water supplies) and an almost ideal climate for aquaculture. Additionally the main species to be cultured (*Clarius sp* and *Oreochromis niloticus* -the nile tilapia) are both technologically suitable and native species to South Sudan. Further north, in the great floodplains and flatlands, conditions do not appear to be so ideal, certainly for subsistence aquaculture.

Table 13-4: Number of fish ponds in 2013

State	Number ponds established	Number of ponds operating
CES		
Yei County	34	9
Lainya County	12	5
Juba	1 Large investment by an Egyptian Group in a Tilapia farm near Juba temporarily halted due to land acquisition problems	1 (experimental/demonstration)
WES		
Yambio County	28	20
Ego County	2	2. Just stocked
Iba County	1 fish farmer (2 ponds ?)	0. Not yet stocked
Mundri East	1 fish farmer	0. Not yet stocked
Jonglei State	1 - demonstration	At the Padak Fisheries Training Centre at Bor
WGBState, Wau	WFP are supposed to be building 30 ponds for food security Private sector investment occurring	I private sector pond not yet stocked

[560] See also ACP Fish II. 2012. Final Technical Report. *Study On the Regulatory Framework for small and medium enterprises in fisheries in south Sudan.* Project ref. N° EA-4.2-B20.July 2012

[561] Stretching across Southern Greater Equatoria

Upper Nile State	1in Malakal 1 in Longchuk County	Experimental/demonstration Status unknown
NBG State, near Aweil	1	Still under construction by a private individual

Source: CAMP Situation Analysis.

13.5.8 Existing aquaculture

Aquaculture is not particularly well developed though in CES and WES great efforts have been made to introduce village level aquaculture. Much of this is through NGOs which have provided technical support to groups, though the groups provide labour, land and some limited funds. Table 13-4 gives the numbers of ponds established as at July 2013.

Presently aquaculture is concentrated in CES and WES, near Yei and Yambio. These are village level enterprises usually run by groups or associations. Although on paper there are a significant number of ponds problems still beset the farmers, such as supply of fry, lack of nets for harvest, and feed problems. Basic husbandry techniques are not fully understood and the NGOs involved have been remiss in not providing continual support in some areas. DoFAD at MARF is not sufficiently funded to support CES and WES, and are not involved in some NGO/DP initiatives in other areas.

13.5.9 Potential for the development of aquaculture

13.5.9.1 Subsistence Aquaculture

Integrated Agriculture Aquaculture (IAA) is perhaps one of the greatest opportunities for increasing production in the fisheries sector in South Sudan without accompanying serious ecological and social problems. IAA is merely an extension of subsistence fish farming, but taking advantage of agricultural inputs for fish rearing and the water in the pond for things other than growing fish.

Box 13-4: IAA explained

"*The basic principle of IAA is to grow fish in water bodies that are closely integrated into household farms, and intentionally make use of the resource flows such as animal and plant by-products from the diverse on-farm enterprises. The major aim is to convert agricultural wastes and manure into high quality fish protein; to use the nutrients generated in the pond as fertilizers for growing crops in order to reduce the need for off-farm inputs."*
J. Nagoli, et al. 2009. *Adapting Integrated Agriculture Aquaculture for HIV and AIDS-Affected Households: The case of Malawi.* Working Paper 1957. The WorldFish Center, Penang, Malaysia.

Elsewhere in Africa IAA farm families have achieved a range of benefits including increased farm productivity, increased household incomes, improved adaptation and resilience to erratic climatic conditions; improved food and nutritional security through increased production and consumption of fresh fish and food crops grown around the fish ponds[562]. In some countries IAA has been used to mitigate the effects of HIV and AIDS in farming communities by providing extra protein to the families affected. It is however pertinent to point out that this type of aquaculture development has failed to have the impact expected in African countries, and on re-examination of progress FAO has concluded that the approach is not correct, and the emphasis has to move away from subsistence and move towards "entrepreneurship", with larger farms, based in clusters round towns which provide supplies and markets for outputs.[563]

[562] J. Nagoli, E. M. Phiri, E. Kambewa, D. Jamu 2009. Adapting Integrated Agriculture Aquaculture for HIV and AIDS-Affected Households: The case of Malawi. The World Fish Center Working Paper 1957. The World Fish Center, Penang, Malaysia.

[563] Moehl, J et al. 2006.*Guiding Principles for promoting Aquaculture in Africa: benchmarks for sustainable development.* Food and Agriculture Organization of the United Naitons, Regional Office for Africa, Accra, Ghana, 2006

IAA can easily be adopted by go-ahead settled farming families throughout the country, where there is suitable water available and land available (mostly in the “Green belt” of CES and WES).

IAA, particularly if based on entrepreneurial activities in clusters, will have a major impact on food security and livelihoods wherever it can be practiced, and can also provide some income to the communities involved through the sale of fish surplus to immediate requirements.

13.5.9.2 Commercial aquaculture

Large scale commercial aquaculture is a completely different proposition from the sale of surplus fish from essentially subsistence ponds or IAA. Commercial aquaculture is profit motivated.

13.5.9.3 Economic Considerations for Commercial Aquaculture Development

The major considerations in South Sudan are fivefold:

(i) The difficulty in getting access to community owned land. For a large investment such as a commercial fish farm, security of tenure on land is a necessity.

(ii) Costs of inputs - in South Sudan in the short term all inputs to the farm, except land and water, including feed, skilled personnel, farm equipment, and processing equipment will need to be imported. The largest by far of these inputs is feed (up to 80% of all costs), which will have to come from Uganda or Kenya for the next few years until a feed industry is built up in South Sudan. Additionally hatcheries will have to be built to provide seed, which initially at least, will be relatively expensive, though costs of seed should reduce rapidly. It is difficult to see South Sudan having a competitive advantage in commercial fish farming over neighbouring countries (or indeed Southeast Asian countries) in the short term.

(iii) Competition from wild caught fish in the market place - South Sudan is blessed with a considerable fish resource, and in time this will lead to better supplies of fresh fish entering the markets of the larger towns. This fish will compete with aquacultured fish. Generally where there are large amounts of fresh wild caught fish available, aquaculture does not compete unless the products of aquaculture are aimed at a remunerative niche market.

(iv) Competition from imported aquacultured fish is a problem in many African countries (e.g.: Malawi, Zambia) where imported fish from Vietnam and China is cheaper than the locally produced fish. In South Sudan fish from Vietnam and China is already competing with the wild caught fresh fish available, is generally better quality, and in some cases is cheaper.

(v) Finance, which until there is a developed banking system in South Sudan, will have to come from overseas.

(vi) The need for policies and a legal structure that protects the investor covering, *inter alia,* feed quality, bio-security, export standards and pollution of water sources.

Large scale commercial aquaculture in South Sudan has up to now been just talk. It is not an activity for the national government nor states to engage in, and until they have developed their own legal and regulatory environment, they should regulate the industry and ensure

that companies follow the FAO guidance [564] contained in the Code of Conduct for Responsible Fisheries.

The example of Uganda is pertinent, where it is only recently that commercial aquaculture has begun to become profitable and attract major investment.

13.6 Marketing and trade

Internal marketing of fish is done by the private sector, which is very diverse and adept. Fish traders travel to fishing camps and landing sites and buy fresh fish from fishermen and smoked or dried fish from processors and take it by whatever means are available, bicycle, motorbike, truck or boat, to the large urban markets where they either sell it themselves or (more usually) sell on to retailers who sell the fish in the markets in the town. Some fishermen trade their own fish, fresh or processed, to the urban areas. Large amounts of fish is moved to Sudan (more when the border is open), and large amounts of fresh and smoked fish comes north from Uganda to South Sudan.

The main problem with monitoring this activity is the large number of landing sites, traders and the diversity of destinations of the fish. Additionally, only in a few places are fish sold by weight, normally it is by the piece or heap, and the size of heaps can vary immensely.

The size of the fish trade is very large, and its importance for food security, employment and livelihoods is generally not acknowledged.

13.6.1 The local distribution chains

On a more specific basis the in-country trade can be divided into several segments.

i. The transport of large amounts of sun dried (and sometimes slightly salted) fish from Jonglei (predominantly), UNS, Lakes and Unity States to Juba by river transport, and throughout the country by road from Nile landing sites. The product is well preserved, though subject to severe beetle and beetle larvae infestation if kept for a long time. The beetle is *Dermestes maculatus*, a common pest of stored products. Additionally in the wet season drying can be a lengthy affair and the product is subject to blowfly attack, and then bacterial action, as the fish cannot be dried in time to stop it. Salt is sometimes added to try to stop this deterioration but there is some wastage.

   The product keeps for up to 8 months but has generally deteriorated significantly due to the beetle attack after about 3 months leading to significant losses in nutritional value. The beetle action also makes the product taste bitter, so the combined effect is to reduce its value with storage time. There are a variety of ways to deal with beetle attack, but none of them are likely to be adapted in South Sudan due to costs. Rapid movement of the product from processing site to market and on to consumer is the best and most applicable method, reducing time of storage to a minimum. It is impossible to stop the processed fish getting infested with the beetle.

   The size of this trade[565] to Juba "fishport" market alone, is approximately 450 tonnes per year coming by boat to the wholesale markets, and then passing on by road across all of Greater Equatoria, though a great proportion is consumed within the greater Juba area and adjoining counties. The fish is processed by fishing households and sold to consolidators who transport it first to Bor (or other large towns on the Nile, if not from Jonglei) and then to Juba. The fish, sold in plaits, sells

[564] FAO Technical Guidelines for Responsible Fisheries compliment the FAO Code of Conduct for Responsible Fisheries, and cover many aspects of Aquaculture.

[565] Estimates based on a market survey done in Juba by CAMP in 2013

in Juba at between SSP12/kilo to SSP48/kilo wholesale and 24 to SSP62/kilo retail in Juba markets[566] (being sold by the piece the actual price/kg varies considerably). There are no figures available for the total production of dried fish from the Sudd and adjacent areas. The trade is very diverse with many producing areas, many traders and many destinations. Dried fish comes to Juba from as far away as Nassir on the Sobat river in UNS. CAMP was able only to monitor the Juba main port market (before it was closed down in June 2013).Some of this dried fish is exported to Sudan from Unity, Lakes, Jonglei and UNS states.

There are reports of a powdered white insecticide locally called "Budra"[567], normally a pyrethrum based insecticide, sold in bags in towns throughout the country being used to kill *Dermestes maculatus* in fish. This insecticide is not particularly toxic to humans in the amounts encountered though its use may account for some reports of bad tasting fish, and it may be implicated in poisoning of rivers to catch fish, since fish are particularly sensitive to pyrethrums.

ii. The transport of fresh fish from Jonglei State (Bor) to Juba. Fresh fish is transported in large insulated boxes by boat from Bor to Juba and sold to hotels (mostly) and other local markets. Additionally (2013) 10 substantial pickup trucks are carrying approximately 800 kilos/load, (with old domestic freezers on the back) up to 3 times a week by road to Juba, mainly to markets but also to hotels and the catering trade. CAMP, though its Juba market survey has estimated that the trade by boat as no more than 2 tonnes per week, or 100 tonnes per year (2013), but that the trade by road can be up to 25 tonnes a week for short periods at peak season (Dec - April) and but is normally 7-10 tonnes a week, perhaps 1000 tonnes/year.[568]The ice is sourced in Juba as there is no ice production in Bor. (Ice is in 30 - 40kg blocks at SSP0.50/kg, wholesale, in Juba[569]. The retail price of ice is roughly SSP0.85/Kg). Additionally there are significant supplies of fresh fish coming to Juba from Terekeka, but it has been impossible to estimate accurately the quantities. Ice is sourced in Juba as the ice machine provided by GIZ in Terekeka has not been commissioned. In the markets the fishermen use old domestic freezers to keep the fish, buying ice from local ice retailers. Some fresh fish come to the market at Gudele in Juba from rivers to the east of Juba, but only in very small quantities.

iii. The transport of smoked fish from (mostly) the Terekeka area of CES to Juba. This heavily smoked fish is well preserved and keeps for several months. It is very tasty. In fishing camps near Terekeka the SPCRP Fisheries Programme introduced improved "Chokor" fish smokers to reduce firewood use for smoking. The fish when it leaves the fishing areas is of very good quality, but suffers from breakages and beetle infestation, which both in time reduce both its aesthetic and nutritional value.

The size of the trade is unknown, but it is significantly smaller than the dried fish trade, partly due a shortage of firewood in the swamp and toic further north of Terekeka in the Sudd. Smoking fish also requires investment in semi-permanent smoking installations, and for good quality product, great care and attention. Some of this fish is sold on to smaller wholesalers who take it to other towns in Greater Equatoria.

[566] CAMP Countrywide Fish Market Survey 2013.See Fisheries appendix 7

[567] "powder" in Arabic.The bags of insecticide are made up out of bulk plastic drums of the insecticide, so as to be of an appropriate unit size for retail sales.

[568] Information from interviews with fish traders in Juba markets

[569] See Fisheries appendix 8 for details of ice machines in Juba

The price in Juba retail markets is SSP19-SSP62 depending on species and quality. Wholesalers sell to retailers for roughly 20% less than the retail price. The product is sold by the piece, not weight.

iv. Local fresh and processed fish supplies. Around every large town in South Sudan there are fishermen who are catching fish and selling it locally in the market, or selling to middlemen at landing sites, who take it to market and sell it, either by boat or road. Similarly there are fishermen who process surplus fish and retain it to sell later at market in the town or to wholesalers. Additionally traders travel to Juba or the large towns and buy supplies of dried and smoked fish, which they then take to their local small town and sell on in the market. These are a vital part of the food supply in many towns. The web of supply is very complex and there are many permutations. Suffice to say that the system is well organised, efficient at getting the fish to the consumer at a suitable price, and keeps many people employed. Mobile phones are becoming ever more important in fresh fish marketing in South Sudan, with fishermen being in contact with traders, and traders using the mobile phone to sell the fish on to customers, often in advance of collecting the fish from the fishermen.

13.6.2 Import and export products and markets

13.6.2.1 Imported Smoked fish from Uganda

The trade in smoked fish from Uganda is far larger than is generally reported. The Nile Perch fishery in Lake Victoria is large, and now almost totally unregulated. This means that large numbers of undersized fish are being caught and processed by hot smoking and then exported to neighbouring countries, notably DRC and South Sudan.

This fish enters the country through any of the 6 main crossing points from Uganda[570].

CAMP has been unable to ascertain the exact figures for imports of smoked fish from Uganda. CAMP found that at least 1500 tonnes/year enters through Oraba and passes to Yei in CES, where there is, in addition to the routine trade, a large weekly market dedicated to smoked fish from Uganda. Fish is bought by wholesalers in large packages and further distributed throughout CES and WES, and North to NBGS, Lakes (Rumbek) and Warrap State and to WBGS where it is found in all the retail markets in towns.

Probably, as much again, or even more, passes through Nimule, though in smaller units, with the primary destination being Juba. Every market in Juba has a dried and smoked fish section that has large quantities of Uganda origin smoked Nile perch. This fish is also bought by sub-wholesalers and distributed further north into the country. As a general rule the further from Uganda the less is available in the market.

The other border crossing points into South Sudan are assumed to also to be conduits of this kind of fish into South Sudan but CAMP was unable to visit them and verify flows. It is likely that at least 4,000 tonnes of smoked and dried fish is entering South Sudan from Uganda every year, and this may well be an underestimate. (2013 - CAMP estimates, equivalent to about 16,000 tonnes of fresh fish).

The Customs Department of South Sudan does not classify smoked fish as a distinct category, it being included in “Various” and attracting a tax of only 2% (which is variously collected or not).This means that there is no statistics collection that shows the official quantities and values of the smoked fish being imported. The fish is sold by the heap. The price is highly variable depending on the weight of the fish in the heap, averaging about

[570] http://www.eac.int/migration/index.php?option=com_content&id=146:ports-of-entry-a-border-points

SSP50/kg but with a range of SSP46 to SSP62/kg[571]. The product is often eaten in "soup" since a small amount of fish goes a long way in soup, which in turn flavours a large amount of carbohydrate.

13.6.2.2 Imported dried and salted fish from Uganda

A small pelagic Cyprinid fish, *Rastrineobola argentea*, the "Silver cyprinid", is harvested in large numbers from Lake Victoria in Uganda. This is dried and bagged in large ~ 100kg bags, and transported all over East Africa, usually under the generic name of "Daga'a"[572].This fish is sold, usually by women, all over markets in the southern parts of South Sudan. The unit of sale is a variable volume "measure", either large basin size, medium size equating to about 2 litres, and a "small" container which is about 300 - 400ml. Costs in Juba are SSP15-SSP20/kg, significantly cheaper than other fish protein.

The size of this trade is unknown, as the product escapes detection at customs and is generally bought in one sack at a time mixed with other goods (beans, fruits and vegetables, or other staples), and is recorded by Customs as "various". That said, in Yei there are dedicated traders who bring in whole truck loads of daga'a and sell on to retailers who buy one sack at a time. Godowns in Yei serve as stores for this product. From here the fish is distributed all over the western areas of South Sudan.

Salted fish from Uganda also appears on the market throughout the greenbelt and to Rumbek, but the quantities are small and there is no estimate as to the total size of the trade. The fish are usually catfish and Nile perch. The product is surprisingly good quality. In Juba retail markets salted fish is SSP33-SSP45/Kg.

A large amount of dried small pelagic fish from the west of Uganda is transported up to NBGS and WBGS and is made into "mandesha", a crushed, compacted and slightly fermented fish product much liked by pastoralists and even urban dwellers in the northern parts of South Sudan, though not seen often in the southern areas. This is probably *Nebola bredoi* and *Brycinus nurse* from Lake Albert and surrounding area. It comes by road, through either Nimule or Yei but is not seen in the markets of the green belt. Mandesha costs SSP40/Kg in Aweil.

13.6.2.3 Fresh fish imports from Uganda

Nile Tilapia (*Oreochromis niloticus*) and Nile Perch (*Lates niloticus)* are traded up from Uganda (Entebbe, Kampala area and Jinga) to Juba in chilled small lorries of up to 5 tonnes capacity. The fish is fresh gilled and gutted and kept on ice. This is sold to traders at the "Uganda" market in Konyo Konyo in Juba and the "Uganda" market in Jebel Market; and then sold on to retail buyers. Some is sold directly to hotels and restaurants. Typically two lorries carrying 3 tonnes each will arrive in Juba every week, making a total import of roughly 300 tonnes/year. The importers are an organised group of 7 traders who have formed an association. In the "Uganda" market at Konyo Konyo the 27 retailers, who also have formed an association, use old domestic freezers to keep the fish as do retailers in the Jebel Market though there are only 3 traders, all Ugandans, there. The ice (flake) comes with the fish from Uganda, and if extra supplies are required then locally sourced blocks are available in the market. The conditions where the "Uganda" markets are situated leave much to be desired, but the fish is generally of acceptable quality, though subject to contamination from ice and the general unhygienic surroundings. The importers sell to the retailers at SSP20/Kg and the retailers sell to the public for SSP22/Kg. The mobile phone is becoming important in marketing of this fish, as the traders like to have buyers waiting and a guaranteed sale,

[571] See Fisheries appendix 7 for price data in markets in South Sudan

[572] A name also applied to small *Limnothrissa miodon*, the Lake Tanganyika Sardine, which is similarly traded widely in East Africa.

which they can achieve by use of a mobile phone. This trade used to be much larger in the late 1990s, with 25 trucks engaged in the trade. A major problem for the traders is a failure by hotels and restaurants to pay for product sold on credit.

13.6.2.4 Dried fish imports from Sudan

A significant quantity of small pelagic fishes is imported from Kosti in Sudan to WBGS, NBGS and Warrap State to make "mandesha". The full extent of the trade is not known exactly. In Aweil (NBGS) in 2013 this fish was still being imported dispite the border being "closed".

13.6.2.5 Fish imports from Kenya

An unknown amount of dried and smoked fish enters South Sudan through the border with Kenya in EES. This seems to be consumed in EES.

13.6.2.6 Fish imports from Democratic Republic of Congo (DRC)

An unknown amount of smoked fish enters South Sudan through the border with DRC in WES. This fish can be seen in Yambio market competing with locally produced smoked fish from Terekeka, and Uganda smoked fish which has come from Uganda via Yei.

13.6.2.7 Other imported fish products (Prices mid-2013)

- **Canned fish**. A variety of canned fish products are available in the stores and supermarkets of South Sudan. The cheapest is Philippines produced sardines in a rather lurid coloured tomato sauce, costing SSP5 for 125gms tin, weighing 90gms drained. This is equivalent of USD13.2/kilo drained weight. Other more expensive products include canned tuna, sardines in oil, and more arcane products aimed at the luxury markets. It should be remembered that canned fish should not be compared to fresh fish, in that canned fish requires no refrigeration, is very convenient and keeps for years. Neither, gustatorily, is it considered to be a comparable product to fresh fish by the consumer.

- **Frozen Pangasius fillets (Vietnam).** Pangasius is a catfish farmed mainly in Vietnam. Frozen fillets arrived in the stores in Juba in mid 2013. At SSP35/kg for skinned, boneless, Individually Quick Frozen (IQF) fillets in a 1kg shatter pack they are very competitive with local fish in the Konyo Konyo market, and far more convenient, requiring no further processing at home. It remains to be seen how long before this cheap fish, which has already found its way into the restaurants, hotels and domestic kitchens of the world, becomes a major competitor to any aquaculture or wild capture products that may be produced in South Sudan. Some people complain that Pangasius is not particularly tasty and has a dry, unappealing texture.

- **Frozen Tilapia fillets (China).** These have been available since 2012 in Juba. They are an aquacultured product from China. Presented as individual fillets vacuum packed and Carbon Dioxide (CO) treated they are sold by the kilo at SSP70/kilo, making them very expensive[573], and out of reach of the average consumer. Given that it is possible to buy and transport frozen whole Chinese IQF ~300gm gutted and scaled tilapia in 20 kg cartons of 1kg shatter packs to Mombasa for a mere USD1.66/kilo[574] it will not be long before these start appearing in Juba, competing directly with the local wild and aquaculture product. (The tax on imported fish products is only 2%).This is a major long term threat to the commercial aquaculture industry in South Sudan.

- **Frozen Tilapia Fillets (Uganda).** These are available in supermarkets in Juba. The presentation is poor, being a frozen lump of 500gms of fillet in a vacuum pack bag. They

[573] This reflects the rapacious greed of the supermarket owners.

[574] R Lindley - personal information

are also very expensive at SSP84/kg, about twice the cost of a fillet produced from a locally caught or imported (Uganda) fresh tilapia, but less bother to prepare. Consumers report that they taste better than the Chinese vacuum packed product.

- **Frozen Nile perch fillets (Uganda)**. These are available in many supermarkets in Juba. These come up from the Nile perch fishery on Lake Victoria. The packing is in cardboard cartons of 500grammes.The quality suffers due to poor temperature control and the cheap inadequate packaging. These are SSP60/kg. Mostly purchased by expatriates, hotels and restaurants.

Other more esoteric products are now (October 2013) available from wholesalers (no shopfront) for the hotel and catering trade.[575]

13.6.3 Fish product exports

The amount of fisheries exports from South Sudan to neighbouring countries is unknown with any accuracy.

It is generally reported that at least 10,000 tonnes[576] of fresh fish was transported from Nasser, Ulang, Sobat and Fangak in Upper Nile state to Khartoum by boat and truck (using ice made in Khartoum and Kosti). Additional trucks used to visit Bentiu and other areas along the Nile River and collect fresh fish to take north and to western areas of what is now Sudan. Khartoum (particularly) and what is now Sudan generally was considered to be an insatiable market for fresh fish from Upper Nile, Jonglei, Unity and Lakes States. Some of the larger *Lates niloticus* (Nile perch) were onward traded to Libya, Saudi Arabia and Egypt by air. With the closure of the border in 2012 this trade virtually stopped.

CAMP conducted extensive interviews with fish traders in UNS in 2013. A slightly different picture appeared from that given above. A large number (up to 35 operating at a time) of vehicles came South from Sudan to UNS and Unity State, including to landing sites on the Sobat River. These went wherever there was access to fish. Additionally up to 15 boats from South Sudan and Sudan travelled up the Sobat as far as Nasser, and the Nile as far as Bor. Fresh fish was purchased by the traders from landing sites everywhere who then returned to the North, sold the fish and returned to South Sudan with ice from Khartoum (or Kosti, where the ice is more expensive).The vehicles carried 3-5 tonnes[577] per trip and the boats 10-15 tonnes per trip. Some of the traders used satellite phones to keep in touch with buyers in Khartoum.

The size of this trade would therefore have been more than previously estimated and may have been as much as 16,000 tonnes/ year when the border was open. Khartoum can apparently absorb as much fresh fish as there is supply.

When the border permanently re-opens the trade will restart in earnest, but even with tension continuing the fish trade continues, with much dried fish passing through Ethiopia and clandestinely both dried and fresh fish cross the border to Sudan.

Of note is that this trade, over a considerable distance, was conducted with only the use of ice as a cooling medium and in insulated boxes. No chill stores, freezing units or cold stores were necessary. It is undoubtedly a model that could be followed for moving fish around South Sudan, to Juba and other urban destinations from the major producing areas in Jonglei, Lakes, Unity and Upper Nile States.

[575] An example of what is available is given in Fisheries appendix 7.

[576] SPCRP. 2012. *Fisheries Production and Marketing Report. Final technical and financial report. 29 March 2008 – 28 September 2012* Fisheries Production and Marketing Project STABEX-SPCRP 02 Livestock/03 Irrigation/04 Fisheries. Programme Coordination Office Juba. September 2012

[577] Anecdotally they could get up to 8 tonnes into one of these trucks

A large amount of dried fish also found its way north into what is now Sudan. Most of this was dried and/or salted fish, presented as plaited strings and split gutted fish[578], though Mandesha[579], a compacted mass of small fish in a wicker basket, is popular with nomadic pastoralists as it is very compact and can be transported easily[580].This trade amounts to at least 1000 tonnes per year[581].Some of the fish used to make Mandesha in NBGS and WBGS is imported from Kosti in Sudan, though the majority is from Uganda (with some locally produced in NBGS & WBGS and from Bentiu and Wau). With the closure of the border the fish trade up the Nile stopped but the trade in Mandesha northwards continued, for the northern border in the Western part of South Sudan is notoriously leaky.

Apparently, and it has been impossible for CAMP to verify this due to security problems, there is a large trade into Ethiopia from Pibor, Nasser and Akobo of dried and salted fish, as well as some fresh product[582].Anecdotally much of this just goes round the Sudan/South Sudan border and enters Sudan from Ethiopia, thus avoiding the presently closed border. The majority of the trade is thus in reality to Sudan, not Ethiopia. Fish traders from Sudan are a common sight in these north eastern areas of the country.

Historically (before the start of the second Sudanese civil war) there was a very significant trade in dry fish from the central Sudd region down to Juba and then on to DRC through Yambio. This trade has all but stopped, though the product can be found in all towns in Greater Equatoria, and it would be presumed that some still makes it way over the border.

13.6.4 Fish market prices

Fresh fish market prices[583] in South Sudan are relatively low in places near to rivers and lakes and higher the further away from the source, except in Juba, where high demand and low supplies makes fresh fish prices high all the time. The cost and unreliability of transport, along with informal taxation, is a major influence on the increase in fish prices away from the source. In Juba a constant supply of fresh Tilapia and Nile Perch from Uganda, whole gutted and chilled on ice puts a baseline limit on fresh fish prices, at SSP22/kg in 2013, and fresh fish therefore is generally less than this price (in Juba fish is sold by the piece or heap, so prices vary by as much as 20% on the same stall). Even when fresh fish can be got to market, the conditions in the markets are generally unhygienic and unappetising to the consumer. Modern markets have been built in some places, such as in Terekeka (by the SPCRP GIZ project), and in Rumbek but much more requires to be done.

Box 13-5: Four major constraints to fresh fish marketing

i. Poor roads and expensive transport
ii. Ice availability and cost
iii. Informal taxation
iv. Poor retail markets

In many of the towns in South Sudan fresh fish is available only in the late afternoons and evenings and the demand is such that supply is inadequate. Customers queue to buy and prices are relatively high, compared to the smoked and dried fish that is always available in South Sudanese market towns. In Juba fresh fish is displayed in the mornings and put away in old freezers with (insufficient) ice during the day, to be displayed again in the evening.

[578] See Fisheries appendix 5

[579] Also spelt “madesha”

[580] FAO (2012) *Country Report Juba, South Sudan.* Regional Trade on fish and Fish Products Project TCP/RAF/3308

[581] Pat Murphy, 2013, AECOM. *Pers Comm*

[582] Figures given in the FAO (2012) report for exports to Sudan and Ethiopia are insufficiently robust

[583] Prices for fish, dried, fresh and smoked, throughout the country are given in Fisheries appendix 7, which gives the prices for fish throughout the country where CAMP took measurements.

Near sources of supply the fish price reduces considerably, as supply is so much greater. Dolieb Hill in UNS is such a location, with large numbers of fishermen on the Nile and Sobat rivers, demand reduced due to the closure of the border with Sudan and the main market in Malakal is more than 20 miles away. Here fresh fish are relatively cheap, compared to alternatives, or elsewhere in the country at SSP7-SSP10/kg depending on species.

Smoked and dried fish is far cheaper than fresh fish (on a per kilo of fresh fish equivalent basis), and is far more widely available to the general public. Every small market in the country has stalls selling dried or smoked fish in one form or another. Prices vary considerably, depending on how far the fish has been transported. In Juba town smoked fish and dried fish is more expensive than in most other places.

13.6.5 Post-harvest losses

Post-harvest losses have been studied by FAO and others. Estimates as large as 50% of the catch[584] have been published, but it seems that these are vast overestimates. Losses occur, primarily if fish is caught which cannot be sold fresh or processed (dried) due to the weather. Losses due to insect infestation can be high in dried and smoked fish products that are stored for long periods, and some smoked fish is brittle and so suffers from losses due to breakages. There is no doubt that post-harvest losses exist and all post-harvest losses are greater than would be ideal, but they should be kept in perspective, as a small, but undesirable proportion of the total production. The increasing mobile phone use by traders and fishing communities offers opportunities to reduce post harvest losses by ensuring that the market for fish exists before it is caught.

13.6.6 Potential for the fish trade

Once the border with Sudan reopens then the fresh fish trade to the north will begin again. The private traders are adept and adaptable. It can be anticipated that the volumes sent previously to the North by the private sector will soon be re-established and possibly increased. This is not an activity suitable for direct government intervention.

Internally there is a large market for fresh fish in all the larger towns. The problem for the private sector has been, and continues to be, getting the fish to market and short term storage. Other problems include poor and expensive roads and transport, informal taxation, poor retail markets, and no ice availability. These are the key constraints to marketing fresh fish in South Sudan; until they are overcome then the market for fresh fish in the towns will continue to be poorly served. Fresh fish is a far more valuable product than dried or smoked fish, and per kilo offers a potentially much higher return to the fishermen and traders, so it is desirable to aim to provide as much as possible fish as “fresh fish” to the consumer. As general conditions improve it will be possible to develop cool chains for frozen fish and produce added value products for a rich urban elite, currently served by imports.

Dried fish continues to be greatly appreciated by the consumer, partly because it requires no refrigeration and only a small amount is needed. The dried product is also appropriate since the fishermen do not require refrigeration in the landing sites and villages, it is within the fishermens financial and skills capacity to produce, and there is no particular hurry to sell the product, so it is possible to get it to market in sellable condition despite the poor road and transport network. With time the dried fish trade can be expected to decline as the fish distribution network improves and the consumers begin to buy fridges to keep fresh produce, but in the short term the dried fish trade will remain the backbone of fish trading in the country. There is nothing fundamentally wrong with this, and the common assumption that dried fish is a somewhat “primitive” way of processing fish needs to be dismissed.

[584] 50% is a catastrophic loss. Post harvest losses were not a problem noted at all during CAMP household survey work. No fisherman mentioned it. Catastrophic losses would have been mentioned.

Frozen fish is not a suitable product for distribution at the moment, because there is no low temperature cold chain in South Sudan, the consumers have no freezers, and electricity supplies are irregular in most of the country. Frozen fish requires a significant investment in ice machines, freezing units, cold stores and refrigerated transport which does not now exist.

Value added products, beyond gilled and gutted whole fish, require a processing industry and cold chain far more sophisticated than anything that is currently installed in the country.

For the next few years South Sudan will be unable to export fish to lucrative markets in the USA, EU or Middle East. There is no Competent Authority (CA) to regulate and oversee such exports, and it will take years to setup the necessary inspection and certification systems. Trained staff are insufficient also. HACCP[585] is not applied currently in any fisheries establishment. It is not clear that the investment required to make high grade exports of this sort possible would be desirable in the short term, given the other pressing problems in the industry, and the large local and regional demand for fish. Exporting fish can also have serious negative consequences for local consumers, as has occurred in Uganda with the Nile Perch export industry on Lake Victoria. Export will remain a long term objective for fisheries, particularly if large scale aquaculture takes off.

13.7 Services

13.7.1 Development partners

A large number of Development Partners (DPs), NGOs and agencies make inputs to fisheries development in South Sudan. The largest are probably FAO, the EU and USAID, who both support programmes implemented by NGOs and MARF, as well by the States.

Among the numerous programmes and institutions supported by USAID are Padak Training Centre; the USAID South Sudan Transition Conflict Mitigation project (SSTCM) through fisheries by AECOM International in Nasser (UNS) and Akobo (Jonglei State) and in a fishery program in Panyijiar County (Jonglei State) in 2013 through a local NGO; and the establishment of fish ponds and support to fish farmers in CES and WES, again through NGOs. Most of these inputs to fisheries are justified as livelihood orientated or conflict mitigation; not just fisheries.

FAO has made a series of inputs to fisheries and in 2009 undertook a survey of several areas of the country to map fishing activity and survey fishing villages.[586]FAO has also funded some training courses, notably on boatbuilding, post-harvest and fishing gears (mostly though NGOs & other DPs), provided money for fishing gears for distribution and undertaken some studies and workshops, notably on post-harvest losses through the Smartfish programme, which aims to improve regional counties capacities to implement fisheries management and food security plans.

The Agriculture and Food Information System (AFIS) is a three year project (2013-2015) implemented by FAO and funded by the European Union, which will support the institutionalization of robust food security information systems at both the national and state levels in South Sudan; this should lead to better statistics on the fishery in the country.

FAO is also working with South Sudan and other countries in the region to build a more competitive and efficient fish trade in the region through a regional project in partnership with

[585] Hazard analysis and critical control points, is a systematic preventive approach to food safety

[586] GRSS 2011 *Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA). Technical Assistance on Fisheries Assessment.* Report prepared for the Government of South Sudan by The Food and Agriculture Organization of the United Nations, Juba 2011.

the Intergovernmental Authority for Development (IGAD).A report[587] on fish marketing in South Sudan was produced in 2012, as part of this project. FAO also provided 20,000 pieces of fishing gear to residents of Boma and two other towns affected by the outbreak of conflict in Pibor and Likuangole in Jonglei State in December 2011. FAO has also made some progress in aquaculture in WES. The Country Framework Programme 2013-2017 which is being implemented, will provide a secure basis for future cooperation between MARF and FAO.

The EU, through the SPCRP, funded the Fisheries Production and Marketing Project (FPMP), implemented by GIZ. It was one of three model projects in the SPCRP programme from 2009 through September 2012. The FPMP project was implemented in Central Equatoria, Lakes and Unity States and focused on capacity building for fisherfolk and government fisheries staff, construction of infrastructure and fish marketing for fisheries development. There were problems with the implementation of the project, but despite all the problems a significant amount was actually done.[588]Some fisheries officers received training under the project. Various NGOs have been supported in aquaculture in WES and CES. The ACP Fish II project has implemented three short term projects in South Sudan in 2012 and 2013, a project to help DoFAD write a Fisheries Policy, a mission to look at constraints facing SMEs in Fisheries, and a training programme on Socioeconomic Analysis and Monitoring in Fisheries. ACP Fish II is also, though a regional project, looking at Commercial Aquaculture opportunities in South Sudan. EU contributes greatly through its wide ranging programmes to other aspects of fisheries.

JICA Egypt has been implementing a Third Country Training Program (TCTP) in Egypt since March 1985.Several South Sudanese have benefited from this training which in this case has been in Warm Water Fish Production in Egypt, the most recent in 2012.

The Netherlands has a fellowship programme in conjunction with the University of Wageningen to which a fisheries officer is sent in most years. One went in 2012 and one is going in 2013.

Other DPs also make contributions to fisheries development, such as WFP, who are promulgating fish farming in WBGS as a livelihood and food security option; Oxfam conducted fisheries training in Malakal as a livelihood improvement tool. CAMP is funded by JICA, and IDMP, a subprogramme of CAMP, will also benefit fisheries in the long term. SNV, a Dutch NGO, has also developed the Producing for Urban Market Projec (PUMP) project in CES at Terekeka, concentrating on marketing fish to Juba. This is funded by the EU. Many of these smaller inputs by donors and NGOs, particularly local distribution of gears[589], may not even get reported to DoFAD in MARF, so details remain very hazy.

13.7.2 Educational establishments

Apart from Padak Fisheries Training Centre in Bor there are several other institutions that host courses related to fisheries.

Degree courses are offered in fisheries at the Faculty of Animal Production, Upper Nile University in Malakal. In 2012 activities at the university were severely curtailed due to a shortage of money, and some student unrest, but the University is now operating normally

[587] FAO (2012) *Country Report Juba, South Sudan.* Regional Trade on Fish and Fish Products Project TCP/RAF/3308

[588] SPCRP. 2012. *Fisheries Production and Marketing Report. Final technical and financial report. 29 March 2008 – 28 September 2012* Fisheries Production and Marketing Project STABEX-SPCRP 02 Livestock/03 Irrigation/04 Fisheries. Programme Coordination Office Juba. September 2012

[589] a favourite amongst donors, as it is cheap and easy, though completely un-necessary in most cases, since gear can be bought in any major town in South Sudan.

again. Courses used to be taught in Arabic but since separation English has become the main language of tuition. Many of the government fisheries officers at MARF and in the states attended Upper Nile University. The course is a generalised fisheries course, the first two years being generalised "animal production" with options for the second two years, one being fisheries. This course has recently been extended to 5 years. The course is mostly classroom based with limited field work. Numbers graduating from the fisheries course vary from year to year. The University of Juba, now fully based in Juba, has a Faculty of Fisheries which offers undergraduate and postgraduate courses in fisheries. The job opportunities available to graduates are limited, and few remain within the sector.

Generally, staff of DoFAD continues to look to Europe and the US, or even regional universities for post graduate education, and the major problem is funding, since few donors will cover the full costs of such long term education.

13.7.3 Private sector

The private sector provides supplies to the fishing industry. This includes ice from the ice factories in Juba (five ice factories exist in Juba, one inoperative, with a capacity of more than 60 tonnes/day)[590] and Malakal (one small ice factory), appropriate fishing gears which are available throughout the country[591], and transport and marketing for the catch, both fresh and dried. Outboard motors, transport, ice boxes, fishing gear and fuel are also provided by the private sector and are essential for the industry.

All of these are provided without any support from the government, and indeed through the ubiquitous informal and formal taxation systems, the governments' influence is more malign that benevolent.

13.7.4 Formal credit institutions

Banks and savings institutions worldwide generally avoid fisheries due to a perceived high risk and lack of knowledge of the industry.

The CAMP household survey did not find any fishing household with a bank account, and none had managed to obtain a loan from a formal credit institution.

Apparently some funds have been raised for larger scale investment in fisheries by non-South Sudanese investors, but the details of either the schemes or the funding are difficult to obtain, and in at least one case the funds were raised from outside the country. There is little evidence on the ground of these schemes.

Traders operating into South Sudan, such as those providing fresh fish on ice from Uganda, raise investment funds in their home country from formal credit institutions to fund investments like the insulated vehicles that they use.

13.7.5 Informal credit services

Nearly every settled fishing household in South Sudan has access to informal credit. If money needs to be raised then it can be, through loans from other members of the family, from savings or the sale of assets (usually livestock) owned by the family.

The CAMP survey of fishing households found that 79% of the fishing households stated that they had access to funds if needed, usually from relatives, savings or the sale of

[590] See Fisheries appendix 8, which describes the working ice factories in Juba.
[591] See Fisheries appendix 2

livestock.[592]. These figures are very similar to other surveys, such as the GIZ project in the Terekeka area of CES in 2012, and the FAO frame survey of 2009.

13.8 Infrastructure

Modern infrastructure specifically for fisheries production and marketing does not exist in South Sudan, with extremely rare exceptions. Fisheries tends to rely on infrastructure provided for other sectors and activities, such as roads, jetties and wharves all of which have other applications and users. There is no permanent "fisheries wharf" or jetty in the country, though decent wharves exist at Shambe (Lakes State) and Juba from which fishers and fish traders are excluded. Fishermen and traders land to landing sites on the banks of the river or in creeks close to it. The absence of decent landing stages, not only for fisheries, points to serious underinvestment in infrastructure in the past.

The GIZ implemented SPCRP constructed three fisheries extension centres in Terekeka, CES; Nyal, Lakes State; and Liap/Adok, Unity State. Additionally offices, accommodation and kitchen/dining hall were fully furnished. In 2013, these are nbow primarily used for accommodation and occasional workshops and training courses. A floating landing stage is installed in Terekeka. An improved fish market was also built by SPCRP at Terekeka; to which an ice machine was supposed to be installed, but this has not happened, though the ice machine has been delivered. A gear shop (bush shop) was also built but has already fallen into disrepair. Additionally a fish processing area was constructed but is not operating.

Ice machines are run and managed by the private sector in Malakal (UNS), and in Juba. The ice is very expensive and this limits its use in fisheries. Ice is taken from Juba to Bor by boat for the preservation of fish destined for Juba, and similarly to Terekeka. Ice is taken from Khartoum to Nasser, Ulang, Shambe, Bor and Adok when the export of iced fish to Khartoum is allowed. There are no chill stores for the storage of fish stored on ice, except in Bor, where there is no power supply to run it. Chilled fish is kept in insulated boxes, though most of these are old domestic freezers, unsuitable to the task. Fish coming from Uganda by refrigerated lorry comes with its own ice, and is stored in old domestic freezers.

There is (except for high class supermarkets in large towns) no trade in frozen fisheries products, so there is no cold store devoted to fisheries in the country. It will be some time before such installations will be necessary, since development efforts in the short term should concentrate on chilled fresh product, and improvements to traditional dried and smoked fish production and marketing. In the case of markets, segregated fish markets exist in nearly all towns and cities in South Sudan, but the facilities are basic, unhygienic, and need to be bought up to modern standards. The majority of stalls are just wooden and bamboo structures covered with a basic tin roof. No ice is used and surfaces cannot be cleaned. There is no hygienic waste disposal. In many markets fish products are displayed on the ground. Most markets are open to the elements, with earthen floors. In some of the major towns, and in Terekeka in CES, better markets have been constructed.

Fisheries has continued to expand over the years without any dedicated infrastructure. This has been because of the inherent robustness of most of the products of the sector that do not need much public infrastructure, dried and smoked fish. Dried and smoked fish are stable food products, and thus can tolerate poor transport, rough handling and inadequate storage without catastrophic losses. As the industry develops, and the demand for, and

[592] Full details of the results of the Household Survey are in Fisheries appendix 9. See also: GRSS 2011 *Sudan Institutional Capacity Programme: Food Security Information for Action (SIFSIA). Technical Assistance on Fisheries Assessment.* Report prepared for the Government of South Sudan by The Food and Agriculture Organization of the United Nations, Juba 2011, which has detailed frame survey results from selected areas of South Sudan.

supply of fresh chilled products increases, the needs for dedicated infrastructure, such as ice machines, wharves and jetties, chill stores and chill transport vehicles will increase. Improved shared infrastructure, paved roads and bridges, electricity supplies, reticulated "WHO quality" water and municipal markets will also be necessary to realise the subsectors' potential. This of course still lies in the future.

13.9 Important cross cutting issues

13.9.1 HIV and AIDS

Fishermen and workers in fisheries related industries are far more likely that the general population to be affected by HIV. This is mostly related to mobility, making fishing communities and freight transporters more vulnerable to infection with HIV. The results of HIV infections are devastating. Fishing households in which one or more people are affected by AIDS have reduced income, spend their savings on medical care, sell their productive assets (such as fishing equipment and cows) and withdraw their children from school. Their poverty deepens, their food security decreases and their general vulnerability increases.

Box 13-6: Case study - AIDS Lake Victoria

"Fishermen are five time more likely to die of AIDS-related illness than farmers in the Lake Victoria region, where seroprevalence rates in lakeshore towns and villages in Kenya, Tanzania and Uganda are thought to have reached levels as high as 30-70% during the late 1990s."
FAO (Undated) *Impact of HIV/AIDS on Fishing Communities. Policies to support Livelihoods, Rural Development and Public Health.* DFID/FAO Sustainable Fisheries Livelihoods Programme (http://www.sflp.org)

It is not only the fishing communities that are affected: as in fisheries departments, firms, and agencies, HIV may reduce management capacity, decrease productivity and efficiency, and divert fishery development resources into HIV prevention and AIDS mitigation efforts. The overall impacts are likely to result in increased incidence of poverty and a reduced likelihood of sustainable exploitation of resources. Recent data for South Sudan[593] indicates that the rate of infection (based on antenatal care reports) is only 2.6%.The infection rate is 6,000 every year with 153,000 people living with HIV in South Sudan. This is acknowledged as an underestimate. The most affected states are WES 6.8%, EES 3.9% and CES 3.8%. In northern states the rate of infection is much lower.

Current prevention programmes are:

- HIV and AIDS awareness in companies with large workforces, such as UNMISS, who concentrate mainly on their own staff, particularly peacekeeping forces, and are very active in this area.
- Through UNMISS targeting ex-soldiers going through the Disarmament, Demobilization and Reintegration (DDR) process.
- General counseling and testing.
- Distribution and education on the use of condoms.
- Targeting truck drivers in border areas (an NGO is assisting).
- Focusing on sex workers in Juba.[594] On a day to day basis 2,600 girls are trading sex but on Friday and Saturday numbers can reach 3,500 per night.

There is no specific data on HIV or AIDS in fishing communities nor in the fisheries administration of GRSS or the SMARFs. The only guidance for fisheries is the example of

[593] Provided to CAMP by the National Aids Council, Juba 2013.Note that the "New Nation" newspaper in its 25-28th 2012 edition in article quote the NAC as saying that the number of people living with HIV and AIDS in South Sudan as 300,000.
[594] According to" The Citizen" newspaper in early 2012, 12,000 sex workers have come to Juba from Uganda and Kenya.

what has happened in neighbouring countries in the past. This is not reassuring. In South Sudan there is also a worrying trend of alcohol becoming available to fishing camps, and particularly where those camps are made up of men away from their families, risk taking behaviour can be widespread.

The CAMP team has found that within GRSS MARF and SMARFs there is widespread ignorance of HIV. Additionally CAMP fisheries subsector household survey data, where fishing households were questioned on HIV awareness, showed that the majority of fishing households (more than 90%) had not received any visits from health care professionals related to HIV or AIDS, though more were aware of the disease but had no specific knowledge about it. Padak Training Centre courses for fishermen do not include any specific advice on HIV. This is a very unsatisfactory state of affairs and bodes ill for the future of the fishing industry in South Sudan. GRSS MARF and the SMARFs should cooperate with all concerned government, NGO and DP agencies on HIV and AIDS and mitigation measures should be included in all development activities undertaken by any agency, and within the government itself. GRSS MARF is currently incapable of implementing strategies on its own due to lack of financial resources and insufficient skills amongst the staff.

13.9.2 Gender and child labour in fisheries in South Sudan

Within South Sudan there is wide variation between tribal groups that defines the roles of men, women and children in fisheries. Generally men do most of the fishing except those using methods that can be done by women accompanied by children. Men thus go out in boats using gill nets and long lines, use spears and cast nets. Women use cover pots, collect by hand and use traps, often in groups. Male children use small imitations of the adult gear, and also use pole and line as a recreational and food gathering activity after school (or instead of school). Female children accompany their mothers and assist as far as they can in any fishing operations.

Marketing of the fresh catch is generally done by the fisherman himself, either directly from the landing place or he may travel to a central landing place where buyers come to purchase the catch. What is required for the family pot is retained. Women, who fish on the other hand, tend to retain the catch for home consumption, and only if there is a large catch above what can be consumed by the family group is it sold. Children who fish almost invariably take the catch home for consumption. Many women are involved in the sale of fresh fish (not in Juba) and in many markets are involved in the sale of processed fish.

In areas of large catches where there is often a surplus the catch may be dried or smoked. In both cases the majority of the work is carried out by men,[595] though in times of great surplus, women may also help, and children too. It is often said that the women do the processing in fishing camps, but in many camps women are absent, and even when women are present it is often the men and male children who do the processing. Once again the traditions and customs of the main tribal groups and sub-groups vary. There is no obvious reason why DPs or the government should attempt to overturn the traditional roles of men and women in fishing communities.

Although children of both sexes assist at all stages in fishing, processing and marketing of fish this cannot be described as exploitative. Children generally go to school in areas where there are schools, and fishing communities are staunch supporters of child education, making every effort to ensure that their progeny get as good an education as possible. The CAMP household survey[596] showed that for fishing households, their children's education

[595] Camp Fisheries subsector survey work 1n 2013 showed that in 60% of households men only do the processing, in 18% of households men and women do the processing and in 18% of households women only did the processing. See survey results in Fisheries appendix 9.

[596] See Fisheries appendix 9

was one of the priority items of expenditure of income generated by fishing. In this way fishing households in South Sudan are similar to nearly all family groups worldwide. It is also natural that children should accompany their elders when fishing[597] if they have nothing else to do or no school to go to: in some cases this is the only education the child will get.

Child labour is thus not currently a problem in fisheries in South Sudan.

13.9.3 Security

Poor security is locally a problem, though generally this is a feature of a traditional form of insecurity, cattle raiding, which is a large problem in many areas, notably in Jonglei State, but it also occurs in other places. The use of automatic weapons makes cattle raiding a very dangerous activity.

There are occasionally conflicts between neighbouring tribal groups on fishing rights, in that a resident group will not allow interlopers to fish in "their" area. These are generally settled without bloodshed, through negotiation. It demonstrates a strong sense of ownership of the fisheries resources by the users of those resources.

From a fisheries point of view this form of insecurity is not something that can be tackled easily, except by providing livelihood alternatives to cattle raiding which make it not desirable for young people to go cattle raiding as they can earn a decent living from fishing, and not risk injury or death cattle raiding. This is the approach used by AECOM in their efforts to improve security in UNS and Jonglei/Akobo, with reported success in the limited area where it has been tried. Unfortunately cattle raiding is very traditional, and there is also long group memory amongst the cattle owning peoples, which stretches back generations. As a result past cattle raiding activities cannot be easily forgotten or forgiven, and reprisals can occur long after the original incidents.

Since the CPA in 2005 there have been increasing reports of banditry, particularly along roads, and particularly against vehicular traffic. Dacoits and miscreants rob travellers of their possessions and steal vehicles and cargo. Although this affects fish movements it is no greater problem for fisheries than it is for other sectors that rely on the arterial roads for transport of goods.

13.9.4 Taxation

All traders and transport operators complain of taxation. Whilst import taxes at border posts is an accepted part of life, and indeed the tax rate for importing fish to South Sudan is negligible, at 2%, and easily reduced by bribes, the level of informal taxation is extremely onerous and greatly resented. This became apparent during interviews by the CAMP fisheries subsector team during the situation analysis wherever fishing households or traders were questioned about marketing fish. Margins on fish trading around are slim, and the imposition of these taxes is a great disincentive to business in any form, and particularly fisheries, where the fish may have to travel many kilometres to reach markets, and be taxed time and time again. It also has the effect of greatly increasing the cost of the product paid by the consumer.

Box 13-7: Case study of informal taxation

Informal Taxation. Terekeka. (July 2013). A trader using a motorbike moving smoked fish from Terekeka to Juba Town pays 200 SSP total in informal taxes to three sets of officials on each trip. This is about 10% of the final price the consumer pays.

[597] Children's or adolescents' participation in work that does not affect their health and personal development or interfere with their education is generally regarded as being something positive.

Of great concern is that many of the taxes raised do not get deposited with the revenue office in the appropriate county or state. In one state visited by the CAMP fisheries subsector team, the revenues deposited did not cover the collectors' salary, though the monthly revenues raised through the taxation paid by one individual fish trader alone [598] are greater than the amount deposited annually in the revenue collection office. One can surmise therefore that very large amounts are going missing. Some payments made by fish transporters and traders are never intended to be, nor are disguised as, government revenue activities, being straight bribes to government officials, police or security officers. For fisheries to thrive this "taxation", little better than banditry, will have to be stopped.

13.9.5 Transport and fisheries

The CAMP fisheries subsector team's visits, surveys and data collection activities revealed that transport problems are one of the most complained about issues in fisheries today in South Sudan.

The complaints cover:

- Bad roads
- Expensive fuel
- Formal and informal taxation on transport - multiple checkpoints etc.
- Security on roads

This leads to expensive road and river transport. Since transport affects the price of everything in South Sudan, the price of transport ultimately affects the price the consumer has to pay.

13.9.6 Private investment

Government investment has not generally been successful in fisheries in South Sudan. The private sector, on the other hand, has made significant funds available to develop fisheries, and is the backbone of the industry; as it should be.

Private investment into fishing is significant. Every fisher has made a personal investment in gear, sometimes a boat, and other equipment for fish processing, storage and sometimes in transport. There is also a significant on-going contribution in labour which is uncosted. Larger operations, such as those moving iced fresh fish from Bor to Juba have made significant investments, which include the ice boxes (and the vessels to transport the insulated boxes). Additionally the cash investment in stock and ice is significant, since the fish is generally bought for cash (though occasionally on credit in hard times).This can add up to a significant sum.

The investment in stock of both dried and smoked fish is immense. Similarly the trade in UNS, Jonglei, Lakes and Unity State, northwards to Khartoum has involved a lot of investment, both in Sudan and in South Sudan. The more than 30 chilled and insulated vehicles used in the trade, together with the 15 motorised vessels is a considerable investment, and the ice machines in Khartoum, where the ice is sourced for the trade, are also expensive. Ugandans have made investments, some with loans from Ugandan financial institutions, in trucks and stock to transport fresh fish to Juba by road in insulated vehicles. In Juba, other Ugandans in the "Uganda" market have made investments in old freezers and basic equipment.

Service industries to fisheries are also investors. The ice machines in Juba and Malakal are extremely expensive to buy, maintain and run (ice is a huge user of electricity or diesel). The ice machines also serve the rest of the community, mainly for the chilling of drinks, in a

[598] interviewed by CAMP fisheries subsector team

society with irregular or absent electricity supplies. Similarly fishing gear and outboard engine suppliers have large stocks of gear available to the public. It is very difficult to put a figure on the private investment in fisheries in South Sudan, due to it being so spread out geographically and amongst so many fishermen, gear suppliers, processors and fish traders. Little of it is raised by formal credit means through local financial institutions; as it is not accurately recorded, there are no formal records. The continuing insufficient utilities, land tenure problems, shortage of local skills, poor transport links and insecurity are not conducive to future large scale investment in aquaculture or fisheries.

13.9.7 Public investment

Public investment in fisheries is very low, and fortunately so, since the development of fisheries production is not really an appropriate use of public funds. When public money has been diverted to fisheries it has not been successful. A shining example of the futility of a state government attempting to enter the fishing business is the fish barge in Jonglei State, which is not a good intervention, and has failed so far to produce any significant return on investment.

Fresh fish markets in towns have benefited from improvements in many places; generally these have been justified on public health grounds .GIZ built a very fine market in Terekeka in 2011.Most fish markets in the country are still in a lamentable condition; commensurate with the absence of funding available to improve them. Modern wharves have been constructed in South Sudan along the river Nile, notably in Juba and Shambe. Fishermen are banned from using them. Recently the dried fish market in Juba was evicted from the wharf area, with no substitute site being provided.

Padak Training Centre, supported now mainly by USAID, FAO and NGOs, and originally funded by DFID, is the sole training institution dedicated to fisheries, and is not functioning well, due to shortage of funds. The costs of establishing, maintaining, renovating and running Padak are unknown. GRSS MARF has a proposal for a parastatal company SUDAFISH, but to date no funding has been forthcoming to establish it. This is not an appropriate proposal, since the government is not the right organisation to invest directly in the fish trade. Governments' job should be limited to management of the resources and regulation and oversight of the private sector.

14. Key issues and challenges in the agriculture sector

As introduced in Section 1.5.1, the objectives of the situation analysis are: 1) to understand the past and present status, issues and opportunities of agricultural service delivery, 2) to understand the past and present status, issues and opportunities of the agriculture sector; 3) to analyse the mechanisms and processes of agricultural transformation; and 4) to identify information useful to estimate the expected impact of public service delivery. These objectives are set to answer the questions of i) how CAMP can be integrated into the government system, ii) how a devolved CAMP implementation mechanism can be designed, and iii) how changes in the behaviour of beneficiaries such as producers, traders and investors can be promoted. This Progress Report mainly covers the first and second objectives, describing the current situation and issues identified of service delivery and the agriculture sector. Accordingly, preliminary conclusions presented in this section are mainly concerned with these two objectives. Tasks to achieve the third and fourth objectives are still in progress and conclusions will be presented in the Interim Report.

14.1 Agricultural service delivery: private sector-led development

High-level development strategy and sector policies are already in place in South Sudan. However, the subsector policies, laws and regulations necessary to guide day-to-day public service delivery are still in the early stage of development. The overall development vision, development goals and strategy of South Sudan are articulated in the South Sudan Development Plan (SSDP) and its successor, the South Sudan Development Initiative (SSDI). The Agriculture Sector Policy Framework 2012-2017 provides overall policy guidance to the then MAFCRD, and the Policy Framework and Strategic Plans 2012-2016 defines the principles of service delivery by the then MARF. None of the subsector policies have been approved by the National Legislative Assembly (NLA).

The current legal frameworks of the agriculture sector are in urgent need of revision or establishment of new laws. No new laws and regulations have been established since independence and laws regarding crops, livestock, forestry and fisheries subsectors are lacking. The "laws" currently applied are those of the Sudan and were enacted many years ago. They are out of date and some parts of them are inconsistent with the Transitional Constitution. For example, the old fisheries law does not acknowledge the rights of users of resources to manage them. These laws are still used by the GRSS, state governments and local governments since there are no other laws to rely on. When it comes to legal disputes, the courts usually do not recognise the old laws. Similarly, there are no regulations established after independence. The early stage of development of a modern legal system is a constraining factor, but customary laws, as part of the legal system of South Sudan, should be adopted as conflict mitigation mechanisms and applied wisely to accelerate CAMP implementation.

Public sector human and financial resources, infrastructure and instruments for service delivery are very limited compared to the huge demand for public services. It is arguable that the government is able to mobilise oil revenues for the development of the country once the oil production is resumed. However, the situation analysis has revealed symptoms of the Dutch disease (negative consequences arising from large increases in a country's revenue from natural resources) throughout the country, suggesting a need for the prudent use of oil resources and strict economic management. State and local governments are seriously constrained by very small budget allocations for operating costs and investment, and weak institutional and human capacity. In addition, inappropriate devolution of power to levy taxes and fees, nepotism, inadequate exercise of political and administrative powers, and other institutional problems seriously hamper effective and efficient service delivery. Evidence

from other countries indicates that a government can deliver services, even with scarce resources, if it functions in a transparent and accountable manner.

There are also a number of issues external to the agricultural sector but that shape it. The government's overdependence on oil revenues leads to fiscal uncertainty and inefficiency in public services which are already expensive with respect to their impacts. Poorly developed roads and public utilities, such as electricity, transport and water supply, hinder the development of the sector. However, telecommunications are rapidly expanding among urban and rural populations, and there is an opportunity to utilise them for service delivery.

The formulation and implementation of CAMP should be guided by the principle of small government and private sector- and market-led agricultural development. CAMP formulation is a challenging task because the above issues are all real; ways to mitigate them must be designed in a practical manner. To realise effective and efficient service delivery under the existing constraints, it is essential for the government to recognise and support the efforts of the private sector.

14.2 Understanding the behaviour of the market and the private sector

To design and construct mechanisms to deliver agriculture services which could encourage private sector- and market-led development with minimum public sector resources, an in-depth understanding of the behaviour of farmers, traders and agro-industries is needed. Therefore, the situation analysis was conducted to answer the question how changes in the behaviour of beneficiaries could be promoted. Case studies and data analyses were conducted to see the effect of various public interventions, such as taxation and fee collection, goods and monetary transfer, investment and inputs support, and DP-supported emergency measures, programmes and projects. In this section the important findings relevant to the option of private sector- and market-led development are summarised. Detailed issues and challenges facing the private sector are presented in Section 13.3, and more detailed reports of these issues and challenges can be found in the preceding chapters.

The development of markets for agriculture, livestock, forestry and fisheries products and their value chains is constrained by poor road conditions, very limited support services, and stiff competition with imported goods from neighbouring countries. However, the situation analysis has also revealed the existence of vibrant rural-to-rural and rural-to-urban market economies. For example, a large part of sorghum consumption is met by supply from local markets, even in the areas where sorghum is grown as the main crop. Rural populations, particularly those in the Eastern and Western Flood Planes and Pastoral livelihood zones, are vulnerable to erratic climatic conditions, but their coping mechanisms are well-developed and incorporate crop, livestock, forestry and fisheries production in an efficient fashion. Farmers relying on one type of livelihood are rare, and most of them combine various means of agricultural production and off-farm employment to limit the risks of food insecurity.

While vibrant private sector activities need to be nurtured, the situation analysis has revealed that uncontrolled and unregulated production and marketing hamper the development of a fair, competitive and efficient market. The uncontrolled and unsustainable harvest of logs depletes forest resources quickly; and if market demand for fish increases, overfishing is likely to exhaust the wild stock rapidly. Consumer health can suffer from inappropriate agricultural chemical use and slaughterhouse management. Sanitary and phytosanitary issues, for which private sector players are responsible, are also reported.

Many market players, including producers, traders, wholesalers and retailers, perceive that taxes and fees collected either enrich the people who collect them, or become part of government revenues; no services are provided in return for their payments. On the other hand, government officials perceive that private sector activities promote corrupt practices

and deprive subsistence farmers, artisans and consumers of their scarce resources. The lack of trust between the public and private sector players is a serious problem hindering productive synergy. Since the relationship between the public and private sectors can be reciprocal, a change in behaviour is required of both public and private sector actors.

14.3 Crosscutting and subsector issues and challenges

14.3.1 Crosscutting issues and challenges

(1) Access to land: Access to land and land use is a key factor of agricultural development, but land rights are not secured for many people in South Sudan, particularly for returnees, Internally Displaced Persons (IDPs) and women. Procedures for large-scale land acquisition have not been clarified nor properly followed. The absence of an audit and monitoring system reduces transparency and accountability in statutory land administration. As a result of decades of civil war, customary laws were weakened and are not effective in securing equal land rights for every community member.

(2) Food security: The food security situation has deteriorated in recent years due to a large number of returnees, refugees from Sudan and IDPs, natural population growth, a reduced harvest (in 2011) and food price inflation caused by greater demand and tight foreign reserves following the oil shutdown. The GRSS and DPs have been providing food assistance to vulnerable groups, and it could be necessary to continue such services for some time. The impact of food assistance should be examined within the context of long-term agricultural development in terms of linkages with markets and behaviour changes of food aid recipients.

(3) Coping mechanisms: The diet becomes insufficient and less nutritious during the pre-harvest period, especially in dry lands. Household food security in the country traditionally depends on a complex system of food production, livestock, seasonal migration, informal trade, fishing and the collection of wild fruits, which was severely disrupted by the war. Activities to cope with this seasonal food scarcity might include selling livestock, charcoal and other homemade products and providing labour for cash or food. Introducing an appropriate number of livestock would be particularly helpful since they are more drought-resilient than crops and can supply food as well.

(4) Support to returnees and IDPs: The influx of over two million returnees and IDPs since the signing of the CPA has placed pressure on communities across the country and has increased competition over scarce resources and worsened living conditions among vulnerable groups. The agricultural production of returnees and IDPs is considerably smaller than that of non-returnee farmers. More systematic support regarding access to land, farming and other income generating activities is needed to facilitate the reintegration process and thus to ensure their long term economic independence.

(5) Gender equality: There are significant gender disparities in ownership of land and other property, education, health and human rights protection. Since women play important roles in agricultural production and marketing, it is essential to improve their living and work environment and enhance their capacity for agricultural development. Equal land rights should be given to women by strengthening land administration and accelerating implementation of the land laws. Support to female-headed households, who are among the poorest, is urgently required.

(6) Security: The legacy of insecurity and violence significantly undermines steady development of the agricultural sector. Further disarmament is expected to reduce armed incidents, mitigate conflict damage and contribute to agricultural development, as

demonstrated in the attempts by the GRSS and DPs. Since conflicts over scarce resources tend to occur during the dry season, a drought management system could be established as a conflict mitigating measure.

14.3.1.1 Institutional development

(1) Institutional and human capacity building: Public sector capacity for administration and financial management is weak, particularly at the state and local levels. Inadequate professional knowledge and skills and poor coordination between the GRSS and the state governments hinder performance at all levels. Low governance, accountability and transparency are reported throughout the system. Many of the issues identified by the four subsectors are also directly or indirectly linked to the weak public sector capacity for service delivery. Capacity development should be an integral part of CAMP for its effective and efficient implementation.

(2) Funding: Inadequate funds for operating costs and capital investment, together with limited institutional capacity, severely affect public investment and service delivery, especially at the lower levels of government. It would be necessary to secure external funds for CAMP implementation, through project support, earmarked funding, pooled funding or budget support. Whatever the funding modality may be, the ministries concerned at the national and state levels would be required to follow properly prescribed procedures for budget execution, control and monitoring. This also implies a need to strengthen their management capacity.

(3) Service delivery: Public services are not effectively and efficiently delivered to target groups with respect to location, timing, size and content. Among these, timeliness is critical to agricultural support services because of the seasonality of production activities. The government relied heavily on NGOs for service delivery and failed to establish sound service delivery systems during the CPA period. It is vital to design a simple but effective system for agricultural service delivery through the CAMP formulation and deliver it in CAMP implementation.

14.3.2 Subsector-wise issues and challenges

14.3.2.1 Crops

(1) Agricultural production: The gross cereal yield has stagnated at a low level since 2009, approximately from 0.8 t/ha to less than 1.0 t/ha due to rain-fed farming, use of traditional varieties, low quality seeds, limited inputs (e.g., fertilisers and agro-chemicals) and damage by pests and diseases. Likewise, cereal area harvested per capita is small, about 0.1 ha, since 2009 because land reclamation, ploughing, seeding, weeding, harvesting, and postharvest handling are mainly done manually by family labour. These two aspects (i.e. yield and area harvested per capita) have lead to serious food insecurity in 2013. The estimated cereal deficit in 2013 is approximately 370,000 tons, which could be filled by food aid and cereal imports. Even farm households face food insecurity. Due to favourable rainfall, temperature and soil conditions, some areas are suitable for cash crop production (e.g., vegetables, fruits, tea, coffee and oil seeds); however, this potential is not fully exploited.

(2) Costs of production: Compared to neighbouring countries, labour costs are high due to a strong South Sudanese currency affected by oil exports. Prices of agricultural inputs are relatively high since they are imported. South Sudan is a landlocked country so import costs tend to be higher. Domestic transport costs are high due to poor road conditions and high fuel prices. Higher costs of production reduce agricultural competitiveness in international markets. A large volume of agricultural products is formally and informally imported from neighbouring countries such as Uganda, Kenya, Ethiopia and Sudan.

(3) Infrastructure: Interstate and primary road networks are not well maintained; some areas are inaccessible during the rainy season. This makes transportation costs high. Since the condition of feeder roads is very poor, collection of products from production areas is difficult and expensive. Only a limited number of farmers own irrigation facilities, although large parts of the country have substantial water resources. Large and medium scale warehouses for storing and shipping cereals and drying yards for postharvest activities are not developed. Public electric services are not provided in rural areas, and only minimally in urban areas, so most businesses are using generators for electricity, which makes electricity expensive.

(4) Security: Due to insecurity some farmers fail to cultivate crops. When farmers escape from inter-communal or tribal conflicts and become IDPs, they can lose the opportunity to cultivate crops, which causes serious food insecurity in rural areas. Livestock accompanied by armed pastoralists often destroys farmers' crops. Fencing is an effective preventive measure, but it requires a large investment, which most farmers cannot afford.

(5) Service delivery to farmers: Both national and state governments are delivering very limited services to farmers. Agricultural Extension Officers (AEOs) are deployed at the payam level, but their number remains negligible. Therefore, farmers rarely get access to improved technical knowledge and skills. NGOs provide some technical services (e.g., training and extension), but the number of beneficiaries is limited. Public agricultural research institutes exist, but they rarely carry out research activities due to the lack of institutional, human and financial capacity. Thus, new technologies for crop production are little developed. Similarly, information and technology dissemination for extension officers and farmers is almost non-existent. Even though some farmers in the northern-eastern part of the country face serious damage to their crops from migratory pests such as quela birds, the government cannot carry out pest control. Likewise, they take no preventive measures for cassava mosaic and brown streak diseases. Rural financial services are not available except for some initiatives by NGOs, though farmers need capital to start new operations.

(6) Farmer Organisations: Farmers lack the capacity to gather their harvest into a large volume for sale, so traders tend to purchase products in bulk from neighbouring countries. Active farmer organisations, such as cooperatives and Farmer Based Organisations (FBOs), are few.

(7) Environment for investment: Land acquisition processes are often influenced by local politics and traditional arrangements. The high uncertainty of land acquisition is a serious factor adversely affecting investors' decision to make investments in the agricultural sector. Legal and illegal multiple taxation hinders investment. Illegal taxes (i.e., bribes) make transaction costs high. In addition, tax rates are often changed without prior notice. Basic infrastructure (roads, electricity, irrigation, potable water, ports, etc.) is not well developed.

14.3.2.2 Livestock

(1) Policy, legal and strategic framework: There is a lack of a comprehensive sector policy framework and subsectoral policies and lead institutions for the development of livestock-related industries. Current strategic frameworks are more focused on public sector issues than on the needs of the subsector. There is need to review the existing acts and bills and to institute mechanisms for their enforcement. An unclear and incomplete legal, policy and regulatory framework for land tenure has resulted in inconsistencies in implementation, adversely affecting land for livestock production, migration, marketing and processing in both rural and urban areas.

(2) Conceptual framework: The sub-sector potential is poorly understood and articulated as a result of lack of reliable livestock population data which has undermined strategy development, planning, investment and coordination at all levels and across the stakeholders. Areas of comparative advantage at the state, national and regional levels have not been identified. Mutually beneficial linkages to the crop sector are not harnessed for an integrated approach.

(3) Institutional framework: Public sector institutions at the national and state levels do not have the necessary levels of staffing, in terms of number, qualification and capacity; neither do they have infrastructure and budgets to carry out their mandates. Coordination and communication within the public sector and with other stakeholders are poorly defined and resourced. Institutional arrangements to address natural resource issues are poorly developed; issues include water for production, rangeland management, drought and flooding, resource-based conflict, protection of key production and trade migration routes, and shared transboundary resources.

(4) Production and productivity: The subsector is dominated by subsistence producers who rely on indigenous breeds, knowledge and technologies and aim to produce for household consumption. There is scope for making initial substantial gains in filling the large production and productivity gaps and eliminating seasonality of production by using low-level technologies already in existence in the region and by organization of producers. There is also scope for diversifying both the species and production systems to utilise a broader range of resources and strategies.

(5) Animal health and food safety assurance: The prevalence of diseases due to the lack of facilities, human resources and investment impedes the delivery of animal health services. The impact of priority diseases is the largest on food security with losses in meat and milk production and related costs of treatment, amounting to hundreds of millions of USD. Hygiene standards for food of animal origin are inadequate and unenforceable due to lack of legal and regulatory frameworks, deterring private investment in meat and milk processing.

(6) Market development: Around 60-90% of livestock production is consumed within producing households, i.e., low integration into value chains. Domestic value chains are faced with stiff competition from regional and global actors and encumbered by high transaction costs due to poor transport infrastructure, conflict and insecurity, low product quality and poor sanitary and phytosantiary standards. Neighbouring countries might benefit from adding value to cheaper raw materials from South Sudan for their domestic markets or re-exporting to more lucrative markets.

(7) Taxation: Livestock and livestock products suffer from the multiple formal and informal taxes due to the lack of an integrated taxation framework with proper supervision on the ground. Production inputs such as day old chicks and feeds attract high taxes, which deters the growth of livestock inputs businesses and results in farmers and organisations purchasing them only on an ad hoc basis. Exports of hides and skins also attract high taxes.

(8) Investment: Public sector expenditure on the subsector is far below the stipulated Maputo Declaration allocation of 3% of the national budget, needed to improve food security, reduce poverty and stimulate economic growth. Development assistance to the subsector has been minimal and mostly short-term and/or emergency funding. Subsidies by NGOs and some government initiatives have a mixed effect on ownership, growth of business acumen and sustainability. Financing for the majority of sector value chain actors is not forthcoming, and they are unable to get access to innovative financing opportunities in the region.

(9) Training, research and extension: The four public universities offering training in animal production, animal health and veterinary sciences suffer from inadequate funding,

limited qualified staff and weak capacity for practical training, and are not linked to regional university consortiums. Only one institution offers short-term training and refresher courses for those who deliver services on the ground. There are no dedicated public livestock research facilities, with only minimal research being conducted by the universities. Without effective public extension services, farmers and other actors rely on NGOs, radio broadcasts, farmer-to-farmer exchange and the Internet for information, but the information is often not appropriate or complete.

(10) Security: Conflict and insecurity, including cattle raiding and rustling, disrupt livestock activities, resulting in loss of human lives and livestock, displacement of communities, inaccessibility to grazing and water resources and underutilisation of stock routes for production and marketing. In some counties, insecurity has reduced livestock populations and deprived people of their livelihoods; this has aggravated food insecurity and poverty.

14.3.2.3 Forestry

(1) Commercial forestry: While some agroforestry and small-scale plantations have been developed in the Greater Equatoria region, teak plantations and woodlots for sustainable production are not fully exploited. Traditional and micro- and small-scale enterprises oriented to marketing forest products and services dominate the subsector. Large-scale private investment can be found only in forest management under concession arrangements. A limited volume of a few specific products, i.e., teak timber and gum acacia, are exported to regional and global markets. This can be attributed to the lack of a legal framework, poor infrastructure, inadequate government technical and regulatory support and a speculative market environment. Further investment is necessary to explore market opportunities for other forest products and services.

(2) Community forestry and agroforestry: Although the concept of community forestry is defined in the Forest Policy 2013, the government does not have a legal framework consistent with varying customary laws and has insufficient expertise to deliver technical services for community forestry and agroforestry. The same issues arise with the collaborative management of Central Forest Reserves (CFRs) and other types of public forestry reserves involving forestry communities, private concessionaires, processors and traders. The legal framework and government expertise must be established to realise a community management regime.

(3) Conservation: The country has experienced rapid degradation of biodiversity resources due to the widespread illegal and uncontrolled exploitation of such resources. The current management of CFRs is extremely weak and its strengthening is urgently needed to avoid further uncontrolled exploitation of forest resources, and encroachment. The public sector is unable to implement conservation measures in an effective manner because of weak collaboration among authorities at the national and state levels to manage and conserve forest resources, and due to the inadequacy of legal frameworks, expertise and resources for communication and transportation.

(4) Institutional arrangements: A legal framework to clarify responsibilities and financial modalities of the national, state and local governments is under development. Coordination within the public sector is lacking, and low accountability, both upwards and downwards, is causing serious reporting and supervision problems. The viability of the South Sudan Forest Commission and Forest Development Consultative Forum, proposed in the Forest Policy 2013, in promoting private investment and decentralised forest management needs to be thoroughly analysed.

(5) Policy implementation: The government's delineation of responsibilities is inadequate for the implementation of the Forest Policy 2013. Key legal instruments such as the Forestry

Law, related acts and other legal instruments are not in place or only partially implemented. Completeness, fairness and efficiency of forest revenue collection are neither achieved nor can be achieved due to unrealistic administrative provisions with respect to the human and financial resources allocated. Impediments to forestry development include corrupt practices, distrust between the public and private sectors, poor coordination within the public sector and with the private sector and DPs, and insufficient fund allocation for human resource development, application of science and technology and knowledge creation activities.

14.3.2.4 Fisheries

These issues and challenges can be divided into two main areas, “management” and “production and marketing”. Generally, the former is the responsibility of the government at national and state levels, and the latter is the responsibility of the private sector, though of course under the control and oversight of the government.

(1) Management: For the government the key issue to be tackled is the lack of skills, coordination and finance within the administrations involved in fisheries. Currently most government bodies involved in fisheries are not sufficiently active, and do not contribute to the good management nor development of fisheries in South Sudan. Until this lack of capacity is addressed it will be difficult for the government to carry out its role, and implement necessary legal and regulatory obligations, as recognised in its own policies and strategies.

(2) Production and marketing: The private sector is quite capable of improving production and post harvest in fisheries by itself, without government assistance (but necessarily under government regulatory supervision). The private sector however faces several challenges, greatest amongst them being poor transport and communications, the high cost of energy and utilities and informal taxation. All of these could be alleviated by direct government interventions.

(3) Crosscutting issues: Major cross cutting issues, not only affecting fisheries, impact the whole sector, such as general health provision, education in fishing communities and poor security. As an example, the upcoming HIV epidemic is a hidden threat to fisheries and will hit the sector badly unless action is taken quickly.

Part 2: Situation Analysis 2015

15. Pests and diseases

The cultural and agro-ecological divide between the northern and southern provinces of the former Sudan led to a marked disparity in efforts devoted to understanding and overcoming the challenges posed to agricultural development by pests, diseases and weeds. From colonial times onwards very little research on pests and diseases took place in the former southern provinces of Sudan, other than some few records of plant diseases in the survey work of Tarr.[599,600] Most plant protection interest was focused on cotton and other cash crops in large irrigation schemes in the north, especially the Gezira. The main exception to this norm was the setting up by the UK Overseas Development Agency (now Department for International Development) of a Project Development Unit at Yei (Central Equatoria State) in 1982-86, which worked on pest problems as part of an applied crop research programme.

The only record of the pest management work carried out in Equatoria was summarized in 2005 by Robinson,[601] who reported 85 species or groups of related species of insects and other arthropods causing significant damage to crops. He also listed 45 plant pathogens or groups of related pathogens impacting 12 principal food crops. There is no similar information for plant parasitic nematodes, although in 1974 Yassin reported the occurrence of two root-knot nematodes (*Meloidogyne* spp.) on tomato and eggplant in Wau District (Western Bahr el Ghazal State).[602]

In late 2014 Southern Sudan acceded to the International Plant Protection Convention which requires the National Plant Protection Organization of each member country to produce two lists: 1) a list of pests and diseases of quarantine significance which are present in the country and 2) another list of those species that are deemed to be absent from the country.

The list of quarantine pests for Sudan is maintained by the European Plant Protection Organization. They are largely based on global distribution maps of many important pests published more than 30 years by CAB International. These maps show Sudan as a single country and often do not record the exact location of pest records within the country.

Hence in the newly independent country of South Sudan, one major obstacle to pest diagnosis and phytosanitary regulation is to determine whether a pest, such as the invasive fruit fly, *Bactrocera zonata*, which was reported to occur in the former Sudan, actually occurs in South Sudan or not. In many cases there are no records from South Sudan simply because no specimens have ever been collected and identified from the former Greater Bahr el Ghazal, Greater Upper Nile and Greater Equatoria regions, which comprise the present territory of South Sudan.

Updating Robinson's 2005 pest listing, which contains only a fraction of the likely pest fauna, along with the production of a list of the main crop diseases of economic and quarantine significance occurring within South Sudan and the surrounding countries, will require significant effort and regional collaboration over an extended period; neighbouring states have yet to publish such pest lists themselves.

---

[599] Tarr, S.A.J. 1955. *The Fungi and Plant Diseases of the Sudan*. Kew, Surrey: Commonwealth Mycological Institute,.

[600] Tarr, S.A.J. 1963. *A supplementary list of Sudan fungi and plant diseases*. Mycological Papers No. 85. Kew, Surrey: Commonwealth Mycological Institute, pp 34.

[601] Robinson, J., 2005. Pests and integrated pest management in western Equatoria, southern Sudan. *International Journal of Tropical Insect Science.* Vol. 25, No. 4. pp. 224–235.

[602] Yassin, A.M. 1974. Root-knot nematodes in the Sudan and their chemical control. *Nematol. Medit. 1.* pp. 103-112.

South Sudan has been impacted, along with its neighbours (including Sudan, Uganda, Kenya, Ethiopia, Central African Republic and Congo) by a spate of accidental plant pest and disease introductions. In 2011 Satti listed 26 non-native insects of economic importance which have invaded Sudan (including areas now in South Sudan), mostly within the last century, usually as a result of unregulated movements of infested plant material; he identified a further ten species of quarantine pests posing an imminent threat of establishment.[603]

In recent years several important crop diseases, including banana xanthomonas wilt (BXW), cassava brown streak viruses (CBSVs) and maize lethal necrosis disease (MLND) have spread across East Africa and are now threatening, if not actually present, in Greater Equatoria. The mass movements of refugees and large shipments of unscreened food grains of varied origin through Uganda into South Sudan by humanitarian agencies to address or prevent large-scale food insecurity are likely to have introduced plant diseases into new areas. Unscreened commercial movements of staple crops such as cereals and cassava are also likely to have contributed to disease spread.[604] Currently there is no officially confirmed record of MLND, BXW or CBSVs in South Sudan, but they may be present.

Based on the earlier practice in Sudan, the Plant Protection Department of the Ministry of Agriculture, Forestry, Cooperatives and Rural Development (MAFCRD) considers crop pests to be of two categories: pests of national concern and those that are not. National pests include, locusts, weaver birds (quelea), armyworm and the sorghum bug or "dura andat". In the former Sudan these pests were considered to need direct intervention by the government for control.

The most serious national pest for large-scale sorghum production is a migratory colony-nesting weaver bird, the Sudan dioch or red-billed quelea (*Quelea quelea aethiopica*).[605] Quelea flocks may include millions of individuals and, especially in mechanised schemes in Renk County, the damage from quelea can be extremely serious. Pest control is regularly carried out in Sudan by aerial spraying organised by the Sudanese government,[606] but in South Sudan pest control measures have not been undertaken by MAFCRD in recent years. Due to serious damage from quelea in 2012, many sorghum farmers had very little harvest.

In 2012, South Sudan became a member of the Desert Locust Control Organization for Eastern Africa (DLCO-EA), a regional pest and vector management organisation established in 1962. This organisation is mandated to control migratory pests such as desert locust, African armyworm moth, quelea and tsetse fly.[607] Subsequently, in September 2013, MAFCRD requested DLCO-EA to provide aerial spraying against quelea nesting colonies in woodland close to large mechanised schemes in Upper Nile State. Surveys were undertaken in these areas and, where concentrations of quelea were found, spraying by fixed-wing aircraft was carried out in October 2013. MAFCRD procured 35,450 litres of Fenthion 600 ULV for this purpose from Kenya (manufactured in China). No data are available on the area

[603] Satti, A.A. 2011. Alien insect species affecting agriculture and natural resources in Sudan. *Agriculture & Biology Journal of North America*, 2(8). pp. 1208-1221.

[604] Once a phytosanitary law is in place it will be desirable, though extremely difficult in current political and economic circumstances, to prevent unregulated inter-state movements of crops potentially harbouring diseases and major pests within South Sudan.

[605] An account of this pest and its control in Sudan was given by Schmutterer. H., 1969. *Pests of Crops in Northeast and Central Africa with particular reference to the Sudan*. Stuttgart: Gustav Fischer Verlag. pp. 213-217.

[606] Aerial spraying is carried out in mechanised schemes in Sudan by the government, using Fenthion ("Queletox®").

[607] DLCO-EA. http://www.dlcoea.org.et/

of the colonies surveyed, the area sprayed or the effectiveness of the action (% quelea killed or post-spray crop losses to birds), nor whether any fenthion was left unused.

Spraying of organophosphates against quelea is becoming increasingly controversial on environmental grounds (see Box 15-1). There is unlikely to be support by development partners for continuation of such action under CAMP, owing to the difficulty of preventing severe impacts against non-target organisms, especially birds, and the proximity of the quelea infestation areas to major Nile Basin wetlands of international significance for biodiversity and bird migration.

Box 15-1: Environmental impacts of quelea control in Africa

Control of the red-billed quelea (*Quelea quelea aethiopica*) is carried out throughout Eastern Africa because of its status as a major pest of small grain cereals (sorghum, millet, rice and wheat). The standard control methods for quelea in Africa have either been by destruction of breeding colonies and night roosts by detonation of explosive mixtures of diesel and petrol, or by spraying them with organophosphate pesticides (fenthion).

The environmental impacts of quelea control using fenthion have been reviewed by McWilliam & Cheke (2004). Secondary poisoning of non-target bird species is common. They found that predatory and scavenging birds and mammals can be affected up to 20 km from a control site. Residues may persist in soil invertebrates for up to 42 days after spraying. Spraying over water also impacts aquatic organisms, especially crustacea. The study recommends an integrated pest management approach and rigorous assessment of impacts of spraying.

A recent study of soil contamination by fenthion sprays and petro-chemical explosions in Botswana and Tanzania (Cheke et al., 2012a) quantified the extent and duration of pollution and demonstrated long-term persistence and leaching back to the surface by rainfall months after extended periods during which no pesticide was detectable. Cheke et al. (2012b) demonstrated the impact of fenthion in depressing cholinesterase activity in non-target bird species by more than 80%.

A recent study (Elliott et al., 2014) has examined the viability of alternatives to the use of pesticides and explosives to control quelea. This demonstrated that use of mist-nets was effective in controlling quelea, while catching few non-target species. In areas where netting was carried out, quelea tended to abandon the nest site, leading to considerably reduced damage to neighbouring crops. Quelea are regarded as a nutritious and palatable human food resource in several countries in Eastern and Central Africa. In Tanzania trapping is licensed (and monitored) by the Ministry of Environment and only quelea may be taken by trappers.

Sources:

Mcwilliam, Andrew N. and Robert A. Cheke. 2004. A review of the impacts of control operations against the red-billed quelea (*Quelea quelea*) on non-target organisms. *Environmental Conservation* 31 (2): 130–137.

Cheke, Robert A et al. 2012. Soil contamination and persistence of pollutants following organophosphate sprays and explosions to control red-billed quelea (*Quelea quelea*). *Pest Management Science* 2013; 69: 386–396.

Cheke, Robert A. et al. 2012. Effects of the organophosphate fenthion for control of the redbilled quelea (Quelea quelea) on cholinesterase and haemoglobin concentrations in the blood of target and non-target birds. *Ecotoxicology* (2012) 21:1761–1770.

Elliott, Clive CH, Boaz N. Mtobesya & Robert A. Cheke. 2014. Alternative approaches to Red-billed *Quelea Quelea quelea* management: mass-capture for food, Ostrich: *Journal of African Ornithology*, 85:1, 31-37.

In addition to quelea, sorghum is also seasonally affected in some areas (mainly in Greater Equatoria) by swarms of the edible bush cricket (*Ruspolia differens*) which feeds on the milky stage grains of sorghum and on wild grasses.[608] In general sorghum is attacked by sorghum midge, head bugs (including the dura andat), shoot fly, stem boring moth larvae

[608] Confusingly the edible bush cricket is sometimes referred to as the “green grasshopper” in interviews and reports. The same name has also been wrongly applied to the variegated grasshopper (*Zonocerus variegatus*) which causes damage to cassava and to vegetables, especially at the seedling stage.

and a range of pathogens affecting seedlings, vegetative stages and panicles (grain head). Weed competition from grass weeds and especially the parasitic witchweed, *Striga hermonthica*, are also a serious constraint. Striga impact is worse in situations where cereals have been grown repeatedly over several seasons, owing to the build-up of long-lived seeds in the soil. Crop damage by locusts (desert locust and migratory locust) in South Susan is intermittent, but potentially of high impact to cereal crops if an upsurge in neighbouring countries should spread to South Sudan.

Vertebrate pests, such as monkeys, squirrels and rodents, have a negative impact on agricultural production, especially where smallholder fields adjoin areas of bushland that provide cover. Livestock kept by pastoralists sometimes causes serious damage to crops grown by local farmers which leads to tribal and inter-communal conflicts. However damage also occurs from animals kept by settled farmers themselves. Fencing is an effective prevention measure against livestock damage but local farmers cannot afford to fence their farmland due to financial constraints. In some areas, traditional conflict resolution mechanisms are working well to solve this issue, but not in all areas.

Maize is affected by several stem borers, fungal diseases, striga and a range of viruses, including maize streak virus. Recently maize lethal necrosis disease (MLND) has invaded much of East Africa and is still expanding its range. MLND results from a combined infection of maize plants by two viruses, the maize chlorotic mottle virus (MCMV) and any of the cereal viruses in the Potyviridae group, like the sugarcane mosaic virus, wheat streak mosaic virus or maize dwarf mosaic virus. The double infection of the two viruses, is now known as MLND, also referred to as corn lethal necrosis.[609] Any of these viruses may have some impact on maize yields, but MLND can cause total losses in maize fields and has already had a significant impact on food security in Kenya. For South Sudan MLND represents the most serious current risk to food security and food sovereignty.

MLND has been reported to be present in South Sudan as of May 2013,[610] based on the observed occurrence of severe symptoms. MLND is believed to have reached Greater Equatoria from Uganda with unscreened seed imports. However the presence of MLND is proving difficult to confirm by virology. A survey was conducted by the Food and Agriculture Organization (FAO) and MAFCRD in Yei and Morobo Counties of Central Equatoria in 2014.[611] A diagnostic examination of six maize samples collected, showing presence of typical MLND virus disease symptoms, was carried out by the UK Food and Environment Research Agency (FERA).[612] However the FERA analyses to date have failed to detect the presence of MCMV in any samples submitted from Central Equatoria.

MLND is locally spread by insect vectors, transmitting the disease from plant to plant and field to field. The most common vectors are maize thrips, rootworms and leaf beetles. Hot spots appear to be places where maize is being grown continuously.[613] The management of MLND is based on screening of germplasm to identify varieties with a degree of resistance or tolerance, and on controlling the vectors of the disease, which requires the use of insecticides.

---

[609] FAO. 2013. *Maize Lethal Necrosis Disease: a snapshot*. Issued by Food Security and Nutrition Working Group (FSNWG), FAO. prepared by FAO Sub-Regional Emergency Office for Eastern & Central Africa (REOA).

[610] FAO. 2013. *Maize Lethal Necrosis Disease: a snapshot*. Issued by Food Security and Nutrition Working Group (FSNWG), FAO. prepared by FAO Sub-Regional Emergency Office for Eastern & Central Africa (REOA).

[611] following a similar survey in 2013.

[612] Diagnostic report sent to David Okot of FAO by Steven Bryce of FERA (FERA Reference 21417761-65) on 16/10.2014. Copy obtained from Atem Malual, Head of Crop Protection, MAFCRD.

[613] FAO. 2013. *Maize Lethal Necrosis Disease: a snapshot*. Issued by Food Security and Nutrition Working Group (FSNWG), FAO. prepared by FAO Sub-Regional Emergency Office for Eastern & Central Africa (REOA).

In South Sudan cassava is widely affected by cassava mosaic virus (CMV) disease and is now threatened by the more serious cassava brown streak disease (CBSD), especially in the Greenbelt zone, where it has been accidentally introduced from Uganda with unscreened planting materials. CBSD is caused by two closely-related strains of virus Ugandan cassava brown streak virus and Cassava brown streak virus (CBSV). CBSVs are highly variable and are thought to have arisen on one or more different (unknown) plant hosts in Africa before jumping to cassava.[614] In Central and Eastern Africa, CBSVs are believed to be vectored by white fly *(Bemisia Tabaci)* and spiralling Whitefly (*Aleurodicus dispersus*).[615]

There are currently no improved cassava varieties with resistance to CBSV but landraces are under evaluation by the International Institute of Tropical Agriculture to find resistance traits for breeding. Hence the current strategy for safeguarding smallholder cassava has rested on distributing clean material throughout the region.

A risk assessment carried out under the Great Lakes Cassava Initiative indicates that it is impossible to use visual inspection to rule out the presence of CBSVs in cassava plants in the field, since symptoms of disease are often weak or absent.[616] Virus testing using polymerase chain reaction methods is required. It is also suggested that the observed rapid spread of CBSVs in Eastern Africa may have been partly caused by the distribution of susceptible planting material through international research institutions and NGOs seeking to counter CMV. This may have narrowed the genetic diversity of cassava in East Africa, facilitating infection by CBSVs, as well as possibly distributing some CBSV-infected planting material.

Virus testing was performed on 330 leaf samples gathered during a survey for CBSD in four counties of Western Equatoria State (Yambio, Maridi, Mundri West and Mundri East) and three of Central Equatoria (Yei, Moro'bo and Juba) in May 2013. The presence of CBSD was confirmed in all sample fields, other than those in Mundri County.[617] It was associated with the variety TME 14, sourced from Uganda.

Cassava is also affected by pests (including green mite and mealybug), but the impact of these pests has not been assessed in South Sudan.

Rosette virus and leaf spot are serious diseases of groundnuts.[618] Groundnut is also affected by soil pests attacking the developing nuts and introducing secondary infections (which produce aflatoxins).

Fruits, including citrus and especially mangoes, are affected by fungal pathogens and by fruitfly larvae ("worms") which cause early fruit fall and render harvested fruit unfit for sale. Banana xanthomonas wilt (BXW) is a devastating disease caused by the bacterium *Xanthomonas campestris* pv. *musacearum*. It was first reported in 1968 in SW Ethiopia and was discovered simultaneously in 2001 in Central Uganda and the North Kivu province of the Democratic Republic of Congo.[619] The subsequent spread of BXW throughout the Great Lakes region, where banana forms a large proportion of the diet for about 25 million people,

[614] Monger W.A et al. 2010. The complete genome sequence of the Tanzanian strain of Cassava brown streak virus and comparison with the Ugandan strain sequence. *Arch Virol*. 155 (3): 429-433.

[615] Smith, Julian & Derek Tomlinson. 2010. A Review on Cassava Brown Streak Disease and Movement of planting material in the Great Lakes Region of East Africa. FERA, UK. Unpublished.

[616] Smith, Julian & Derek Tomlinson, 2010. A Review on Cassava Brown Streak Disease and Movement of planting material in the Great Lakes Region of East Africa. FERA, UK. Unpublished.

[617] Tadu, G., Okao, G. and Mwale, C. Quick Survey of Major Pests and diseases in Central and Western Equatoria States of South Sudan. 2 pages + map. November 2014. Unpublished.

[618] FAO/WFP. 2013. *Crop and Food Security Assessment Mission to South Sudan*. Rome: FAO/WFP. p. 20.

[619] Smith JJ et al. 2008. An analysis of the risk from *Xanthomonas campestris* pv. *musacearum* to banana cultivation in Eastern, Central and Southern Africa. Bioversity International, Montpellier, France.

is posing a serious threat to household food security and income. It is probably spread via cross-border transport of infected suckers. The disease causes loss both through death of the plant and rotting of edible/marketable fruit. The presence of BXW in South Sudan is as yet unconfirmed, but is suspected.

Young stages of snails, identified in early literature as *Limicolaria kambeul* (Achatinidae), are considered to be a significant pest of vegetables, seedlings of all crops and even of mature maize in Western and Central Equatoria, because of their high numbers and their ability to hide by day in the soil and surrounding bushland and climb up into crops at night. Control by hand-picking is feasible but the nocturnal nature of the pest makes this problematic. There is as yet no use of molluscicides such as metaldehyde pellets or poisoned baits in South Sudan.

Although cumulative damage by pests and diseases is serious, including a range of new invasive species, the phytosanitary control of cross-border movements of seeds and plants is not provided by the government. The existing phytosanitary legislation of Sudan is not applied and no new legislation has yet replaced it. MAFCRD is acutely aware of the vulnerability of South Sudan to the ingress of invasive species by infected or infested plant materials but currently lacks capacity and resources to develop the necessary regulatory apparatus. It has however produced several relevant policy documents and has recently developed the first draft of a National Plant Protection Act.

Through interviews with farmers, it was found that most farmers do not use chemicals for pests and diseases. A few farmers sometimes utilise pesticides for destroying termite nests (*Macrotermes* sp.) because of termites causing lodging (plants falling over either due to breakage of the stalk at the ear or poor root systems) of mature cereal crops before harvest and also damaging the developing pods of groundnuts below ground. Input suppliers carry a very limited range of pesticides but have received some training from USAID in safety issues.

Despite playing only a limited role in direct management of pests countrywide, MAFCRD plant protection personnel conducted a four-day reconnaissance survey of crop pests in West, Central and Eastern Equatoria in July 2011.[620] Subsequently MAFCRD has procured some pesticides and distributed them to the state Ministries of Agriculture and Forestry. With the assistance of development partners, three short training courses on pest management and the safe use of chemicals have been held for some state extension personnel and national plant protection staff in 2007, 2011 and 2012.

[620] MAFCRD. 2011. Sampson A-Koi Binyason and Alfred Atem Malual, A Report on crop protection pests and diseases field assessment of the major crops grown in South Sudan (1st – 4th July 2011).

16. Private sector investment

In view of the state of development of the South Sudan economy, and on the basis of development best practice, priority should be placed by the government on growing the domestic private sector, whose growth will be propelled by the agriculture sector and agri-business development.

16.1 Situation of private sector investment in South Sudan

16.1.1 Micro, small and medium enterprises

The South Sudanese private sector is embryonic and substantial locally managed businesses are very limited despite government efforts to promote local entrepreneurial activities. At the policy level, it is the objective of the government to transform agriculture from a traditional subsistence system to a scientific, market-oriented, competitive and profitable one without compromising the sustainability of natural resources for future generations.[621] The implication of this policy is that the private sector has to play a significant role in developing the agriculture sector. The private sector component in the government's Vision 2040 [622] underscores the need for efforts to encourage and nurture local entrepreneurship, with a view to broadening growth and employment opportunities. Focus is also on changing the strong tendency of 'educated people' in South Sudan to see the public sector as the only possible reasonable employment.

With a few exceptions, almost all formal businesses in South Sudan are micro, small and medium sized enterprises (MSMEs). MSMEs dominate all sectors of the economy, including retail and wholesale trade, construction, hotels and restaurants, and transport and communication. MSMEs are highly diversified in terms of ownership, type of enterprise, number of employees, capital investment and stage of development (Table 16-1). There is, however, no record of MSMEs operating in the agriculture sector; although, the more than 70% of the population engaged in subsistence agriculture are essentially micro and small enterprises.

Table 16-1: Micro, small and medium enterprises definition

Business Type	No. Employees	Annual Turnover (SSP)	Capital investment (SSP)	Characteristics
Micro	1 – 4	Max. 20,000	Max, 19,000	Informal, family
Small	5 – 49	21,000 – 500,000	21,000 – 550,000	Formal, license, taxes
Medium	50 – 99	500,001 – 1 million	550,001 – 10 million	Formal, licenses, taxes, better management, accts
Large	100 and over	+1 million	Over 10 million	Formal, accounts, banking

Source: *Draft Private Sector Development Strategy*, Prepared by the Working Group established by the Ministry of Commerce, Industry and Investment to consider small business size: subject to future revision.
Note: Definition is subject to change or revision.

African Development Bank (AfDB) reports shows that the number of registered businesses in Juba has grown exponentially from 471 in 2006 to 8,894 in 2010.[623,624] This situation, however, is by no means representative of the country, as formal business activity outside

[621] GRSS, Ministry of Agriculture and Forestry's, (2012), Mission Statement from MAFCRD. 2012. *Agriculture Sector Policy Framework 2012-2017*. pp. 9-12. Juba: GRSS.

[622] GRSS. 2011. *Vision 2040: Towards Freedom, Equality, Justice, Peace and Prosperity for All.* Juba: GRSS.

[623] AfDB. 2012. *South Sudan - A Study on Competitiveness and Cross Border Trade With Neighbouring Countries*. http://www.afdb.org/en/documents/document/south-sudan-a-study-on-competitiveness-and-cross-border-trade-with-neighbouring-countries-33438/

[624] AfDB. South *Sudan Infrastructure Action Plan - A Program for Sustained Strong Economic Growth*. http://www.afdb.org/en/documents/document/south-sudan-infrastructure-action-plan-a-program-for-sustained-strong-economic-growth-full-report-33384/

the capital is reported to remain extremely limited.[625] There are numerous constraints for private sector development in South Sudan: political insecurity, weak government institutions, weak rule of law and high levels of corruption, lack of physical infrastructure, limited access to land, poor access to finance, multiplicity of taxes, lack of input and output markets, and a lack of skilled workers and well-educated managers.

16.1.2 Business environment and the state of competitiveness of South Sudan

Many South Sudanese depend on the public sector payroll in the absence of an appropriate environment for the development of business activities. Many service jobs, especially in Juba, are filled by expatriates from Intergovernmental Authority on Development (IGAD) countries due to lack of local capacity. Few South Sudanese are engaged in trade.

In Doing Business in Juba 2011, the World Bank and International Finance Corporation (IFC) ranked Juba as 159 out of 183 economies on the ease of doing business (Table 16-2).[626] While South Sudan's indicators for doing business exceed its peers significantly in some respects, overall these indicators point to constraints in the business environment. The overall ranking indicates that South Sudan has one of the most difficult business climates in the world. A number of key challenges emerged, including human and institutional capacity constraints, major infrastructure gaps, and overlapping legal and regulatory instruments. Clear, consistent enforcement of existing and new policies and laws to underpin good governance remains a major challenge.[627]

Table 16-2: Ease of doing business indicators

		Doing Business Indicators (days)	
Indicator	**Juba South Sudan (days)**	**Khartoum Sudan (days)**	**Sub-Sahara Africa (days)**
Starting a business	123	121	126
Dealing with construction Permits	49	139	117
Registering property	124	40	121
Getting credit	176	138	120
Protecting investors	173	154	113
Paying taxes	84	94	116
Trading across borders	181	143	136
Enforcing contracts	74	146	118
Closing business	183	183	128
Overall ease of doing business	159	154	137

Source: World Bank/IFC. 2011. *Doing Business in Juba 2011*. http://www.doingbusiness.org/~/media/GIAWB/Doing%20Business/Documents/Subnational-Reports/DB11-Sub-Juba.pdf

Despite the challenging context, some private sector actors were active in 2011 and 2012, particularly in the banking sector, real estate, information communication technology and agriculture. These developments were not fully captured in the Doing Business in Juba 2011 report. Companies registered increased from 470 to 12,000. Investors seem increasingly interested in the country's potential and intend to take advantage of being first.

The stabilisation of exchange rates, reduction of inflation, elimination of multiple taxes, are key to improving the competitiveness of the private sector overall, and for attracting all

[625] The Business Registry, Ministry of Legal Affairs and Constitutional Development, Government Data, December 2010.

[626] World Bank/IFC. 2011. *Doing Business in Juba 2011*. http://www.doingbusiness.org/~/media/GIAWB/Doing%20Business/Documents/Subnational-Reports/DB11-Sub-Juba.pdf

[627] Also refer to section 16.1.3 dealing with the legal framework in a more holistic manner.

categories of investment, from large to small. Evidence from post-conflict country experiences demonstrates that the improvement on all key doing business indicators is key to agriculture sector led private sector investment, ensuring improved governance and institutional capacities at both national and decentralised levels.

This must be accompanied by improvement in governance institutions, in terms of human resources and quality, in terms of enhancement of institutional (organisational) capacities at national and state levels, to create an enabling environment that attracts private sector investment in the agriculture sector.

16.1.3Legal framework for private sector development

South Sudan's legal framework is characterised by a high degree of legal ambiguity.[628] Since its creation in 2005, the National Legislative Assembly has enacted laws covering a range of issues, but large gaps in the regulatory framework remain. Several policies have been developed but a large number of them have remained as drafts for a number of years and, as such, are still to be implemented. The few laws that do exist are poorly disseminated and under-enforced. These include the Land Act (2009), Draft Land Policy (2011), which supports the Land Act, the Local Government Act (2009) and the Investment Promotion Act (2009). Without adequate or sufficiently detailed rules to guide their activities, government institutions tend to function through a combination of discretionary decision-making and pre-existing practice. The lack of clarity often gives rise to power struggles among government institutions when high profile foreign investments are proposed.[629] It also has created a confusing environment for private sector investment. The situation is not improved by high levels of corruption, which the government is making an effort to tackle, with evidence of success yet to be realised.

Shortly after the signing of the Comprehensive Peace Agreement (CPA), state-level governments began using the provisions relating to decentralisation and grassroots empowerment in the CPA and the Interim Constitution of Southern Sudan, 2005 to claim the right to unilaterally manage land without involving the central government.[630] The resulting confusion over reporting lines and jurisdictions among government institutions introduced opportunities for private sector actors. Without regulatory oversight from the central government, investors were free to negotiate land leases with power brokers at the state level, thereby shielding themselves from national regulatory requirements. The fact that investments are managed almost entirely at the state level also contributes to an overall lack of transparency, since there is no central monitoring body responsible for keeping track of who is investing in what and where.[631]

Available information from cases of recent private sector investments by a number of foreign owned firms shows that South Sudan still has to address a number of challenges within its institutions, from national to state government levels. The Land Act[632] has a clause which states that community land may be allocated for investment purposes, but that the investment must reflect an important interest for the community and contribute economically and socially to the development of the local community. In the absence of strong governance systems with effective enforcement, there is evidence that point to a situation where a

[628] Oakland Institute, 2011, *Understanding Land Investment Deals in Africa: Country Report: South Sudan,* California: Oakland Institute.

[629] Oakland Institute, 2011, *Understanding Land Investment Deals in Africa: Country Report: South Sudan,* California: Oakland Institute.

[630] GOSS. 2005. *The Interim Constitution of Southern Sudan*. Juba.

[631] Oakland Institute, 2011, *Understanding Land Investment Deals in Africa: Country Report: South Sudan,* California: Oakland Institute.

[632] GOSS. 2009. *The Land Act*. Juba: GOSS.

number of communities may be short-changed in the process. Particular individuals may be positioning themselves to benefit from private investments in land at the expense of communities, a situation which ought to be avoided.[633]

Despite the weak rule of law in South Sudan, the laws that have been enacted during the interim period encompass a number of key reforms, including: ceilings on land acquisitions,[634] limits on lease periods for foreign investments,[635] requirements for prior environmental and socioeconomic studies; requirements for prior community consultation; and prohibitions on non-consensual interference with pastoralist communities' grazing rights. If properly enforced, these laws can help South Sudanese to begin channelling foreign investment toward their own development priorities. Domestic laws such as these will also become increasingly important as a means of determining the reciprocal obligations when the government of South Sudan and private investors begin to use international arbitration as a means of resolving their disputes.

A clear and well-functioning regulatory framework is central to private sector promotion for South Sudan if the market is to work with enhanced predictability and reduced risk. This is central to creating an environment where the private sector, both large and micro, small and medium entrepreneurs are confident in investing in emerging economic opportunities. There is also lack of clarity among federal, state and county jurisdictions over business licensing, taxes, and customs. Although some progress was made in terms of drafting laws, addressing the infrastructure and institutional gaps will remain a major challenge. The development, (together with their enforcement) of specific laws, policies and strategies is central to stimulating agriculture centred private sector investment in South Sudan. Of great importance as well is the issue of consistency, ensuring that the behaviour and actions of all key players is in support of the established laws and policies. There is also the issue of dealing with errant members of the public sector, either through inaction or other ways that are likely to undermine set laws and policies.

With respect to lessons learnt internationally, despite land laws, land reforms and a range of legal, policy and regulatory measures being instituted in other East African countries, such as Kenya, Tanzania, Uganda and Rwanda, there are some challenges and contradictions still being encountered in many African countries. For example, access to land by large scale private investors remains an emotive and politically volatile issue. Critics of some large scale land investors have even gone as far as labelling investors as **'**land grabbers', and the notion of 'land-grabbing' has generated growing resonance with an increasing number of sympathisers and promoters in development circles in Africa and globally. For South Sudan, given the direction already taken with the Land Act and Draft Land Policy, it can only be hoped that the legal, policy and regulatory measures adopted thus far, and those that will be put in place in the future, would be managed in a transparent and professional manner; this would facilitate better understanding and cooperation between private sector investors and the country's population.

[633] Recent studies, for example:case studies in Oakland Institute, 2011, *Understanding Land Investment Deals in Africa: Country Report: South Sudan,* California: Oakland Institute..

[634] The Land Act requires that state authorities provide approval for land acquisitions above 250 feddans (105 hectares) and calls for regulations to be put in place that prescribe a ceiling on land allocations. Land Act xx, ch.v , § 15 (5) (6).

[635] Although the Land Act allows for long-term leases of up to 99 years, the Investment Promotion Act explicitly limits foreign investments in agriculture and forestry to renewable terms of 30 and 60 years, respectively. Land Act, ch. I v , § 14; Investment Promotion Act, 2009 xx, Second Schedule (3).

16.1.4 Financial services

Banks are understood to be opening aggressively in South Sudan. The Association of Bankers was launched in July 2012, showing that the banking sector is getting more organised to engage in more substantial business than previously. The association represents 14 commercial and development banks, of various scale of operation. Significant regional or continental financial services providers have also entered the market since 2012. The total number of micro finance institutions operational in South Sudan increased from 4 in 2007, to over 10 in 2012, and to more than 15 by 2014. Data provided from the Southern Sudan Microfinance Development Facility shows that the average loan size was in the region of USD 200 per recipient, with repayments made weekly.[636]

Private sector banking operations are concentrated on trade financing. Difficulties relate to the increased scarcity of US dollars (USD) and the depreciation of the SSP on the informal market. A number of established commercial banks with headquarters in neighbouring countries, for example, Kenya Commercial Bank, Equity Bank, and Ecobank, have opened branches in Juba and other South Sudanese cities. Some of the largest banks (80 to 100,000 clients) are offering loans up to 3 years but cannot offer longer repayment terms as the law prohibits pledging collateral for a period exceeding 3 years. Most corporate loans are said to be cash collateralised, due to the lack of credit history and management capacity of borrowers.[637]

The World Bank funded, Multi-donor Trust Fund (MTDF) Project, has paid considerable attention to laying the foundation for improved financial services for the private sector, focusing on micro and small enterprises.[638] Efforts of other development partners have been mobilised in support of the endeavour. Despite these efforts, major challenges remain ahead, with inadequate financial services from both the formal commercial banking sector and within the micro-financial institutions (MFIs). The latter are still at an embryonic stage. In particular, there remain substantial bottlenecks regarding access to micro credit for smallholder farmers and producer cooperatives. There is very limited direct funding support to farmers to acquire technology or inputs. New institutions have been established in recent years, and the few established MFIs, such as Bangladesh Rural Advancement Committee (BRAC) and Rural Finance Initiative, have expanded their client base. However, the national coverage of MFIs, in terms of increase in access to credit by a growing number of MSMEs, in particular, those in the agri-business sector, remains very low.[639] Informal non-bank finance (savings and loans associations) in some countries have grown to be equally as strong if not more than the formal financial sector, e.g. Kenya's experience of Savings and Credit Unions.

16.1.5 Agro-input value chains and output markets

Given the widely recognised market failure in the agro-input value chain, within the framework of private sector investment support, there is need to improve the flow of agro-inputs to all categories of farmers, including smallholder farmers.[640] This would improve productivity and farmers' livelihoods. Opportunities to promote local manufacture of inputs, (fertilisers, seed, chemicals etc.) inputs should be explored, with a view to reducing unsustainable dependence on imported inputs.

---

[636] World Bank. 2013. *South Sudan - MDTF South Sudan Private Sector Development Project*. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/2013/03/17539288/south-sudan-mdtf-south-sudan-private-sector-development-project

[637] For more information on financial institutions see section 5.3.4.

[638] World Bank. 2013. *South Sudan - MDTF South Sudan Private Sector Development Project*. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/2013/03/17539288/south-sudan-mdtf-south-sudan-private-sector-development-project

[639] For more information on financial institutions see section 5.3.4.

[640] See section 5.3.2 Agro-input dealers, 10.4.6 Private sector.

Fair competition is required in the provision of inputs, through facilitation of different sized agro-dealers, from small to large scale. On the basis of structures that have worked in other regions and African countries, there is potential for the support of establishment of linkages with agro-based MSMEs interested in the agro-input markets (agro-input dealerships), an area which needs to be explored and supported in the context of South Sudan.[641]

According to the World Bank, an area that is nine hours away from the market, for example, realises only 8% of its agricultural potential, compared to 46% for an area only four hours away from the market.[642] Less than 5% of the existing 7,171 km of primary roads are in good condition. Much of the road network is gravel, dilapidated and mainly inaccessible during the rainy season. Freight tariffs in South Sudan are very high and at least twice those found in the main African corridors and even in Sudan.

There is need to accelerate transportation and distribution of inputs to areas which have been inaccessible because of the undeveloped infrastructure. In view of the dilapidated nature of infrastructure, this requires construction of new access roads and bridges to access various areas. Collaboration with other government authorities, such as the Ministry of Roads and Bridges, to identify areas with high agricultural and private sector development potential is needed. The prioritisation of such projects is critical for agri-business based private sector investment. Better infrastructure would facilitate access to output markets, which is essential for MSMEs to sell their produce.

16.1.6 Labour markets and human capital

South Sudan has mismatches between demand and supply of labour in the market, with high levels of illiteracy[643] and unemployment, characterised by extremely limited choices for employment, especially amongst the youth. Agriculture is an unattractive employment option for youth who see it as unprofitable. Efforts should be made to encourage youth to consider primary production and value chain agri-businesses. In neighbouring countries youth development global players, such as the Young Men Christian Association (YMCA), and micro-finance institutions such as BRAC, are already key players in support of youth livelihoods and employment creation. Other activities could involve the establishment of youth agro-based internship training schemes, formation of young farmers clubs, farmer-field schools, and use of youth role models through a youth in agriculture/agri-business advocacy strategy. Through an MSME support strategy, more employment opportunities could be developed in the crop/fruit and vegetables, livestock, fisheries, honey, and forestry value chains.

There is urgent need to review the land tenure system, given that youth below age 30, constitute 72% of the population, and yet their access to land is a major challenge, with resource allocation structures that favour mature adults, and not young women and men.[644] Through new legal and policy reforms, central government, in collaboration with state authorities and community structures, can be mobilised to promote access to land by the youth and women and which is central for empowerment of young people.

[641] The Draft Private Sector Development Strategy (2012), initiated by the Ministry of Commerce Industry and Investment points out that this is a potential area of investment that is identified in their proposed Small Business Promotion Project for South Sudan.

[642] World Bank. 2012. *Agricultural Potential, Rural Roads, and Farm Competitiveness in South Sudan*. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/11885

[643] See section 8.1 Population, Communities and Households.

[644] The presumption is that youth gain access to land through their parents, which often does not hold.

There are high levels of poverty in the country, in particular, amongst the youth and women. Poverty which, nationally is recorded at 51%[645], is a major development concern, from both the broader and private sector development context. The poorer people are in any country, the more depressed the demand for goods and services generated in the economy, which is not good for private sector development.

16.1.7 Agriculture sector business development services

There is a lack of business development services to provide entrepreneurship, marketing, business management and mentorship training and capacity building; technology development; and, no value chain support for business activities in both the agricultural and allied sectors. As found in all subsectors, extension services are vital,[646] as are value chain linkages between medium and large scale agri-business actors and smallholder/MSME agri-businesses. This would allow informal subsistence producers to transition to more formal MSME businesses.

The South Sudan Chambers of Commerce, Industry and Agriculture are at a formative stages and lack experience and capacity to deal with complex issues. There is a need to mobilise MSMEs into effective and functional associations and organisational arrangements within specific sectors and across sectors.

16.2 Public-private partnerships

The use of public-private partnerships (PPSs) to support private-sector entities to provide commercially viable services and markets is becoming an essential component of sustainable rural development programmes. The promotion of PPPs in South Sudan should be based on lessons learnt, and what is considered by the key stakeholders as the best way forward. There are several examples in neighbouring countries of successful collaboration with development partners, such as the specialised UN agency International Fund for Agricultural Development (IFAD).

16.2.1 Case studies

Several models of successful PPPs are described in Partnering for Innovation: From Smallholders to Shareholders, for example the aggregator model (Box 16-1) and contract farming model (Box 16-2).[647]

Box 16-1: Coca-Cola: Localising and aggregating supply, Kenya

The Coca-Cola Company's 2020 Vision includes the ambition to triple sales of its juice business. To meet this goal, the company needed to secure sustainable supplies of fruit pulp to meet the projected production targets.
By getting into partnership with other stakeholders under the Project Nurture, in Kenya (which included the Bill and Melinda Gates Foundation and Technoserve), smallholder farmers were aggregated into Producer Business Groups (PBGs) of 30-50 farmers. Structured in this manner, the famers were able to attract investment, gain access to agricultural goods and services and access to markets for their products beyond just fruit. Over 42,000 farmers in 1,300 PBGs were engaged in the Project Nurture and were able to sell more than 36,000 metric tons of fresh fruit. The model is being replicated in other countries such as Zimbabwe, Mozambique and India.

[645] See Table 1-1 South Sudan's key indicators.

[646] See sections 10.8.3 Extension services, 11.9.1 Extension services, 12.10 Forestry education, research, training, and extension and 13.4.9 Fisheries extension.

[647] USAID/Fintrac. 2014. *Partnering for Innovation: From Smallholders to Shareholders – A Guide to Optimizing Partnerships with the Private Sector for Smallholder Impact.* http://www.partneringforinnovation.org/smallholders-shareholders.aspx

Box 16-2: PPPs in contract farming

Smallholder farmers in general, and in South Sudan, face a range of issues at the farm level: they produce limited quantities of low-quality commodities, lack capital, operate with limited access to markets, and often sell to informal buyers, often referred to as "middlemen", at low prices; through one-time transactions. This in turn reduces repeat sales, leaving future potential sales in doubt. Where options exist, purchasers up the value chain see little value in engaging these low volume, low quality supply sources.

Contract farming arrangements which involve a buyer contracting smallholder farmers or producers to directly source specific agricultural commodities can be beneficial in the South Sudanese agricultural development context. The concept involves large private sector buyers organising the supply chain from the top, including collections and processing services and provides critical inputs, specifications, training, and credit to its suppliers. The farmer provides assured volumes of crops of specified quality, on specified dates, and at agreed upon prices. There is evidence to show that contract farming arrangements have been successfully implemented in many African countries, in Eastern, Southern and West Africa, for example in Kenya, Uganda, Zimbabwe, Mozambique, amongst others.

IFAD has in the past entered into public-private partnerships through its projects and programmes, working with other organisations. The IFAD East and Southern Africa Division has a number of examples of successful partnerships with the private sector, through projects or through grants to trade associations (Box 16-3).

Box 16-3: Smallholder Cash and Export Crops Development Project

The ongoing Smallholder Cash and Export Crops Development Project in Rwanda was one of the first projects of its kind in which IFAD entered into a partnership with the private sector. The project aimed at rehabilitating a run-down government tea plantation at Nshili by developing 1,200 hectares of plantations and building the capacity of tea-workers associations to form a cooperative. However, there was no factory nearby to process the tea. Before making physical investments, the project facilitated the creation of Nshili Kivu Tea Factory, a joint venture company between private investors and the cooperative to operate a new tea factory that would process tea from its own plantation and from the smallholders. "It proved difficult to get a financial commitment from the private sector to finance the project," explains Claus Reiner, Country Programme Manager at IFAD. "IFAD persevered and it proved worthwhile in the end." The private partners financed US$ 2 million to construct a processing plant close to the plantation and contributed the required technical and marketing know-how, while IFAD provided US$ 5.2 million to upgrade the government plantation, which was then partly leased to the company and partly allocated to smallholders, and to establish new tea plantations and woodlots for smallholders. It also financed US$ 300,000 to buy the smallholders a 15% share in the company. As of this year, 2,500 small producers are selling tea from their own plots to the company and also work on the plantation. The price they receive has increased by about 60 per cent, and as shareholders they sit on the board and can ensure fair producer prices. As far as private investors are concerned, additional smallholder production allows use of the factory to be maximised. The IFAD project has started supporting another tea estate at Mushubi with a view to replicating the model in a similar public-private partnership.

Source: IFAD. 2008. *Progress in East and Southern Africa, Issue Number 9*. http://www.ifad.org/newsletter/pf/9.htm

In Uganda, a public-private partnership was established in 1998 for vegetable oil production, which has proved to be a successful venture.[648] IFAD provided a technical assistance grant of US$1.5 million to PhytoTrade, a trade association established to promote natural remedies based on the traditional knowledge of local farmers and to link micro-producers living in remote areas of the region to global consumers. In 2007, nearly 15,500 smallholder

[648] IFAD. 2008. *Progress in East and Southern Africa, Issue Number 9*. http://www.ifad.org/newsletter/pf/9.htm

producers sold more than 80,000 kg of raw or semi-processed natural products to PhytoTrade members (typically cosmetic and food companies in the natural products market).

In Mozambique, IFAD supported Rural Market Promotion Programme, has promoted commercial partnerships by introducing purchase contracts between existing agro-processing companies and smallholders.[649] It seeks to assist companies to share the cost of establishing a partnership, and at the same time help build capacity of farmers' organisations. In Malawi, the Rural Livelihoods and Economic Enhancement Programme concentrates on developing commodity value chains and provides matching grants to PPPs, consortiums and farmers' groups.[650] In Madagascar, using a Public Partnership model, the Rural Income Promotion Programme has helped small-scale agricultural producers introduce and commercialise new products by creating "partnership poles" (*poles de partenariats*).[651]

16.2.2 Review of PPPs in Kenya

This analysis draws from a study designed to appraise selected agribusiness PPPs in Kenya as a contribution towards an African-wide study on agribusiness PPPs commissioned by the Food and Agriculture Organization of the United Nations (FAO) in collaboration with the United Nations Economic Commission for Africa. The appraisal seeks to develop practical guidance for technical officers in both the public and private sector for the successful development and implementation of agribusiness PPPs (Box 16-4).[652]

Box 16-4: Kenyan PPPs review

The case studies are concentrated in three main areas: commercialisation of a product, value-chain development and contracting. The main goals advanced by the PPPs include: increased employment, improvement in rural incomes and poverty reduction.

The Kenyan BIOFIX Project involved the commercialisation of a product, which involved the British Council providing a research grant to the University of Nairobi. It involved licensing of a private fertiliser company to undertake mass-production and marketing of a technological output from a public institution (University of Nairobi). Many times an international development partner is involved in the provision of funds to enable a public institution to carry out research and development, through to the commercialisation stage. The PPP exemplifies a model for deploying technologies from public research institutions that could spur agribusiness and create employment.

In the Striga Eradication Project, a consortium of public research institutions (international and local), NGOs and private companies (multinationals and a local company), put resources together to deploy technology from a collaborative project. This case study highlights how partnerships can evolve to cascade innovations which can optimise new opportunities or overcome emerging challenges in implementing PPPs.

Evidence show that the effectiveness of a given PPP was not only based on its implementation but also sustainability elements built in the PPP from the preliminary stages of its development. These included: an appropriate legal and regulatory framework, suitability assessment, selection of the PPP type, structure and design, agreement of the oversight body, funding, competitiveness of the procurement process and the actual implementation. Achieving effective partnerships requires strong political support and government's commitment through policy and supportive infrastructure development such as roads, ports, irrigation infrastructure, cereal banks, warehouses, acquisition of machinery

[649] Rural Markets Promotion Programme. http://operations.ifad.org/web/ifad/operations/country/project/tags/mozambique/1423/project_overview

[650] Rural Livelihoods and Economic Enhancement Programme. http://operations.ifad.org/web/ifad/operations/country/project/tags/malawi/1365/project_overview

[651] IFAD. 2008. *Progress in East and Southern Africa, Issue Number 9.*. http://www.ifad.org/newsletter/pf/9.htm

[652] FAO. 2013. *Agribusiness public-private partnerships – A country report of Kenya.* Kenya: FAO.

and others.

The agribusiness PPPs noted to have the most significant impact were in sub-sectors that have the potential for high value returns on their investment. The three priority sub-sectors for PPPs according to Kenyan stakeholders include: irrigation for high value crops; value-addition; and agricultural insurance. Development partners in Kenya also noted that early development of a conducive and consistent national legislative and regulatory structure greatly facilitates the identification, development and implementation of PPPs (Table 16-3).

Table 16-3: Main reforms for agribusiness development - Kenya

Policy/bill/act/strategic intervention	Relevance for agribusiness	Remarks
The Public Procurement and Disposal Act No.3 of 2005.	Outlines procurement procedures e.g. contracting and procurement.	Launched in 2005
Privatization Act No. 2 of 2005.	PPPs recognised as a means of privatisation; Establishes institutional structure for implementing PPPs – PPP Unit & Secretariat.	Launched in 2005
Public Procurement and Disposal (Public Private Partnership) Regulations, 2009.	Establishes a PPP Steering Committee and a secretariat charged with promotion & development of PPPs.	PPP Unit serves as the focal reference point for technical advice & approval of PPPs.
Economic Recovery Strategy for Wealth and Employment Creation.	Revival of selected agricultural institutions and investment in research and extension.	Launching pad for Strategy for Revitalizing Agriculture.
Strategy for Revitalizing Agriculture.	Policy, legal & institutional reforms, Enhanced market access (inputs, output & financial services), food security programmes	Transformation of agriculture from subsistence to commercial sector.
Agricultural Sector Development Strategy 2010-2020.	Revival of agriculture through well-coordinated partnerships, Establishment of Agricultural Sector Board under PPP Secretariat.	Agricultural Sector Board advices on priority sub-sectors for PPPs
Vision 2030	Identified flagship PPP projects to address productivity, land use, markets and value-addition challenges in agriculture.	Extension, R&D and value-addition takes centre stage.
Agribusiness Strategy	Prioritises value addition and commercialization.	Undergoing review by stakeholders
PPP Bill	Legal framework for PPPs.	At preliminary stages

Source: FAO. 2013. *Agribusiness public-private partnerships – A country report of Kenya*. Kenya: FAO.

17. Conflict and food security

17.1 Situation of current conflict

This section describes the situation as of mid-2014; the conflict is still continuing in May 2015. Since the outbreak of violence in Juba in mid-December 2013, which quickly spread to other parts of the country, South Sudan has been facing considerable challenges including insecurity, displacement of people, food shortages, outbreaks of disease such as cholera, and seasonal floods. The legacy of civil war, and chronic poverty and underdevelopment impacted heavily on the ability of the government to provide basic services to the people and respond to humanitarian needs, putting households in a crisis situation.

Agriculture is the main source of livelihood for refugees and returnees from neighbouring countries and internally displaced persons (IDPs), as well as the local residents in the country. Food security in the country has worsened due to the combination of widespread insecurity, low agricultural production and sharp increases in the price of agricultural commodities.

Thousands of people have been killed or wounded since December 2013, many of whom were targeted based on political affiliation with ethnic backgrounds. Initial fighting broke out among members of the Presidential Guard at the headquarters of Sudan People's Liberation Army/Movement (SPLA/SPLM) which split between forces loyal to the President Salva Kiir, a Dinka and those who supported former Vice President Riek Machar, a Nuer. Fighting moved rapidly to various military installations and into civilian neighbourhoods in Juba, and spread across the country by the end of December.

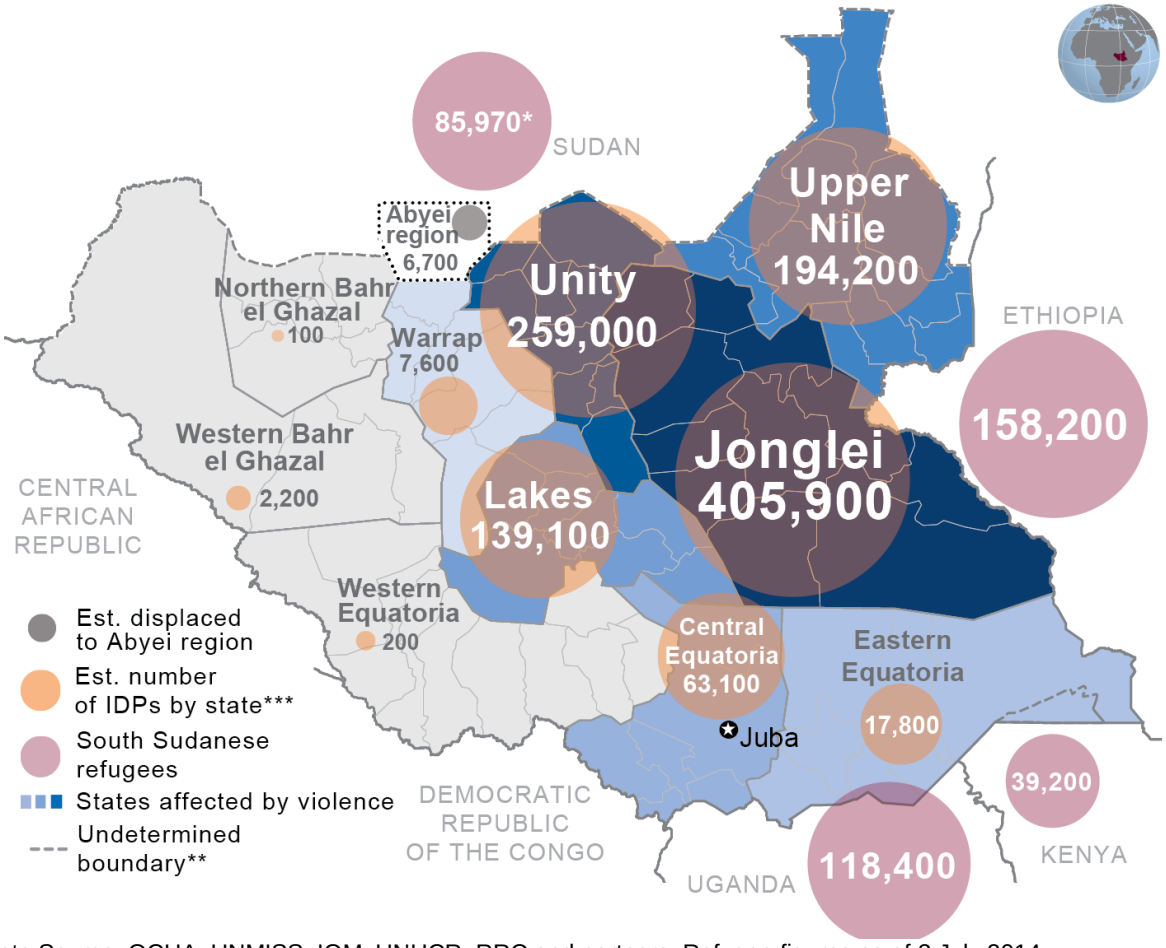
A Human Rights Report published by the United Nations Mission in South Sudan (UNMISS)[653] reveals that many soldiers of both parties conducted house-to-house searches, killing, looting, destruction, rape, abductions and arbitrary arrests. Churches, hospitals, schools and other social infrastructure were attacked and destroyed. Minority groups, including the Anyuak, Murle and Shiluk, and foreigners including Ethiopians, Eritreans, Kenyans and Ugandans, were also the subject of targeted attacks in Bor town in Jonglei State. UNMISS Bor base was also attacked. On 1 January, the President declared a state of emergency in Jonglei and Unity states, which was followed by a similar declaration for Upper Nile State on 17 January. Despite the signed agreements on the cessation of hostilities by both parties on 23 January and 9 May 2014, both side traded accusations of ceasefire violation immediately upon signing. The security situation in the country remains unpredictable and volatile. Incidents of random shooting and sporadic clashes continue to be reported in Jonglei State and Upper Nile State due to the long history of conflicts and availability of weapons in the region.

According to the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) and the United Nations High Commissioner for Refugees (UNHCR),[654] over 1.5 million people became displaced from their homes between December 2013 and June 2014, including over 400,000 people who fled to neighbouring countries such as Uganda, Kenya, Ethiopia and Sudan. Inside South Sudan, IDP were scattered over 186 locations and the number of people who fled to 8 UNMISS bases[655] was over 100,000. Displacement patterns are fluid and many IDPs were forced to flee several times. The influx of IDPs often

[653] UNMISS. 8 May 2014. *Conflict in South Sudan: A Human Rights Report*. Juba: UNMISS.
[654] UNOCHA. 3 July 2014. *South Sudan Crisis Situation Report*. *No.43*. *http://reliefweb.int/sites/reliefweb.int/files/resources/South%20Sudan%20Crisis%20Situation%20Report%20No.%2043.pdf*.
UNHCR. 23-27 June 2014. *South Sudan Refugee Situation, UNHCR Regional Update, 21.* Juba: UNHCR.
[655] Juba (Tomping and UN house), Bor, Malakal, Bentiu, Wau, Melut, Nasser and Rumbek

overwhelms host communities, leading to tensions and further movements. Tens of thousands of people sought shelter on small islands to protect themselves from attack without access to basic services. Most other displaced people were scattered in rural areas with limited information on their living conditions.

Figure 17-1: IDP and refugee map



Data Source: OCHA, UNMISS, IOM, UNHCR, RRC and partners. Refugee figures as of 3 July 2014.
Map Source: UNOCHA. 3 July 2014. *South Sudan Crisis Situation Report. No.43.* http://reliefweb.int/sites/reliefweb.int/files/resources/South%20Sudan%20Crisis%20Situation%20Report%20No.%2043.pdf

The displacement and insecurity has worsened already fragile food security in the country. According to the UN Crisis Response Plan of June 2014,[656] the planning figures for 2014 are: 3.9 million people facing acute food insecurity and 7.3 million people at risk of food insecurity. The livelihoods of millions of people are disrupted since they are unable to farm, access their normal food sources or migrate with their livestock. Food security has deteriorated most in Jonglei, Upper Nile and Unity States where 50-85% of the population are at acute risk. Even before the conflict, these states were the most food-insecure.

17.2 Historical background and causes of conflict

South Sudan has a long history of conflicts. The current conflict which erupted in December 2013 was caused by the mix of historical, political and ethnic contexts. Before independence in 2011, South Sudan fought two long civil wars against successive governments in the Sudan during 1955-1972 and 1983-2005.

[656] UNOCHA. 2014. *South Sudan Crisis Response Plan (revised June 2014).* https://docs.unocha.org/sites/dms/CAP/Revision_2014_South_Sudan_CRP_June_2014.pdf

The SPLA/SPLM was formed in 1983 under the leadership of John Garang and this was the beginning of the Second Sudanese Civil War. However due to internal disagreement within the SPLA/SPLM leadership several factions split along political and ethnic lines with the most notable being the SPLA-Nasir in 1991, led by Riek Machar.

At independence on 9 July 2011, the SPLA became the national army, while the SPLM became the ruling party and formed the majority of the new government. The chairman of the SPLM, Salva Kiir, who fought in both civil wars, became the President and Riek Machar, who rejoined the SPLM in 2002, was appointed as the Vice President.

Many difficult issues arose immediately after independence, including a power struggle within the SPLM leadership, lack of rule of law, lack of accountability, rampant corruption injustice, and inter-communal conflicts. Despite the dominant position of the SPLM/SPLM, the new government had a weak command and control system. This was because the SPLM/SPLA was formed out of loosely organised guerrilla groups who retained their own identities even after independence.

In addition, maintaining social cohesion in a country which has more than 60 ethnic groups and 80 linguistic groups is a big challenge. Disputes between pastoralists, settled farmers and river basin users over natural resources are common in most states. Particularly in Jonglei State, several groups have fought each other over livestock and grazing lands, leading to many losses and displacement. Ethnicity has often been manipulated to foster discord when it served political interest.[657] Once fighting starts in these areas the conflict continues and reoccurs regardless of its actual causes.

Moreover, after independence, political tensions between South Sudan and Sudan remained high due to the fact that key aspects of the 2005 Comprehensive Peace Agreement (CPA) have not been resolved, including border demarcation, agreement on assets, the political status of Abyei, and political settlements in the Southern Kordofan and Blue Nile states of Sudan. The tension between the two sides prompted Sudan to accused South Sudan of supporting the SPLA-N (rebel group in Sudan) and also South Sudan made similar accusations that Khartoum was supporting the militias fighting against the government in South Sudan. These accusations led to a deterioration in relationships; in January 2012 the South Sudan government decided to shut down oil production leading to national austerity measures, which worsened the economic situation and food security.

Together with these immense challenges, political rivalries and ethnic grievances put more pressure on the SPLM/SPLA senior leadership who had fundamental disagreements about the future direction of the party. The President dismissed almost the entire cabinet, including the Vice President, in July 2013, which increased tension. On 15 December, Riek Machar and other members did not attend the SPLM National Liberation Council and fighting broke out.

17.3 Peace and reconciliation initiatives

The current conflict has involved many countries in the region and beyond in various roles. Peace and reconciliation initiatives have been promoted at international, national and community levels. From 4 January 2014, the Intergovernmental Authority on Development (IGAD) led peace talks in Addis Ababa in Ethiopia and both parties signed agreements on 23 January on the cessation of hostilities and on the status of political detainees arrested in relation to the purported coup attempt. However, immediately after the signing, fighting broke out in Jonglei, Unity and Upper Nile Stales. The second agreement on the cessation of

[657] UNMISS. 8 May 2014. *Conflict in South Sudan: A Human Rights Report*. Juba: UNMISS.

hostilities and establishment of a transitional government of national unity was signed on 9 May 2014, but fighting still continued in some parts of the country.

The United Nations Security Council Resolution in May 2014[658] decided to extend the mandate of UNMISS until November 2014 and to increase UNMISS troop strength. It also decided to reprioritise its mandate towards the protection of civilians, human rights monitoring and support for the delivery of humanitarian assistance. UNOCHA prepared the South Sudan Crisis Response Plan 2014, which as of June 2014, had 258 projects to improve the humanitarian conditions.[659] The plan requires US$1.8 billion for its implementation. At a donor conference in Oslo in May 2014, 22 countries and intergovernmental organisations reaffirmed their commitment by pledging over US$600 million for the response. However, more funding is still needed.

In April 2014, church groups and civil society organisations came together to create the National Platform for Peace and Reconciliation as an independent body seeking to form a united platform to work for peace and reconciliation in the country. Under this platform, government bodies are included, such as the South Sudan Peace and Reconciliation Commission and parliament's Specialised Committee on Peace and Reconciliation. The platform has the task to link government bodies and communities. It includes civil society, youth, women's organisations, the international community and even the opposition forces, with the aim of hearing their voices in the peace and reconciliation process and developing an agenda for peace, healing and reconciliation.

In South Sudan, the churches play an important role, and their involvement in a peace platform is crucial. Throughout the decades-long civil war, they were the only stable institutions which had legitimacy, especially in remote areas of the country. The South Sudan Council of Churches has constituted the Committee for National Healing, Peace and Reconciliation to address conflict in the country. The committee is headed by the Anglican Bishop of South Sudan and supported by a number of bishops from the other denominations, such as the Catholic Church, Africa Inland Church, and Presbyterian Church. One of the successes of this committee was the resolution of the conflict in Jonglei which temporarily brought relative peace to the area.

Local leaders such as chiefs in boma, payam and county from the warring communities have been preaching peace and reconciliation among their communities, stressing the importance of coexistence among different tribes in their regions. Meetings within the community and with neighbouring communities have been held to explain that the war is political not ethnic, although it had taken ethnic lines. A peace process which is truly inclusive of the people on the ground and grass-roots level discussion on their future are key initiatives to stop the violence and build trust across social divides.

[658] United Nations Security Council Resolution 2155 (2014) adopted on 27 May 2014
[659] UNOCHA. 2014. *South Sudan Crisis Response Plan (revised June 2014).*
https://docs.unocha.org/sites/dms/CAP/Revision_2014_South_Sudan_CRP_June_2014.pdf

18. Gender issues

18.1 Gender issues in agricultural production

South Sudan's land based economy relies heavily on subsistence farming for food security and economic development, most of which is small scale, private and predominantly family-based.[660] Women have been called the face of agriculture in South Sudan as they constitute 80% of all subsistence farming but their crucial role and contribution to food security is often unrecognised.[661] As a result of the conflict and outmigration of men to urban areas, a high proportion of households are headed by females, which means that the South Sudanese farmer is predominantly female.[662] It will be difficult for South Sudan to increase agricultural production and food security without involving women who are the majority of its farmers. As a result of their primary role in agricultural production, women also constitute a wealthy repository of indigenous knowledge on genetic varieties, natural resource management and conservation, food processing and preservation, and traditional medicines.

Women's production is, however, constrained by many factors, most of which stem from patriarchy and their subordinate status in the family and communities due to social customs and cultural practices. This results in their marginalisation from decision making in key socio-economic processes and activities. The National Gender Policy (NGP) 2013 affirms that South Sudan is a "highly unequal society" in terms of access, control, and ownership of resources between men and women.[663] Despite the provisions in the Land Act 2009[664] which accords equal rights to women and men, women`s land rights are still insecure, and even widows' land rights are often not respected. Land is generally owned and controlled by men.[665] The Comprehensive Country Gender Assessment 2012 shows that women in general have access to land but limited ownership and control over the key productive assets (Table 18-1).

Table 18-1: Access to and control, ownership of productive/economic assets

Resources	Access		Control		Ownership	
	Women	Men	Women	Men	Women	Men
Land	3	5	1	5	1	5
Labour	5	3	5	3	5	3
Food crops	5	4	5	4	5	4
Cash crops	2	5	1	5	1	5
Cows	2	5	1	5	1	5
Goats	2	5	1	5	1	5
Houses	2	5	4	5	1	5
Vehicles	2	5	2	5	2	5
Donkeys	3	5	1	5	1	5
Hoes	5	5	5	5	5	5

Note: Scale of 1 to 5 indicate low to high on access, control and ownership of asset.
Source: MOGC&SW. 2012. *Comprehensive Country Gender Assessment. Juba: MoGC&SW.*

A very few women in urban areas, especially the well-educated, can access, control and own any resource and asset of their choice through purchase. However, the situation is

[660] GRSS. 2011. *South Sudan Development Plan (SSDP) 2011-2013*. Juba: GRSS.
[661] Maina, Immaculata. 2011. *South Sudan Food Security: Gender Equity Scoping Report to CIDA South Sudan Programme.* Canada: Government of Canada.
[662] Maina, Immaculata. 2011. *South Sudan Food Security: Gender Equity Scoping Report to CIDA South Sudan Programme.* Canada: Government of Canada.
[663] MoGC&SW, 2013. *South Sudan National Gender Policy*. Juba: MoGC&SW.
[664] GOSS. 2009*. The Land Act*. Juba: GOSS.
[665] MoGC&SW, 2012. *Comprehensive Country Gender Assessment*. Juba: MoGC&SW.

different for women in rural areas who mostly access land belonging to their husbands or male relatives. Such gender disparities are more pronounced in rural than urban areas and among poorer women.

Other key constraints to women's production include access to agricultural inputs such as good quality seeds, skills, knowledge, technology, extension support, credit and markets. Where women have access to land, the use of traditional hand tools limits women's capacity to clear and cultivate large areas of land, especially where the households have no adult males or the men are unwilling to participate.

Extension workers in South Sudan are predominantly male, which creates constraints in face to face interactions with women producers in areas where there are strict taboos and social codes. This is confirmed in the World Bank, FAO and IFAD Gender in Agriculture Sourcebook[666] which notes that in some societies male extension workers are not able to have face to face contact with female farmers due to prevailing taboos. It was reported that women's absence in extension work was a result of low levels of literacy, the reluctance of the educated few to work in the rural areas and family commitments which made it difficult for them to move around. It noted that research and extension systems can become more effective in developing sustainable production systems, if they adopt a gender perspective and include the distinct roles, needs and opportunities for different members of the household, for example, gender responsive extension support. Ensuring that women benefit from research, extension and other elements of innovation and participation will require a significant shift in many agricultural services.

Access to credit is an important indicator of economic empowerment, since credit allows people to invest in business. South Sudan's financial infrastructure is underdeveloped and dominated by foreigners. Most women in South Sudan have few financial resources and do not have access to financial services due to lack of collateral, lack of information and decision making control.[667] A later gender assessment in 2013 showed that the majority of female respondents had never taken credit or loans from a financial institution.[668] Of those who had got credit or loans, they had obtained them mainly from their friends or microfinance institutions. Those who had never accessed any credit or loans indicated reasons such as high interest rates, lack of knowledge on procedures for borrowing, the stringent procedures involved in borrowing and lack of required collateral.

Access to markets allows people to expand agricultural production and increase their income through purchase of inputs and household supplies and sale of surplus products. Findings of the Country Gender Assessment (Table 18-2) in 2012 show that females tend to go to the market more frequently than males. The main reasons for not going to the market include shortage of money to purchase items, failure to identify need to go to the markets, poor transport worsened by heavy rains, long distances and bad roads. Recent conflict has destroyed many of these market routes.

Table 18-2: Access to market by gender

	% of respondents who go to the market					Number
	I don't go to the market.	Every day	Weekly	Monthly	Total	
Male	36.4	20.5	34.1	9.1	100	44
Female	6.4	51.1	34.0	8.5	100	47

[666] World Bank, FAO, IFAD. 2009. *Gender in Agriculture Sourcebook.* USA: World Bank.
[667] Maina, Immaculata. 2011. *South Sudan Food Security: Gender Equity Scoping Report to CIDA South Sudan Programme*. Canada: Government of Canada.
[668] Ravololonarisoa, Micheline. May 2013. *Gender Assessment of Sustainable Livelihoods and Private Sector Development in South Sudan.* Final Report to the Joint Donor Partners, South Sudan.

Total	20.9	36.3	34.1	8.8	100	91

Source: MOGC&SW, 2012 *Comprehensive Country Gender Assessment, Juba: MoGC&SW.*

Women's agricultural production is characterised by low inputs, low volume, low diversity, low yield, low technology and low output and hardly any income generating as most of the produce is destined for domestic consumption. Due to the low yields and post-harvest losses, harvests have to be supplemented by other sources of food, for example, fruits, vegetables, roots foraged from forests and other income generating activities such as weaving, grass cutting, charcoal and pottery, offering their agriculture labour for wages and food aid.

Women's disproportionate burden, for reproductive, household, productive and community roles, leaves little room for increased production. Some of the domestic roles are time consuming, for example, walking long distances to fetch firewood or forage for food from forests, and fetching water. Women have reported being overburdened by the introduction of development activities which do not take into account their existing workloads.

18.2 Roles and interests by gender

18.2.1 Crop

The World Bank, FAO and IFAD Gender in Agriculture Sourcebook notes that gender division of labour can sometimes be very complicated, with different fields being cultivated for different purposes by women, men and family groups,[669] with women and men growing different crops or different varieties of the same crop for different reasons such as yield, taste, convenience and type of benefit. Women would tend to grow more traditional crop varieties which may be low yielding, are hardier but taste better mostly for household consumption, while men would grow mostly cash crops destined for the market and income. As a result of their different roles and interests, women and men also have different knowledge and skills around crop production. Men also generally control profits from male crops and often a large portion of female crops and how income from sales is used.

18.2.2 Livestock

The livestock sector is characterised by cultural taboos, attitudes and values which prescribe ownership, control and gender division of labour for different livestock and livestock related tasks. The sector is generally dominated by men for the large animals, while women keep and may have control over small animals and ruminants which have lower value on the market, such as chicken, goats and pigs. Women's and men's reasons for keeping animals may also vary, with women keeping them for food and income, while men may keep them for status, bride wealth, social safety nets against disaster and income in times of hardship.

18.2.3 Forestry

Women and men usually have different connections and relationships with forests and other natural resources depending on their roles and socio-cultural values and taboos. For example, men may see forests as a source of animals to hunt, wood timber or charcoal while women will see forests as a source of fuel wood, food, fruit and medicines. Women also have a primary role in conserving and managing natural resources on which their communities depend, restoring woodlands and managing water supplies. Women and men are impacted differently by environmental degradation or changes in the ecosystem based on their different dependence on the environment.

18.2.4 Fisheries

The World Bank, FAO and IFAD Sourcebook notes that women and men often undertake different and changing roles in fishing depending on local norms in relation to resource

[669] World Bank, FAO, IFAD. 2009. *Gender in Agriculture Sourcebook.* USA: Word Bank

access, control, mobility, technology involved, and extent of commercialisation as well as the product. The report also notes that capture fishing is largely dominated by men while women are confined to fish processing (drying and smoking) and marketing, which are considered more appropriate given their reproductive roles.

18.3 Policy and legal framework for gender equality

The Transitional Constitution of South Sudan 2011 is the primary document through which women's rights are currently defined.[670] It espouses the principles of equality and non-discrimination (equality before the law and equal protection of the law regardless of sex - section 14). It includes a women's rights section in the bill of rights (section 16) where it accords women "full and equal dignity with men" (section 16.1). In section 16.2(a), it requires all levels of government to promote the participation of women in public life and prescribes a quota of 25% (affirmative action) for women's representation in the executive and legislative levels of government. It also affirms women's equal rights to education without discrimination (section 29) and to property and inheritance (section 16.5). It also directs enactment of laws to "combat harmful customs and traditions which undermine the dignity and status of women" (section 16.3).

Gender equality and socio-economic and political empowerment of women is one of the guiding principles of Vision 2040.[671] In section 3.2, it states that diversification in agriculture "will have advanced role of women in mainstream development". In section 3.7, it states that "no citizen will be disadvantaged because of gender, among other things, and that a future South Sudan will have eradicated negative social attitudes …and women will be free from all forms of sexual harassment and other prejudices". The strategies for delivery of the vision include promotion of gender equity and social change, mainstreaming of gender equality in all institutions of government and public life and adhering to constitutional provisions for women's representation.

The Land Act 2009[672] builds on the Transitional Constitution and prescribes women's rights to land on the basis of equality and non-discrimination (sections 8, 13.1, 13.2), rights to own and inherit land alongside the legal heir (section 13.4) and prescribes women's participation in land management structures (sections 45, 49) at the county and payam levels (but only one female representative which is less than the 25% prescribed in the Transitional Constitution). The South Sudan Vision 2040 acknowledges that the Land Act had not gone far enough to protect women's equal rights to land.

The South Sudan National Gender Policy 2013 provides guidelines for mainstreaming the principles of gender equality and the empowerment of women in the national development process, with the ultimate objective of making gender an integral part of all laws, policies, programs and activities of government institutions, the private sector and civil society. It adopts, as its guiding principles, commitment to the principle of equality as a human rights issue and subjecting traditional and cultural rights to human rights (Section 1.6.i and iii).[673]

The Agriculture Sector Policy Framework 2012 states that mainstreaming gender in agricultural policies and programs is essential for development success.[674] In includes gender specific commitments in key areas of the policy document, for example, policy choices and objectives (section 3.2), agriculture education and training (section 5.2), access to land, tenure security and land use (section 5.6), water resource development and irrigation, commercial agriculture production, value addition and marketing (Chapter 9 iii). It

[670] GRSS. 2011. *The Transitional Constitution of the Republic of South Sudan*. Juba: GRSS.
[671] GRSS. 2011. *Vision 2040: Towards Freedom, Equality, Justice, Peace and Prosperity for All*. Juba: GRSS.
[672] GOSS. 2009. *The Land Act*. Juba: GOSS.
[673] MoGC&SW, 2013. *South Sudan National Gender Policy*. Juba: GRSS.
[674] MAFCRDS. 2012. Agriculture Sector Policy Framework (ASPF): 2012-2017. Juba. GRSS

also contains a chapter dedicated to gender empowerment (Chapter 11 - Policy Guidelines on Social Justice), which provides guidelines for mainstreaming gender in the sector. The policy statement in that section is to “facilitate the implementation of gender empowerment programs in the sector and influence the same in other spheres”. The policy also commits to eradication of gender based differences in social and economic activities, access to resources and decision making processes and “encourage cultural and traditional norms, social customs that enable women`s participation in decision making processes and their ability to engage in productive and social activities in rural areas”. The policy also commits to the development of a rural women’s empowerment program.

All these documents acknowledge the critical role of women in agriculture; and, the marginalisation of women from key production processes and decision making as a result of social customs and cultural practices, which limit their ability to participate and contribute meaningfully to agriculture. However, the approach to gender mainstreaming is generally fragmented and inconsistent and gender equality commitments are still weak. There is a need to revise and strengthen the policy framework, especially at the subsector level to explicitly state this commitment in key areas such as guiding principles, policy statements, objectives, strategies and plans.

Expanding women’s rights in farming requires comprehensive action at a number of different levels e.g. information and capacity building; organisational and empowerment measures; and, legal assistance and advocacy. Mainstreaming gender in agricultural policies and programs is essential for development success. Gender mainstreaming will require women’s and men’s equal participation in agricultural development activities, not only in terms of numbers (quantitatively) but effectively (qualitatively) in ways that improve the quality of that participation, transform and improve their lives, and allow them to benefit equally. Special attention will be needed to remove barriers to women’s and men’s participation, build their respective capacities and promote their equal partnership in the productive process. Special measures (affirmative action) will be required to ensure that there is equal participation and benefit. Gender responsive budgeting is an important tool for mainstreaming gender in policies and programs.

References

References

ACP Fish II. 2012 *Final Technical Report. Preparation of a Fisheries Policy for South Sudan*. Project ref. No: EA-1.2-B1a. South Sudan. March 2012

ACP Fish II. 2012. *Final Technical Report. Study On the Regulatory Framework for small and medium enterprises in fisheries in south Sudan.* Project ref. N° EA-4.2-B20. July 2012

Action against Hunger-International website http://www.actionagainsthunger.org/blog/south-sudan-nation-building-step-step, and http://www.actionagainsthunger.org/countries/africa/south-sudan

African Development Bank. 2012. *South Sudan - A Study on Competitiveness and Cross Border Trade With Neighbouring Countries*. http://www.afdb.org/en/documents/document/south-sudan-a-study-on-competitiveness-and-cross-border-trade-with-neighbouring-countries-33438/

African Development Bank. South *Sudan Infrastructure Action Plan - A Program for Sustained Strong Economic Growth*. http://www.afdb.org/en/documents/document/south-sudan-infrastructure-action-plan-a-program-for-sustained-strong-economic-growth-full-report-33384/

African Development Bank Group. Temporary Relocation Agency. 2013. *South Sudan: An Infrastructure Action Plan. A Program for Sustained Strong Economic Growth.* Tunisia.

African Development Solutions website http://adesoafrica.org/abuk-atak-akot-back-on-her-own-two-feet-with-livelihood-support-in-south-sudan/

African Economic Outlook. http://www.africaneconomicoutlook.org/en/countries/east-africa/south-sudan/

African Union http://www.au.int

African Union Interafrican Bureau of Animal Resources. 2011. *The Eradication of Rinderpest from Africa: A Great Milestone.* Nairobi: AU-IBAR

African Union, Economic Commission for Africa and African Development Bank. 2010. *Framework and guidelines on land policy in Africa*. Addis Abeba: AU, ECA and AfDB.

African Union. 2003. *Protocol to the African Charter on Human and Peoples Rights on the Rights of Women in Africa* Adopted by the 2nd Ordinary Session of the Assembly of the Union. Maputo, 11 July 2003

Agency for Technical Cooperation and Development website http://www.acted.org/en/south-sudan

Agency for Technical Cooperation and Development. 2013. *ACTED South Sudan Annual Report 2012*. Wau.

Ahmed, A. H. Ali. 2008. *The Fifth population census in Sudan: A census with a full coverage and a high accuracy*. United Nations Statistics Division.

Ali N.M., 2011. *Gender and Statebuilding in South Sudan.* United States Institute of Peace, 2301 Constitution Ave., NW, Washington, DC 20037

Amos, Michael. 2011. South Sudan delays membership in regional bloc. *Daily Nation.* 17 September. http://www.nation.co.ke

Aranson. S. 2003. *The drying of fish and utilization of geothermal energy; the Icelandic experience* International Geothermal Conference, Reykjavík, Sept. 2003 Session #8

Asian Development Bank. 2011. Handbook of Style and Usage. http://www.adb.org/documents/handbook-style-and-usage

Atari,D.O, S. Abdelnour, K. McKague, and R. Wager,. 2009 *Technical, Vocational, and Entrepreneurial Capacities in Southern Sudan: Assessment and Opportunities.* Centre for Refugee Studies, York University: Toronto.

Atil, M. 2009. *Expanding the Provision and Impact of Microfinance in Southern Sudan*. Juba: World Bank Southern Sudan Office.

Aweil Window Of Opportunities and Development Agency website https://www.facebook.com/pages/AWODA-South-Sudan/290423771084588?ref=stream

Banga International website http://foodsecuritycluster.net/sites/default/files/FSL%20Monthly%20meeting%20NFRs%2030th%20August%202012.pdf

Bangladesh Rural Advancement Committee. 2009. Realizing Potential South Sudan Annual Report 2009. BRAC South Sudan

Bank of Sudan. 1982. *Annual Report 1981*. Khartoum: Bank of Sudan.

Bank of Uganda and Uganda Bureau of Statistics. 2012. *The Informal Cross Border Trade Survey Report* 2011. Kampala: Bank of Uganda and Uganda Bureau of Statistics.

Bank of Uganda http://www.bou.or.ug

Banks, R., Gunawardena, A, Taylor-Moore, N, Fernando, C, Joseph, L, Abeysekera, N. 2007: *Fisheries Sector Institutional Analysis and Capacity Assessment, Sri Lanka,.* Internal Report to the Food and Agriculture Organization of the United Nations, Rome pp 150 plus appendices

Baseline Technical Team. 2010. *Joint Baseline Survey Report on the Agriculture and Animal Resources in Southern Sudan*. Juba: GOSS

Bastin, G. 2011 *Appraisal of Business Opportunities in Southern Sudan. Final report on findings of the appraisal.* Prepared by: Geoffrey Quartermaine Bastin, Senior Advisor, Global Business, Juba, March 2011. (REDACTED to remove references to the client for whom the report was prepared.).

Baumann P O Maximilian 2010. *A study to Identify and Assess the Relative Importance of Priority Animal Diseases in Southern Sudan*. Juba: LESP/VSF-Belgium/GOSS

Behrman.J., Karelina.Z., Peterman.J., Roy.S & Amelia Goh. 2012. *A Toolkit on Collecting Gender & Assets Data in Qualitative & Quantitative Program Evaluations.* Developed as part of the Evaluating the Impacts of Agricultural Development Programming on Gender Inequalities, Asset Disparities, and Rural Livelihoods (GAAP) Project of the International Food Policy Research Institute (IFPRI) and the International Livestock Research Institute (ILRI)

Beveridge. M., 2011 *Update on fish value chain development in Uganda* CGIAR Research Programon Livestock and Fish Planning meeting Nairobi, 27-29September 2011. Powerpoiint Presentation.

Bickel, G, M. Nord, C. Price, W. Hamilton, and John Cook: 2000. *Guide to Measuring Household Food Security,* Revised 2000. U.S. Department of Agriculture, Food and Nutrition Service, Alexandria VA. March, 2000.

Biswas, N. 2011. *Turning the tide: Women's lives in the fisheries and the assault of capital*. Occasional Paper. Chennai, ICSF. 41p. http://www.icsf.net/

Bojang. F. (ed). 2012. *Managing Africa's water resources: integrating sustainable use of land, forests and fisheries* FAO Regional Office for Africa. http://www.fao.org/africa/publications/nature and Faune magazine. Accra, Ghana 2012

Bong. O., 2009. *Financing Sustainable Transport Infrastructure.* Powerpoint presentation at the Annual Transport Sector Policy and Planning Workshop. August 19TH-21ST, 2009. Ministry of Transport and Roads. GOSS.

CAFOD website http://www.cafod.org.uk/About-Us/Where-we-work/South-Sudan

CAMP Task Team. 2012. *Preliminary Administrative and Public Financial Management Study.* Formulation of the Comprehensive Agricultural Development Master Plan (CAMP) of the Republic of South Sudan. JICA Consultant Team Report

CAMP Task Team. December 2012. *Compilation of Development Assistance Project Profiles in South Sudan's Agricultural Sector. December 2012.* Unpublished.

Canadian International Development Agency website http://www.acdi-cida.gc.ca/acdi-cida/acdi-cida.nsf/eng/JUD-217124359-NT2

CARE website http://www.careinternational.org.uk/what-we-do/disaster-relief/current-emergency-interventions/2080-south-sudan-number-of-people-in-need-of-assistance-is-rising

Catholic Organisation for Relief & Development Aid website http://www.cordaid.org/en/countries/south-sudan/

Catholic University of South Sudan. 2012-2013. *Handbook and Student Guide Fifth Academic Year.* Wau.

CDR. Dr. John Garang de Mabior, Chairman of SPLM/A, October 2006, *Local Government Framework for Southern Sudan*, Juba

Central Bank of Kenya. 2004. *Annual Report* 2004. Nairobi: Central Bank of Kenya.

Central Bank of Sudan. 2007. *Annual Report* No. 47. Khartoum: CBS.

Central Bureau of Statistics and Southern Sudan Centre for Census, Statistics and Evaluation. 2009. *5th Population and Housing Census 2008 Priority Results*. Khartoum: Government of the Republic of the Sudan.

Central Bureau of Statistics. 2009. *Statistical Year Book for the Year 2009.* Khartoum: Central Bureau of Statistics.

Central Intelligence Agency, United States of America. 21 February 2013. World Factbook. https://www.cia.gov/library//publications/the-world-factbook/rankorder/2155rank.html

Central Intelligent Agency. 2013. The World Fact Book. https://www.cia.gov/library/publications/the-world-factbook/ (accessed on 9th June 2013)

Cheke, Robert A et al. 2012. Soil contamination and persistence of pollutants following organophosphate sprays and explosions to control red-billed quelea (*Quelea quelea*). *Pest Management Science* 2013; 69: 386–396.

Cheke, Robert A. et al. 2012. Effects of the organophosphate fenthion for control of the redbilled quelea (Quelea quelea) on cholinesterase and haemoglobin concentrations in the blood of target and non-target birds. *Ecotoxicology* (2012) 21:1761–1770.

Chemonics International Inc. 2003. *Agricultural Enterprise Finance Program: A Component of the Southern Sudan Agricultural Revitalization Program (SSARP). Second Annual Workplan October 1, 2003 – September 30, 2004.* Unpublished.

Christian Mission for Development website http://cmdsouthsudan.org/index.php?option=com_content&view=article&id=71&Itemid=53

Christian Recovery and Development Agency website http://www.cradass.org/projects.html

Code of Federal Regulations of the United States of America (2012) *Table 3 to Part 679 - Product Recovery Rates for Groundfish Species and Conversion Rates for Pacific Halibut* Title 50. Wildlife and Fisheries. Chapter VI Fishery Conservation and management. NOAAA Department of Commerce. Part 679

Common Humanitarian Fund South Sudan. 2013. *2012 Annual Report*. Juba.

Common Market for Eastern and Southern Africa http://www.comesa.int

Common Market for Eastern and Southern Africa. *COMESA at glance*. http://comstat.comesa.int/Documents/COMESA at a glance.pdf

Common Market for Eastern and Southern Africa. COMSTAT Data Portal. http://comstat.comesa.int/

Common Market for Eastern and Southern Africa, 2009. Policy Framework for Food Security in Pastoral Areas. Comprehensive African Agriculture Development Programme, Pillar III Consultative Draft. COMESA, December 2009.

Concern Worldwide website https://www.concern.net/where-we-work/africa/south-sudan

Cooperazione e sviluppo website http://www.cesvi.eu/?pagina=pagina_generica.php&id=628

Craig, G. M., ed. 1991. *The Agriculture of the Sudan*. New York: Oxford University Press.

Crul, R.C.M. 1992, *Models for estimating potential fish yields of African inland waters*. CIFA Occasional Paper. No. 16. Rome, FAO. 1992. 22p.

Dan Church Aid website http://www.danchurchaid.org/projects/africa/sudan

Daniels. R. 2001. *Poverty Alleviation in the Subsistence Fisheries Sector: A Microeconometric Analysis.* Working Paper No 01/46 March 2001 Development Policy Research Unit, University of Cape Town

Danish Refugee Council website http://drc.dk/relief-work/where-we-work/east-and-central-africa/south-sudan/

De Silva D.A.M., 2011. *Value chain of fish and fishery products: origin, functions and application in developed and developing country markets*. FAO

Deng. D.K. 2012. *Handbook on Community Engagement*. *A 'good practice' guide to negotiating lease agreements with landowning communities in South Sudan.* South Sudan Law Society. 80pp

Department for International Development South Sudan. 2013. *Operational Plan 2011-2015 DFID South Sudan*. Juba: DFID South Sudan. And https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209164/South-Sudan.pdf

Department of Fisheries Cambodia. 2001. *Masterplan for Fisheries 2001-2011.* Department of Fisheries. Phnom Phen.

Deutsche Gesellschaft für Internationale Zusammenarbeit website http://www.giz.de/en/worldwide/313.html

Dey M.M., Kambewa P., Prein M., Jamu D., Paraguas F.J., Pemsl D.E., and Briones R.M. 2007. *Development and dissemination of integrated aquaculture–agriculture technologies in Malawi. In: The Impact of Natural Resource Management Research: Studies from the CGIAR* (Zilberman D. and Waibel H., Eds). CAB International: Wallingford, UK.

Diao, X., V. Alpuerto, R. Folledo, C. Guvele and L. You. 2009. "Assessing Food Security and Development Opportunities in Southern Sudan." Paper prepared by Development Strategy and Governance Division of IFPRI for US Agency for International Development. Washington, D.C.: IFPRI.

Director General of Education-New Sudan. Chairperson; National Curriculum Development Committee. 2002. *Syllabus for Primary Schools. Volume 2: Primary 6-8.*

Dyson David, 2008: Veterinary Laboratory Diagnostic capacity for Southern Sudan. Juba: LESP/VSF-Belgium/GOSS

East African Community http://www.eac.int/

East African Community Secretariat. 2012. *Communiqué of the 14th Ordinary Summit of EAC Heads of State*. Arusha: East African Community.

East African Community Secretariat. 2012. *East African Community Facts and Figures - 2012*. Arusha: East African Community.

Edmonds, E.V. 2009. *Defining child labour: A review of the definitions of child labour in policy research.* International Labour Office, International Programme on the Elimination of Child Labour - Geneva: ILO

Elliott, Clive CH, Boaz N. Mtobesya & Robert A. Cheke. 2014. Alternative approaches to Red-billed *Quelea Quelea quelea* management: mass-capture for food. *Ostrich: Journal of African Ornithology*, 85:1, 31-37.

Embassy of the Kingdom of the Netherlands in South Sudan. 2012. *Multi Annual Strategic Plan South Sudan 2012-2015*. Juba: Embassy of the Kingdom of the Netherlands in South Sudan

Environmental Governance http://ecogov.blogspot.com

Equatoria Teak Company. 2012. *Forest Management Plan.*

European Union and United States Agency for International Development. 2011. *Seed System Security Assessment Southern Sudan 2010*. Juba.

European Union website http://eeas.europa.eu/south_sudan/

European Union. 2004. *Methodological Guidelines for Regional Studies. Regional Socio-economic studies on Employment and the level of dependency on fishing.* Megapesca Lda, Portugal

European Union. 2012. *Concept Note for Natural Resources Sector Working Group Meeting in September 2012*. Juba.

European Union. 2012. *Terms of Reference for Sector Working Groups 2011*.Juba.

Famine Early Warning Systems Network. 2012. *Production and market flow maps: South Sudan First Season. Sorghum.* Juba

Famine Early Warning Systems Network. 2011. *Production and market flow maps: South Sudan First Season. Maize.* Juba.

Famine Early Warning Systems Network. 2011. *Production and market flow maps: South Sudan Second Season. Maize.* Juba.

Famine Early Warning Systems Network. 2012. *Production and market flow maps: South Sudan Second Season. Sorghum.* Juba

Famine Early Warning Systems Network. July 2013. *South Sudan Price Bulletin*. Juba.

Faull.M. 2009.*HIV in Southern Sudan with a Focus on Ex-combatants and their Destination Communities.* Justice Africa. May 2009

Feeder Road Screening Results. August 19, 2011., Prepared by the Feeder Roads Technical Committee., GRSS.

Food and Agriculture Organization of the United Nations (Undated) Impact of HIV/AIDS on Fishing Communities. Policies to support Livelihoods, Rural Development and Public Health. DFID/FAO Sustainable Fisheries Livelihoods Programme (http://www.sflp.org)

Food and Agriculture Organization. 2013. *Agribusiness public-private partnerships – A country report of Kenya.* Kenya: FAO.

Food and Agriculture Organization of the United Nations and World Food Programme. 2004. *Crop and Food Security Assessment Mission to Sudan Special Report.* 11 February. Rome: Food and Agriculture Organization of the United Nations and World Food Programme.

Food and Agriculture Organization of the United Nations and World Food Programme. 2007, First Ever Agricultural and Livestock Census Uncovers Niger's Hidden Wealth. FAONewsroom. http://www.fao.org/newsroom/en/field/2007/1000727/

Food and Agriculture Organization of the United Nations and World Food Programme. 2009. *Crop and Food Security Assessment Mission to Southern Sudan Special Report*. 6 February. Rome: Food and Agriculture Organization of the United Nations and World Food Programme.

Food and Agriculture Organization of the United Nations and World Food Programme. 2010. *Crop and Food Security Assessment Mission to Southern Sudan Special Report*. 17 February. Rome: Food and Agriculture Organization of the United Nations and World Food Programme.

Food and Agriculture Organization of the United Nations and World Food Programme. 2011. *Crop and Food Security Assessment Mission to Southern Sudan Special Report*. 12 January. Rome: Food and Agriculture Organization of the United Nations and World Food Programme.

Food and Agriculture Organization of the United Nations and World Food Programme. 2012. *Crop and Food Security Assessment Mission to South Sudan Special Report*. 8 February. Rome: Food and Agriculture Organization of the United Nations and World Food Programme.

Food and Agriculture Organization of the United Nations and World Food Programme. 2013. *Crop and Food Security Assessment Mission to South Sudan Special Report*. 22 February. Rome: Food and Agriculture Organization of the United Nations and World Food Programme.

Food and Agriculture Organization of the United Nations South Sudan. 2012. *Common Programming Framework to End Drought Emergencies in the Horn of Africa Country Programme Paper for South Sudan*. Draft 23 March 2012.

Food and Agriculture Organization of the United Nations, SEAGA 2004. *Addressing HIV/AIDS through Agriculture and Natural Resource Sectors: a guide for extension workers.* Gender and Population Division and Policy Assistance Division

Food and Agriculture Organization of the United Nations, SEAGA. 2003. *Gender analysis in macroeconomic and agricultural sector policies and programmes.* Gender and Population Division and Policy Assistance Division

Food and Agriculture Organization of the United Nations, SEAGA. 2012. *Field Level Handbook.* Prepared in collaboration with the Socio-economic and Gender Analysis (SEAGA) Programme, Gender and Development Service

Food and Agriculture Organization of the United Nations. 2012. *Fermented fish in Africa. A study on processing, marketing and consumption*, prepared by Kofi Manso Essuman, Fish Utilization and Marketing Service,

Fishery Industries Division. FAO FISHERIES TECHNICAL PAPER 329. FAO. Rome, 1992. www.fao.org/docrep/T0685E/T0685E00.htm

Food and Agriculture Organization of the United Nations, International Institute for Applied Systems Analysis, International Soil Reference and Information Centre, Institute of Soil Science - Chinese Academy of Sciences and Joint Research Centre of the European Commission. February 2012. *Harmonized World Soil Database Version 1.2*

Food and Agriculture Organization. 2013. *Maize Lethal Necrosis Disease: a snapshot*. Issued by Food Security and Nutrition Working Group (FSNWG), FAO. prepared by FAO Sub-Regional Emergency Office for Eastern & Central Africa.

Food and Agriculture Organization of the United Nations. 2008. *Myanmar Agricultural Sector Review*. Investment Strategy.FAO.

Food and Agriculture Organization of the United Nations. 2008. Sudan Fisheries Country Profile. http://www.fao.org/fishery/countrysector/FI-CP_SD/en

Food and Agriculture Organization of the United Nations. 2009. *Climate change implications for fisheries and aquaculture.* FAO Fisheries and Aquaculture Technical Paper 530

Food and Agriculture Organization of the United Nations. 2010. *Plan of Action for Southern Sudan. Emergency response and rehabilitation for food and agriculture. August 2010 – August 2012.* Emergency Operations and Rehabilitation Division, FAO, Rome

Food and Agriculture Organization of the United Nations. 2010. *Plan of Action for Southern Sudan August 2010 – August 2012.* FAO Rome 2010

Food and Agriculture Organization of the United Nations. 2010. *The State of World Fisheries and Aquaculture 2010*.

Food and Agriculture Organization of the United Nations. 2011. *Food security through effective animal disease control and fish production*. CAP Project Sheet 908 20122810. Project Code SSD-11/A/38720

Food and Agriculture Organization of the United Nations. 2011. *Guidelines for the Preparation of Livestock Sector Reviews.* Animal Production and Health Guidelines. No. 5. Rome.

Food and Agriculture Organization of the United Nations. 2011. *Land Cover Attars of the Republic of South Sudan*. Juba: FAO

Food and Agriculture Organization of the United Nations. 2012. A field guide to the types of insects and mites infesting cured fish. http://www.fao.org/docrep/003/t0146e/T0146E02.htm

Food and Agriculture Organization of the United Nations. 2012. Code of Conduct for Responsible Fisheries (and accompanying guidelines) http://www.fao.org/docrep/005/v9878e/v9878e00.HTM

Food and Agriculture Organization of the United Nations. 2012. *Ten lessons for more effective co-management in small-scale fisheries Regional* Fisheries Livelihood Programme for South and Southeast Asia

Food and Agriculture Organization of the United Nations. 2013 *Gender mainstreaming in small-scale fisheries* Regional Fisheries Livelihoods Programme for south and South East Asia

Food and Agriculture Organization of the United Nations.1964. *Modern Fishing Gears of the World.* Second FAO World Fishing Gear Congress, London, 1963 Published by Fishing News (Books) Ltd, London June 1964

Food and Agriculture Organization of the United Nations.1989 *Management of Fish Stocks and Fisheries of Deep and Shallow Lakes of Eastern/Central/Southern Africa.* Regional Project for Inland Fisheries Planning Development and Management in Eastern/Central/Southern Africa RAF/87/099-WP/02/89 (EN)

Food and Agriculture Organization of the United Nations.2012. *Country Report Juba, South Sudan.* Regional Trade on Fish and Fish Products. Project TCP/RAF/3308

Food and Agriculture Organization of the United Nations. 2005. *The State of Food and Agriculture: Agricultural Trade and Poverty, Can trade work for the poor? 2005.* Rome.

Food and Agriculture Organization of the United Nations. 2012. *The State of Food and Agriculture: Investing in agriculture for a better future 2012*. Rome

Fresquez, P. R and J.K. Ferenbaugh (undated) *Moisture conversion ratios for the foodstuffs and biota environmental programs at Los Alamos National Laboratory. (Revision 1)* Los Alamos National Laboratory.

Gelmon.l. 2011. *HIV Epidemic and Response Review Report.* Southern Sudan AIDS Commission, April 2011.

Glichen. Lt-Colonel & Count [ed], 1905. *The Anglo Egyptian Sudan: A compendium prepared by officers of the Sudan Government*. HM Stationary Office, London.

GOAL website http://www.goal.ie/South_Sudan/499

Government of Ethiopia. 2007. *Livestock Development Master Plan Study Phase I Report – Data Collection and Analysis.* Volume B – Meat Production November 2007. Ministry of Agriculture and Rural Development

Government of Republic of South Sudan. 2011. Transitional Constitution of the Republic of South Sudan.

Government of Southern Sudan, 2009. *Local Government Act 200.* Juba

Government of Southern Sudan, Ministry of Agriculture and Forestry, Ministry of Animal Resources and Fisheries. 2010. *Final Draft National Agriculture and Livestock Extension Policy.* Juba. Unpublished.

Government of Southern Sudan, Southern Sudan Centre for Census, Statistics and Evaluation. 2007. *Southern Sudan Livelihood Profile 2007*. Juba.

Government of Southern Sudan, Southern Sudan Centre for Census, Statistics and Evaluation. 2010. *Southern Sudan Counts: Tables from the 5th Sudan Population and Housing Census, 2008*. Juba.

Government of Southern Sudan. 2010. *Final Draft. National Agricultural Extension Policy for Southern Sudan*. Prepared by the National Agricultural Extension Taskforce.

Government of Southern Sudan. 2005. *The Interim Constitution of Southern Sudan*. Juba.

Government of Southern Sudan. 2006. *South Sudan Fisheries Policy 2006-2011*. MARF. Matthias Wafula, Fisheries Consultant.

Government of Southern Sudan. 2007. *The laws of Southern Sudan. The Southern Sudan Research Council Act 2007.* The Southern Sudan Gazette No. 1 Volume I dated 10th February, 2009. Printed by Ministry Legal Affairs and Constitutional Development, by Order of the Government.

Government of Southern Sudan. 2007. *Water Policy.* Ministry of Water Resources and Irrigation

Government of Southern Sudan. 2008. *HIV/AIDS Policy* GOSS HIV/AIDS Commission 2008.

Government of Southern Sudan. 2009. *The Investment Promotion Act, 2009*. Juba: GOSS.

Government of Southern Sudan. 2009. *The Land Act, 2009*. Juba: GOSS.

Government of Southern Sudan. 2009. *The laws of Southern Sudan. The Investment Promotion act 2010.* Printed by Ministry Legal Affairs and Constitutional Development

Government of Southern Sudan. 2009. *The Local Government Act, 2009*. Juba: GOSS.

Government of Southern Sudan. 2010. *Government of Southern Sudan Growth Strategy.* Ministry of Finance and Economic Planning

Government of Southern Sudan. 2010. *Ministry of Animal Resources and Fisheries Upper Nile State Short Term Strategic Plan* 2010-12.

Government of Southern Sudan. 2011. *Fisheries Management Cost/Benefit.* Newsletter of the Government of South Sudan. Department of Fisheries Ministry of Animal Resources and Fisheries. Technical Note #3, February 2011

Government of Southern Sudan. 2011. *Fisheries Policy for Sustaining Fisheries as a Renewable Resource to benefit Fisherfolk***.** Newsletter of the Government of South Sudan Department of Fisheries Ministry of Animal Resources and Fisheries, GOSS. Technical Note #5

Government of Southern Sudan. 2011. *South Sudan Development Plan 2011-2013.* Ministry of Finance and Economic Planning

Government of Southern Sudan. 2011. *The Co-operative Societies Act, 2011*. Juba: GSS.

Government of Southern Sudan. 2011. *The Role of Fish in Food Security in South Sudan.* Newsletter of the Government of South Sudan, Department of Fisheries Ministry of Animal Resources and Fisheries, Technical Note #2 February 2011

Government of Southern Sudan. 2011. *The Transitional Constitution of Southern Sudan*. Juba: GOSS.

Government of Southern Sudan. Ministry of Education, Science and Technology. 2007. *Secondary Education. Syllabus for Southern Sudan Certificate of Secondary Education. Volume 1.* Juba.

Government of Sudan, Sudan People's Liberation Movement, World Bank and United Nations. 2005. Joint Assessment Mission Sudan. Juba: UN and WB.

Government of the Republic of South Sudan 2012. *The Status, Potential and the strategy for Development of the Livestock and Fisheries Sectors***.** Presentation to The first Investment Summit of the Government of South Sudan, 20th - 22nd, March 2012, Juba, by Dr. Martin Elia Lomurö, Minister, Ministry of Animal Resources and Fisheries.

Government of the Republic of South Sudan, Directorate of Cooperative Development/ Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2013. *Type of Cooperative in the Republic of South Sudan* (Unpublished). Juba.

Government of the Republic of South Sudan. 2011. *Republic of South Sudan Investor* Guide. Juba

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2010. *National Agriculture and Livestock Policy.* Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2011. *South Sudan Development Plan 2011-2013*. Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2012. *Agriculture Sector Policy Framework: 2012-2017*. Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2012. *Policy Framework and Strategic Plans 2012-2016.* Juba

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2013. *Agriculture Mechanisation Policy*. Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2013. *Horticulture Development Policy*. Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2013. *Plant Protection Policy: 2012-2017*. Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2013. *Soil Health and Conservation Policy*. Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2013. *Strategic Plan 2013-18*. Juba.

Government of the Republic of South Sudan, Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. 2013. *Training and Capacity Development Policy*. Juba.

Government of the Republic of South Sudan, Ministry of Animal Resources and Fisheries. 2012. *The Laws of South Sudan The Fisheries and Aquaculture Development Bill 2012* (DRAFT)

Government of the Republic of South Sudan, Ministry of Animal Resources and Fisheries/Ministry of Agriculture and Forestry. 2010. *The Joint Baseline Survey Report on the Agriculture and Animal Resources in Southern Sudan*. Juba.

Government of the Republic of South Sudan. Ministry of Electricity, Dams, Water Resources and Irrigation. 2013. *Irrigation Development Master Plan: Progress Report 1 (Draft).* 2013. Juba

Government of the Republic of South Sudan, Ministry of Water Resources and Irrigation. 2010. *Assessment, Design, Installation of Irrigation Pumps and Rehabilitation of Water Control Infrastructures, Inception Phase, Preliminary Assessment Works on Renk Project, Final Report*. Juba.

Government of the Republic of South Sudan, National Bureau of Statistics. 2011. *South Sudan Statistical Yearbook 2011*. Juba.

Government of the Republic of South Sudan, National Bureau of Statistics. 2011. *South Sudan, Cost-to-Market Report, an Analysis of Check-points on the Major Trade Route in South Sudan.* Juba.

Government of the Republic of South Sudan, National Bureau of Statistics. 2012. *National Baseline Household Survey 2009.* Juba.

Government of the Republic of South Sudan, South Sudan, Ministry of Environment, and United Nations Environment Programme, January 2012. Environmental Impacts Risks and Opportunities Assessment: Natural resources management and climate change in South Sudan. p.36. Juba.

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

Government of the Republic of South Sudan. 2011. *South Sudan Final Draft Agricultural Research Policy.* Ministry of Agriculture and Forestry. July 2011

Government of the Republic of South Sudan. 2011. T*he Transitional Constitution of the Republic of South Sudan, 2011*. Juba.

Government of the Republic of South Sudan. 2012. *2011/2012 Budget Speech to the National Legislative Assembly by Hon. Kosti Manibe Ngai, Minister of Finance and Economic Planning*. Juba: Government of the Republic of South Sudan.

Government of the Republic of South Sudan. 2012. *Appropriation Act (April, May, and June) 2012*. Juba.

Government of the Republic of South Sudan. 2012. *Approved Budget 2012/13*. Juba

Government of the Republic of South Sudan. 2012. *Final Resolutions of the Second Governors' Forum 26-29 November 2012, Freedom Hall, Juba*. Juba: Government of the Republic of South Sudan.

Government of the Republic of South Sudan. 2012. *Investment Opportunities in Livestock and Fisheries Sectors in South Sudan*. MARF, Department of Investment and Marketing. 1/1/2012 (DRAFT)

Government of the Republic of South Sudan. 2012. *National Strategy for Cooperative Development 2012-2015*. Juba.

Government of the Republic of South Sudan. 2012. *The Co-operative Societies Act.* Juba.

Government of the Republic of South Sudan. 2012. *The Ministry of Animal Resources and Fisheries. Policy Framework and Strategic Plans 2012 -2016.* Juba: MARF 2012

Government of the Republic of South Sudan. 2013. *South Sudan Land Commission*. http://www.goss-online.org/magnoliaPublic/en/Independant-Commissions-and-Chambers/Land-Commision.html (accessed on 12 July 2013)

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

Government of the Republic of South Sudan. *The National Effort for Agricultural Transformation, Draft Integrated Zonal Transformations in South Sudan*, Juba, South Sudan, February 2013. Juba :(Presentation slides).

Government of the Republic of South Sudan. 2011. *Vision 2040: Towards Freedom, Equality, Justice, Peace and Prosperity for All.* Juba: GRSS.

Government of the Republic of the Sudan and Sudan People's Liberation Movement/Sudan People's Liberation Army. 2005. The Comprehensive Peace Agreement between the Government of the Republic of the Sudan and the Sudan People's Liberation Movement/Sudan People's Liberation Army.

Government of the Republic of the Sudan, Ministry of Finance and Economic Planning, Population Census Office, Department of Statistics. 1989. *Population and Housing Census of the Sudan, 1983*. Khartoum: Central Bureau of Statistics.

Government of the Republic of the Sudan, Sudan People's Liberation Movement, World Bank and United Nations Development Programme. 2005. *Joint Assessment Mission: Framework for Sustained Peace, Development and Poverty Eradication. Volume III Cluster Reports.*

Government of the Republic of the Sudan. 2011. *National Strategy for Cooperative Development 2011-2015.* Ministry of Agriculture, Forestry, Cooperative and Rural Development

Government of the Republic of the Sudan. 2011. *South Sudan Development Plan 2011-2013. Realising Freedom, Equality, Justice, Peace and Prosperity for all*. Ministry of Finance and Economic Planning 2011

Government of the Republic of the Sudan. 2011. *Training and Capacity Development Policy* (internal document)

Government of the Republic of the Sudan. 2012. *Agreement between the Republic of Sudan and the Republic of the South Sudan on Border Issues*. Addis Ababa. 27th September 2012

Government of the Republic of the Sudan. 2012. *Annual Needs Assessment Survey 2012*

Government of the Republic of the Sudan. 2012. *Environmental Impacts, Risks and Opportunities. Natural resources management and climate change in South Sudan*. Ministry of Environment & United Nations Development Programme 2012

Government of the Republic of the Sudan. 2012. *South Sudan Agriculture Stocktaking Report. NEPAD.*Ministry of Agriculture, Forestry, Cooperatives and Rural. Development, Ministry of Animal Resources and Fisheries.

Government of the Republic of the Sudan. 2013 *Annual Needs Assessment Survey 2013*

Government of the Republic of the Sudan. Department of Statistics. 1961. *First Population Census of Sudan 1955/1956 Final Report*. Khartoum: Central Bureau of Statistics.

Government of the Republic of the Sudan. Department of Statistics. 1977. *Second Population Census of Sudan 1973 Final Repor*t. Khartoum: Central Bureau of Statistics.

Government of Uganda. 2005. *Strategy for reducing the impact of HIV/AIDS on Fishing Communities.* Ministry of Agriculture, Animal Husbandry and Fisheries. October 2005

Government of Uganda. 2005. *Uganda Strategy for reducing the impact of HIV and AIDS in Fishing Communities.* Summary Document 2005. Ministry of Agriculture and Fisheries.

Government of Uganda. 2010. *Investment opportunities in South Sudan for Ugandans.* Powerpoint presentation by Uganda Embassy, Juba

Government of Uganda. 2012. *Global AIDS Response Progress Report: Uganda Jan 2010-Dec 2012* Uganda AIDS Commission April 2012

Graham, J. 2010. Cattle-izing Change: Livestock Programming in South Sudan. John Graham, Senior Policy and Strategic Analysis Advisor, USAID Ethiopia. TDY to South Sudan, June 29 – July 12, 2020.

Human Security Baseline Assessment for Sudan and South Sudan. 2012. *Women and Armed Violence in South Sudan.* Sudan Human Security Baseline Assessment (HSBA) * 47 Avenue Blanc * 1202 Geneva, Switzerland http://www.smallarmssurveysudan.org

Humane Development Council website http://hdcssudan.org/profile

Humanitarian Policy Group. 2009. Getting it Right: Understanding Livelihoods to Reduce the Vulnerability of Pastoral Communities. ODI Synthesis Paper.

ICCO website http://www.iccokia.org/centraleastafrica/about-us/countries/sudan/

Inamori. T. and K.Ishikawa. 2012. Draft Study of Data Availability for the Comprehensive Agricultural Development Master Plan (CAMP) formulation. CAMP September 2012

International Fund for Agricultural Development. 2008. *Progress in East and Southern Africa, Issue Number 9*. http://www.ifad.org/newsletter/pf/9.htm

Inter-Governmental Authority on Development http://www.igad.org

Inter-Governmental Authority on Development LPI. 2010. The Emergency Industry and the Shaping of Innovative Response Capacity. IGAD Livestock Policy Initiative Brief No. 9.

Intermon Oxfam website http://www.oxfam.org/en/emergencies/darfur-chad/oxfam-international-work-sudan

International Development Association and International Finance Corporation. 2013. *Interim Strategy Note (FY2013-2014*) *for the Republic of South Sudan*. Washington D.C.: World Bank.

International Organisation for Migration.2013. *Returnees to South Sudan*. Juba: IOM. (Internal document based on IOM Tracking and Monitoring Database)

International Organization for Migration. 2012. *Annual Report 2012*. Juba.

International Rescue Committee website http://www.rescue.org/irc-south-sudan-0

Islamic Relief Worldwide website http://www.islamic-relief.com/wherewework/News/15-433-sd-islamic-relief-concerned-about-south-sudan.aspx

Itto. A and T. Joseph. 2004. *Southern Sudan Baseline Study on the Status of Women in the New Sudan: Report for Mundri and Yei Counties, Western Equatoria, Southern Sudan.*

IUSS Working Group WRB. 2007. *World Reference Base for Soil Resources 2006*. First update 2007. World Soil Resources Report No. 103. Rome: FAO

Japan International Cooperation Agency. September 30, 2013. *Supporting Document for the Project for Capacity Development on Sustainable Road Maintenance and Management in Juba.* Unpublished.

Japan Internatiomal Cooperation Agency website http://www.jica.go.jp/south_sudan/

Joint Aid Management International website http://www.jointaidmanagement.org/pdfs/JAMUSA/JAM_2012_4th_Quarter_Report.pdf

Kashorte.M., 2003. *Moving subsistence fisheries to commercial fisheries in South Africa*. Degree Thesis as part of United Nations University Fisheries Training Programme.

Kenya National Bureau of Statistics. 2009. *Kenya 2009 Population and Housing Census Highlight*. Nairobi: KNBS.

Kenyan Export Promotion Corporation. 2012. *Market Survey Report for South Sudan.* (Presentation slides)

Kilimo Trust 2009. Livestock Product Value Chains in East Africa: Scoping and Preliminary Mapping Study. Final Report, Kampala, Uganda March 2009

Kimani M Tabitha and Njue W Sophycate, 2007. Socio-economic impact assessment of priority livestock diseases in Southern Sudan Juba: LESP/VSF-Belgium/GOSS

Kivaria Fredrick M, (Undated) National Vaccination Programme to Control Epidemic Diseases in the Republic of South Sudan. Juba: LESP/VSF-Belgium/GOSS

Kivaria, Fredrick M. 2010. Baseline Survey and Map the Extent of the Expansion of East Coast Fever in Southern Sudan. Juba: LESP/VSF-Belgium/GOSS

Kivaria, Fredrick M. 2010. Disease Strategy. Pestes des Petits Ruminants. Juba:

Lacher. W .2012. *South Sudan: International State building and its limits.* German Institute for International and Security Affairs. Berlin

Lake Victoria Basin Commission. *2010. HIV&AIDS Baseline Sero-behavioural Study among Fishing Communities in Lake Victoria, Kenya.* EAC/AMREF Lake Victoria Partnership Programme

Lanzuela. Dr N. 2010. *Provision of Technical Assistance to foresee the Healthy Establishment and Development of the Fisheries Sector in Southern Sudan. Terminal Report. May 14-September 15, 2010*. Contract No: LFDP/S/2009/04. Consultancy Services of a Fisheries Specialist. MDTF – SS Grant No. TF 057638

Latigo. J. O. 2008. *Promoting Community Capacities to learn across and transform conflicts in Malakal Area. A Grassroots Research & Historical Memory Approach.* PACT, the Southern Sudan Peace Commission(SSPC), and the Magang Grassroots Peace Initiative.

Lau, B. 2010. *Report on the Aquaculture Development Assessment Visit to Western Bahr el Ghazal State Wau.* 26th Oct- 4th N0vember 2010. Internal Ministry of Animal Resources and Fisheries document

Lemoalle, J 2009. *Fish production and water productivity of aquatic inland systems.* A revised, shortened version of a report by J. Lemoalle to the project CP34 “Improved fisheries productivity and management in tropical reservoirs”funded by the Challenge Program on Water and Food.

Lieger. N. 2009. What is work and where does wealth come from? Rediscovering the non-monetarised economy. Paper for the international conference on “Decent Work and Unemployment“ at the Center for Ethics and Poverty Research, University of Salzburg, May 26-29th, 2009. http://p2pfoundation.net/Rediscovering_the_Non-Monetarised_Economy

Lindley R.H. 2008. *Balochistan Fisheries Development Study: Options for Balochistan Coastal Fisheries & Aquaculture.* Competitiveness Support Fund, Competitiveness House # 53, Street 1, F-6/3, Islamabad, Pakistan.

Lindley. 2012. *Some international agreements pertaining to Fisheries in South Sudan* (list provided to the CAMP Fisheries TT

Local Government Board. January 2011. *Participatory planning and budgeting guide for Local* Governments in Southern Sudan. Juba.

Lwihula.GK., Outwater.A. and Klinton Nyamuryekung'e. 2006. Sexually transmitted diseases in Mwanza, Tanzania: Risk, Beliefs, health care seeking behaviour and responses. East African Journal of Public Health, East African Public Health Association, Vol. 3, Num. 1, 2006, pp. 1-7. http://www.bioline.org.br

Macfadyen, G. et al. 2011. *Value-chain analysis of Egyptian aquaculture.* Project report 2011- 54. The World Fish Centre. Penang, Malaysia. 84 pp.

Maina, Immaculata. 2011. *South Sudan Food Security: Gender Equity Scoping Report to CIDA South Sudan Programme.* Canada: Government of Canada.

Maku, J. 2004. Honey Market in Uganda. APIACTA, Vol 38 (2004), pp 302 – 306

Map of South Sudan.
http://www.google.co.jp/search?q=South+Sudan+road+map&tbm=isch&tbo=u&source=univ&sa=X&ei=OqQBUuDVDZHbkgXr0oDQAg&ved=0CCkQsAQ&biw=1143&bih=542#facrc=_&imgdii=_&imgrc=ubgxKYnbyRvJUM%3A%3BMys3I95uKZS1M%3Bhttp%253A%252F%252Fmapsof.net

Marial Lou Livestock Training Centre*. Marial Lou Livestock Training Centre Background.* Unpublished.

Mariner, Jeffrey. Disease impact matrix scoring. (Unpublished)

Martin, E,. 2010 *Gender, violence and survival in Juba, Southern Sudan.* ODI HPG Policy Brief 42

Martin, Martin and Iruna Mosel. 2011. *City limits: urbanisation and vulnerability in Sudan, Juba case study*. UK aid and ODI.

Masiga, Walter and Daborn Chris. 2009. *OIE PVS Evaluation Report of the Veterinary Services of Sudan*. Khartoum:

Masinde, A. 2013. Only 20% of Uganda's Milk is Processed. Agribusiness. The Monitor Newspaper. Published January 28, 2013.

Maxwell. D, K Gelsdorf and M Santschi 2012. *Livelihoods, basic services and social protection in South Sudan.* Secure Livelihoods Research Consortium (SLRC), ODI, London

Mayo, David Nailo N. 1994. *The British Southern Policy in Sudan: An Inquiry into the Closed District Ordinances (1914-1946)*. Northeast African Studies, Volume 1, Numbers 2-3, 1994 (New Series), pp. 165-185. East Lansing: Michigan State University Press.

McElhinney. H. 2012. *Tackling the food deficit in the world's newest country.* Oxfam. South Sudan.

Mcwilliam, Andrew N. and Robert A. Cheke. 2004. A review of the impacts of control operations against the red-billed quelea (*Quelea quelea*) on non-target organisms. *Environmental Conservation.* 31 (2): 130–137.

MDF Training and Consultancy, Anton Bloten. October 2011. *Mission Report for Inception phase of project: "Upgrading Crop Training Centre Yei to offer accredited programmes in agriculture management and production with special emphasis on agricultural extension services."* Juba.

Mercy Corps website http://www.mercycorps.org/south-sudan

Ministry of Agriculture and Forestry, Republic of South Sudan. 2012. *Final Draft of Forest Policy*.

Ministry of Agriculture and Forestry. 2011. *South Sudan final draft agricultural research policy.* Juba.

Ministry of Agriculture and Forestry. November 2011. *Guidelines for implementation of recommendations on organisational restructuring and management systems*. Juba.

Ministry of Agriculture and Forestry. November 2011. *Report on Institutional Analysis (Incorporation Cooperatives and Rural Development)*. Juba.

Ministry of Agriculture and Forests. 2007. *Time Series of Area, Production & Yield Data of the Main Food & Oil Crops by States & Mode of Irrigation (70/1971-04/2005)* Volume 2. Khartoum: Ministry of Agriculture and Forests.

Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2012. *Agriculture Sector Framework*. Juba: The Government of Republic of South Sudan.

Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2013. *Forest Policy 2013.* Juba: The Government of Republic of South Sudan.p. 31.

Ministry of Agriculture, Forestry, Cooperatives and Rural, Government of the Republic of South Sudan. 2012. *Agriculture Sector Policy Framework: 2012-2017*. Juba: The Government of Republic of South Sudan.

Ministry of Agriculture, Forestry, Cooperatives and Rural, Government of the Republic of South Sudan. 2012. *National Strategy for Cooperative Development 2012-2015*. Juba: The Government of Republic of South Sudan.

Ministry of Agriculture, Forestry, Cooperatives and Rural. Development. Research Unit, Agricultural Research Centre, April 2013, *Root/Tuber and Horticultural Crops Research Program 04.09.2013.* Yei. Unpublished.

Ministry of Agriculture, Forestry, Cooperatives, and Rural Development. 2011. *Food and Agriculture Policy Framework (FAPF) 2012-2016.* Juba.

Ministry of Agriculture, Forestry, Cooperatives, and Rural Development. 2012. *Agriculture Sector Policy Framework (ASPF): 2012-2017.* Juba.

Ministry of Agriculture, Forestry, Cooperatives and Rural Development. 2011. Sampson A-Koi Binyason and Alfred Atem Malual, A Report on crop protection pests and diseases field assessment of the major crops grown in South Sudan (1st – 4th July 2011).

Ministry of Animal Resources and Fisheries, Directorate of Veterinary Services, 2008. *Annual Reports 2008-2012* Juba: GRSS

Ministry of Animal Resources and Fisheries, Government of the Republic of South Sudan. 2012. *Policy Framework and Strategic Plans 2012-2016*. Juba: GRSS

Ministry of Animal Resources and Fisheries. 2012. *Policy Framework and Strategic Plans 2012-2016*. Juba: The Government of Republic of South Sudan.

Ministry of Education. 2010. *Education Management Information Syste*. Juba. The Government of Republic of South Sudan.

Ministry of Finance and Economic Planning and Ministry of Labour and Public Service. October 2010. *Budget Call Circular for 2011 Budget Preparation*. Juba.

Ministry of Finance and Economic Planning, Office of the Minister. 2012. *Guidelines for compiling budgets for 2012/13*. Juba: The Government of Republic of South Sudan.

Ministry of Finance and Economic Planning. 2006. *Interim Public Procurement and Disposal Regulations, 2006*. Juba.

Ministry of Finance and Economic Planning. 2011. *Approved Budget 2011.* Juba.

Ministry of Finance and Economic Planning. 2011. *South Sudan Donor Book 2011*. Juba.

Ministry of Finance and Economic Planning. 2012. *Guidelines for compiling budgets for 2012/13*. Juba.

Ministry of Finance and Economic Planning. 2012. *XX natural resources sector aid financing plan FY2012/13-FY2014/15.* Juba.

Ministry of Finance and Economic Planning. April 2008. *Fiscal challenges and progress in public financial management Prepared for the 2008 Sudan Consortium*. Juba.

Ministry of Finance and Economic Planning. August 2012. *2012/13 Approved Budget*. Juba.

Ministry of Finance and Economic Planning. July 2010. *Natural Resources Sector Budget Sector Plan 2011-2013*. Juba.

Ministry of Finance and Economic Planning. June 2010. *Development Partner guidelines for drafting Budget Sector Plans 2011-2013*. Juba.

Ministry of Finance and Economic Planning. June 2010. *Framework on State public financial management reform*. Juba.

Ministry of Finance and Economic Planning. June 2010. *Guidelines for drafting Budget Sector Plans 2011-2013*. Juba.

Ministry of Finance and Economic Planning. June 2012. *National Budget Plan financial year 2012/13*. Juba.

Ministry of Finance and Economic Planning. May 2010. *Guidelines for Integrated State and County planning and budgeting*. Juba.

Ministry of Finance and Economic Planning. November 2007. *GoSS aid strategy 2006-2011 Presented to the Southern Sudan Legislative Assembly*. Juba.

Ministry of Finance and Economic Planning. November 2011. *Aid Strategy for the Government of the Republic of South Sudan*. Juba.

Ministry of Finance and Economic Planning. November 2011. *Guidelines for drafting Budget Sector Plans 2012-2015*. Juba.

Ministry of Finance and Economic Planning. October 2009. *Non-oil revenue study Southern Sudan Volume I Summary final report*. Juba.

Ministry of Gender, Child and Social Welfare. 2012. *Comprehensive Country Gender Assessment*. Juba: MOGC&SW.

Ministry of Gender, Child and Social Welfare. 2013. *South Sudan National Gender Policy*. Juba: MoGC&SW.

Ministry of Health and Southern Sudan Centre for Census, Statistics and Evaluation. 2007. *Sudan Household Health Survey*. Juba: The Government of Southern Sudan.

Ministry of Water Resources and Irrigation 2011. Water, Sanitation & Hygiene (WASH) Strategic Framework. Juba.

Mohamed Y.A., H. H. G. Savenije, W. G. M. Bastiaanssen, and B. J. J. M. van den Hurk. 2005. *New lessons on the Sudd hydrology learned from remote sensing and climate modelling.* Hydrol. Earth Sys. Sci. Discuss., 2, 1503–1535, 2005 www.copernicus.org/EGU/hess/hessd/2/1503/SRef-ID: 1812-2116/hessd/2005-2-1503. European Geosciences Union

Mohamed, Y.A., Bastiaanssen, W.G.M., and Savenije, H.H.G. 2004. "Spatial variability of evaporation and moisture storage in the swamps of the upper Nile studied by remote sensing techniques". *Journal of Hydrology* Volume 289, Issues 1-4, pp. 145-164.

Mohammed. M.O 2012. *Fishes list of Jabel Awlia Dam Reservoir in the White Nile River, Sudan.* Bulletin of Environment, Pharmacology and Life Sciences, Volume 1, Issue 5, April 2012: 26- 29, Online-ISSN 2277-1808

Molden, D., Awulachew, S.B., Conniff, K., et al. 2009. *Nile Basin Focal Project. Synthesis Report*, Project Number 59. Challenge Program on Water and Food and International Water Management Institute, Colombo, Sri Lanka. 149 pp.

Monger W.A et al. 2010. The complete genome sequence of the Tanzanian strain of Cassava brown streak virus and comparison with the Ugandan strain sequence. *Arch Virol.* 155 (3): 429-433.

Muli Musinga, M., J. M. Gathuma, O. Engorok, and T.H. Dargie 2010 *The Livestock Sector in Southern Sudan. Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan covered by*

MDTF with a Focus on Red Meat. The Netherlands Development Organization for Ministry of Animal Resources and Fisheries. August 2010 (DRAFT)

Multi Donor Trust Fund-National Technical Secretariat. 2007. *MDTF-National Sector Policy Note Export marketing of Sudanese Gum Arabic. Khartoum*: World Bank. and United States Agency for International Development. 2011. Gum acacia assessment phase I report. p.5.

Muriuki, H.G. 2010. Development of the Dairy Industry in Southern Sudan: Issues and Suggestions. Ministry of Animal Resources and Fisheries, Directorate of Animal Production and Range Management and Directorate of Special Projects.

Musinga Muli, Joseph M. Gathuma, Obin Engorok and Tesfaye H. Dargie. 2010. *The Livestock Sector in Southern Sudan: Results of a Value Chain Study of the Livestock Sector in Five States of Southern Sudan Covered by MDTF with a Focus on Red Meat*. Draft. Juba: Government of Southern Sudan.

Nagoli,J., E. M. Phiri, E. Kambewa, D. Jamu. 2009. *Adapting Integrated Agriculture. Aquaculture for HIV and AIDS-Affected Households: The case of Malawi.* The World Fish Centre Working Paper 1957. The World Fish Centre, Penang, Malaysia.

National Bureau of Statistics, Government of the Republic of South Sudan. South Sudan. 2011. *South Sudan Statistical Yearbook 2011*. p. 11. p. 23, p. 41, p. 84. Juba.

National Bureau of Statistics, Government of the Republic of South Sudan. South Sudan. January 2012. National Baseline Household Survey 2009, Report for South Sudan 2012. Juba.

National Bureau of Statistics. 2012. *Release of new South Sudan Gross Domestic Product estimates for 2011 and revised figures for 2008-2010*. Press release 02 October 2012. Juba: National Bureau of Statistics.

National Bureau of Statistics. 2012. *South Sudan Statistical Year Book 2011*. Juba: National Bureau of Statistics.

National Bureau of Statistics. http://ssnbs.org/storage/CPI website May 2013.xlsm

Natsios, Andrew S. 2012. *Sudan, South Sudan, and Darfur: What Everyone Needs to Know.* Kindle Edition. *New York:* Oxford University Press.

New Zealand Institute of Chemistry. 2002. *Fish Processing* The Seafood Research Unit, Crop & Food Research

Ngeiywa, Kisa Juma and Sangula Abraham Kiprotich. Sero-survey of Foot and Mouth Disease in south Sudan, Juba: LESP/VSF-Belgium/GOSS

Norwegian Church Aid website http://www.kirkensnodhjelp.no/en/What-we-do/Where-we-work/Eastern-Africa/south-sudan/

Norwegian People's Aid. 2011. *The New Frontier: A baseline survey of large –scale land-based investment in Southern Sudan*. Oslo: Norwegian People's Aid.

Norwegian People's Aid website http://www.npaid.org/Our-work/Countries/Africa/South-Sudan/Development-cooperation-in-South-Sudan

Norwegian Refugee Council. 2012. *Customary law and land rights in South Sudan*. Juba: NRC.

Nuffic, 2010. Support to CTC Yei. *Final Report Assessment Agricultural TVET centres in South Sudan*. *CTC Yei assessment A report.* Consultant's report. NICHE/SDN/096. Unpublished.

Nuffic. April 2010. *ALFFAT Education, NICHE support for Agricultural Development in Southern Sudan. ALFFAT: Agriculture, Livestock, Fishery, Forestry & Agric. Technology. Final Report Assessment Agricultural TVET centres in Southern Sudan.* Consultant's report. Unpublished.

Nuffic. October 2011. *Mission Report for Inception phase of project: "Upgrading Crop Training Centre Yei to offer accredited programmes in agriculture management and production with special emphasis on agricultural extension services."* Consultant's report. NUFFIC/NICHE/SDN/096. Unpublished.

Nuffic. October 2011.*Support to CTC Yei, CTC Yei assessment C-report*. Consultant's report. NICHE/SDN/096. Unpublished.

Nutrition Cluster/ACF website http://www.actionagainsthunger.org/countries/africa/south-sudan

Nyombi. K and S. Bolwig., A. 2004. *Qualitative Evaluation of Alternative Development strategies for Ugandan fisheries.* A Contribution to the Strategic Criteria for Rural Investments in Productivity Program of the United States Agency for International Development Uganda Mission. The International Food Policy Research Institute, 2033 K Street, N.W. Washington, D.C. 20006. September 2004

Oakland Institute, 2011, *Understanding Land Investment Deals in Africa: Country Report: South Sudan,* California: Oakland Institute.

Odero, Andrew Nam. 2007. *Livelihood Characterisation of South Sudan: The use of physiographic and agro-climatic layers*. http://www.fao.org/fileadmin/user_upload/ fsn/docs/Microsoft Word - Andrew Odero_ESRI User_Paper.pdf

Odongkara K., Ntambi B., Khisa.G., and B. Mbilinge. 2006. *Contribution of Lake Victoria Fisheries to Economic Growth, Poverty Reduction and Development*. Literature Review and Data. National Fisheries resource Institute, Jinja, Uganda. 2006

Oketch, Martin Luther. 2013. Uganda's exports to South Sudan decline by 80 per cent. *Daily Monitor*. 7 January http://www.monitor.co.ug

Okwaroh. K. 2012. South Sudan, Resources for poverty eradication: A background paper. Development Initiatives, Bristol, UK.

Omom S. 2009. *HIV/AIDS and artisanal fisheries nexus: A case study on Lake Victoria, Kenya.* PhD Thesis. The University of Manitoba Faculty of Graduate Studies, Canada.

Onyemauwa .C. 2012 *Analysis of Fresh and Dried Fish Marketing in Southeast Nigeria.* Journal of Biology, Agriculture and Healthcare. Vol 2, No.4, 2012

Operation Lifeline Sudan. 1996. OLS Southern Sector Needs Assessment. Nairobi: Operation Lifeline Sudan.

Opia, Dr.A., Mulumba.N. and Michael Muyonga. 2010. *HIV sero behavioral survey in four agricultural plantations in the Lake Victoria basin of Uganda.* Ministry of Health, Uganda.

Organisation for Economic Co-operation and Development. 2008. *The Paris Declaration (2004) and Accra Agenda (2008).*

Organisation for Economic Cooperation and Development. 2011. *2011 Report on International Engagement in Fragile States: Republic of South Sudan*. Paris: OECD Publishing.

Oxfam Canada website http://www.oxfam.org/en/emergencies/darfur-chad/oxfam-international-work-sudan

Oxfam GB website http://www.oxfam.org/en/emergencies/darfur-chad/oxfam-international-work-sudan

Oxfam GB. 2011. *Getting it Right from the Start. Priorities for Action in the New Republic of South Sudan.* Oxfam GB, Oxfam House, John Smith Drive, Cowley, Oxford, OX4 2JY, UK.

Penaflor P (Undated) *Review of Fisheries Policy Framework and Strategic Plan*. Incomplete review of the South Sudan Fisheries Policy 2006-2011

Plan International website http://plan-international.org/where-we-work/africa/south-sudan/what-we-do

Ranganathan. R and Cecilia M. Briceño-Garmendia. 2011. *South Sudan's Infrastructure. A Continental Perspective.* The World Bank, Africa Region, Sustainable Development Unit, September 2011

Ravololonarisoa, Micheline. May 2013. *Gender Assessment of Sustainable Livelihoods and Private Sector Development in South Sudan.* Final Report to the Joint Donor Partners, South Sudan.

Relifweb. 2002. *The USAID Southern Sudan Agriculture Revitalization Project*. http://reliefweb.int/report/sudan/usaid-southern-sudan-agriculture-revitalization-project

Representative of the Secretary-General, F. M. Deng. UN Commission on Human Rights. 1998. *Guiding Principles on Internal Displacement.* New York/Geneva.

Republic of Mozambique 2009 *Fisheries Masterplan*. Ministry of Fisheries, with assistance from & co-financed by Norway and Iceland

Republic of South Sudan Ministry of Agriculture and Forestry. 2012. Final Draft of Forest Policy. Juba.

Republic of South Sudan, *Draft Bills 2013*

Republic of South Sudan. 2011. *Laws of South Sudan Public Financial Management and Accountability Act 2011*. Juba

Republic of South Sudan. 2013. *South Sudan Development Initiative 2013-2020 Final draft report*. Government of Republic of South Sudan: Juba.

Republic of South Sudan. *Food Security Council: Establishment, mandate and composition, John Ogoto Kanisio. Secretary General, RSSFSC.* Unpublished.

Republic of Sudan. 1954 *The Freshwater Fisheries Act 1954.* Vol 4 Chapter 54 of the Laws of the Republic of Sudan

Republic of Uganda. 2004. *Fisheries sector strategic plan.* Ministry of Agriculture, Animal Industries and Fisheries.

Robinson, J., 2005. Pests and integrated pest management in western Equatoria, southern Sudan. *International Journal of Tropical Insect Science.* Vol. 25, No. 4. pp. 224–235.

Ruben,R., M. Slingerland and H. Nijhoff (eds.) 2006. F*ish in Kenya. The Nile-perch chain. In: Agro-food chains and networks for development,* 155-164.Springer. Printed in the Netherlands

Ruddle, Kenneth, and Naomichi Ishige. 2010. *On the Origins, Diffusion and Cultural Context of Fermented Fish Products in Southeast Asia.* In Globalization, Food and Social Identities in the Asia Pacific Region, ed. James Farrer. Tokyo: Sophia University Institute of Comparative Culture.

Rupa Ranganathan, Cecilia M. Briceno-Garmendia. September 2011. *Policy Research Working Paper 5814. South Sudan's Infrastructure: A Continental Perspective.* The World Bank. Washington D.C.

Salih, Abdin. 2010. *Southern Sudan: Preliminary Water Resources Assessment Study.* Draft Final Report. Washington D.C.: World Bank.

Samaritans Purse website http://www.samaritans-purse.org.uk/sudan-crisis

Sandon. H. 1950. *A guide to the fishes of the Sudan.* Sudan Notes and Records on behalf of Gordon Memorial College, Khartoum. London, McCorqodale & Co.

Sandon. H. 1950. *An illustrated guide to the freshwater fisheries of the Sudan.* Sudan Notes and Records on behalf of Gordon Memorial College, Khartoum

Satti, A.A. 2011. Alien insect species affecting agriculture and natural resources in Sudan. *Agriculture & Biology Journal of North America*, 2(8). pp. 1208-1221.

Save the Children website http://www.savethechildren.org/site/c.8rKLIXMGIpI4E/b.6150459/

Schmutterer. H., 1969. *Pests of Crops in Northeast and Central Africa with particular reference to the Sudan*. Stuttgart: Gustav Fischer Verlag. pp. 213-217.

Schorr.D.K. 2004. *Artisanal Fishing: Promoting Poverty Reduction and Community Development Through New WTO Rules on Fisheries Subsidies.* An Issue and Options Paper. UNEP Economics and Trade Branch (ETB)

Senders. A., Lentink. A & M Vanderschaeghe. 2012. *Gender in Value Chains. A practical toolkit to integrate and gender perspective to agricultural value chain development.* AgrProFocus.

Sharron C. Gaudet, SC.,and Peter S. Eagleson.1984. *Surface area variability of the Bahr el Ghazal swamp in the presence of perimeter canals. Massachusetts Institute of Technology.* June 1984; undertaken under the sponsorship of the Technology Adaptation Program

Smith JJ et al. 2008. An analysis of the risk from *Xanthomonas campestris* pv. *musacearum* to banana cultivation in Eastern, Central and Southern Africa. Bioversity International, Montpellier, France.

Smith, Julian & Derek Tomlinson. 2010. A Review on Cassava Brown Streak Disease and Movement of planting material in the Great Lakes Region of East Africa. Food and Environment Research Agency, UK. Unpublished.

Solidarities International, The Food Economy Group. 2013. *Livelihood Baseline Profile: Refugee CAMPS, Maban County Upper Nile State, South Sudan, 2013. Household Economy Approach.* Paris.

South Sudan 2012, www.africaneconomicoutlook.org,

South Sudan Lane Commission. 2013. *Draft Land Policy*. Juba: SSLC.

South Sudan Medical Journal. Vol. 4 No. 3 August 2011. Downloaded from www.southsudanmedicaljournal.com pp. 49-56. HIV prevalence in South Sudan: data from the ANC sentinel surveillance 2009. Ayat C. Jervasea.

South Sudan NGO Forum. 2011. *South Sudan NGO Forum 2011 Annual Report.* South Sudan NGO Forum.

South Sudan Relief and Rehabilitation Commission (SSRRC). *http://www.goss-online.org/magnoliaPublic/en/Independant-Commissions-and-Chambers/Relief-Rehabilitation.html*

Southern Development Investigation Team. 1955. *Natural Resources and Development Potential in the Southern Provinces of the Sudan. A Preliminary Report 1954*. London: Sudan Government.

Southern Sudan Centre for Census, Statistics and Evaluation. 2007. *Southern Sudan Livelihood Profiles*. 2nd Edition. Juba: Southern Sudan Centre for Census, Statistics and Evaluation.

Southern Sudan Centre for Census, Statistics and Evaluation. 2010. *Southern Sudan Counts: Tables from the 5th Sudan Population and Housing Census, 2008*. Juba: Government of Southern Sudan/ Southern Sudan Centre for Census, Statistics and Evaluation

Southern Sudan Centre for Census, Statistics and Evaluation. 2011. *Statistical Yearbook for Southern Sudan 2010*. Juba: Southern Sudan Centre for Census, Statistics and Evaluation.

Southern Sudan Land Commission. 2011. *Draft Land Policy*. Juba: SSLC.

State Government of Unity, April 2012, Strategic Plan 2012-2015, Bentiu

State Government of Upper Nile, 2012, State Strategic Plan 2012-14, Malakal

State Ministry of Agriculture and Forestry, 2013, Central Equatoria State, Strategic Plan 2013-17 (draft), Juba

State Ministry of Agriculture and Forestry, 2013, Warrup State, Strategic Plan 2013-17 (draft), Kwajok

State Ministry of Agriculture and Forestry, September 2012, Jonglei State, Strategic Plan 2012-17, Bor

State Ministry of Animal Resources and Fisheries, 2010, Upper Nile State, Short Term Strategic Plan 2010-11, Malakal

State Ministry of Animal Resources and Fisheries, December 2012, Lakes State, Strategic Plan 2012-16 (Draft), Rumbek

State Ministry of Animal Resources and Fisheries, December 2012, Northern Bahl el Gzhal State, Strategic Plan 2012-16 (Draft), Aweil

State Ministry of Animal Resources and Fisheries, February 2012, Jonglei State, Strategic Plan 2012-2016, Bor

State Ministry of Animal Resources and Fisheries, February 2012, Strategic Plan 2012-2016, Juba

State Ministry of Animal Resources and Fisheries, February 2012, Warrup State, Strategic Plan 2012-2016, Kwajok

Strange E.S. 1978. *A guide to the preparation of net drawings.* Department of Agriculture and Fisheries for Scotland. Scottish fisheries Information Pamphlet No 2

Suatainet East Africa website http://www.sustainetea.org/sustainet_news_and_events.html

Sudan 2005. *Dossier for Recognition of Freedom from rinderpest Disease*. Khartoum Sudan

Sudan Centre for Census, Statistics and Evaluation. 2010. *Southern Sudan counts: Tables from the 5th Sudan population and housing census*. Juba: SSCCSE.

Sudan Government. 1955. *Natural Resources and Development Potential in the Southern Provinces of the Sudan: A Preliminary Report by the Southern Development Investigation Team 1954.* London.

Sudan People's Liberation Movement, Economic Commission. 2004. *Strategic Framework for War-to-Peace Transition*. New Site: Sudan People's Liberation Movement.

Sudan People's Liberation Movement. 2008. *The Manifesto of the Sudan People's Liberation Movement*.

Sudan Productive Capacity Recovery Program. 2012. *Summary of Results of the Fisheries Questionnaire for the Ten States of South Sudan.* Fisheries Production and Marketing Project. STABEX No. 02 Livestock / 03 Irrigation /04 Fisheries. May 2012.

Sudan Productive Capacity Recovery Program. 2011. *Baseline Survey Results for Terakeka* Fisheries Production and Marketing Project STABEX No. 02 Livestock / 03 Irrigation /04 Fisheries.

Sudan Productive Capacity Recovery Program. 2011. *Yirol – Baseline Survey Report.* Fisheries Production and Marketing Project. STABEX No. 02 Livestock / 03 Irrigation /04 Fisheries.

Sudan Productive Capacity Recovery Program. 2012. *Fisheries Production and Marketing Report. Final technical and financial report. 29 March 2008 – 28 September 2012* Fisheries Production and Marketing Project STABEX-SPCRP 02 Livestock/03 Irrigation/04 Fisheries. Programme Coordination Office Juba. September 2012

Sudan Productive Capacity Recovery Program. 2012. *Report on Fisheries Forum Juba, South Sudan, Juba Bridge Hotel, 30-31 May 2012* Fisheries Production and Marketing Project. STABEX No. 02 Livestock / 03 Irrigation /04 Fisheries.

Sudan Productive Capacity Recovery Programme. 2010. *Annual Reports 2010*

Sudan Productive Capacity Recovery Programme. 2011. *Annual Reports 2011*

Sudan Tribune. 21 July 2013. *Swiss firm eyes South Sudan for coffee production.* http://www.sudantribune.com/spip.php?article47343 (accessed on 5 August ,2013)

T. Richardson. 2011. *Pastoral Violence in Jonglei.* www11.american.edu/ted/ICE/jonglei.html (accessed on 1st July 2013)

Tadu, G., Okao, G. and Mwale, C. Quick Survey of Major Pests and diseases in Central and Western Equatoria States of South Sudan. 2 pages + map. November 2014. Unpublished.

Tarr, S.A.J. 1955. *The Fungi and Plant Diseases of the Sudan*. Kew, Surrey: Commonwealth Mycological Institute.

Tarr, S.A.J. 1963. *A supplementary list of Sudan fungi and plant diseases*. Mycological Papers No. 85. Kew, Surrey: Commonwealth Mycological Institute. pp. 34.

Tearfund website http://www.tearfund.org/en/about_us/what_we_do_and_where/disaster_programmes/south_sudan/

The Food and Agriculture Organization of the United Nations (FAO). 2010. *A review of selected sector policies of the Government of Southern Sudan to identify gaps in food security policy.* Rome.

The New Partnership for Africa's Development. 18 December 2012. *South Sudan: Agriculture Stocktaking Report.* p. 92. Unpublished.

The Project for Livelihood Improvement in and around Juba for Sustainable Peace and Development, Ten States of South Sudan. 2011. *Survey on the Situation of Rural Development and Agricultural Extension in Ten States of South Sudan. ANNEX 3 Livelihood Profiles of 10 States.* Juba.

The Rainforest Foundation and Forests Monitor. 2007. *Concession to poverty: the environmental, social and economic impacts of industrial logging concessions in Africa's rainforests*. London: The Rainforest Foundation UK.

Timmers B., 2012. *Impacts of Climate Change and Variability on Fish Value Chains in Uganda*. Project Report 2012-18. World Fish Centre

Titeca K. 2008. *The informal and cross-border trade between North-western Uganda, North-eastern Congo and Southern Sudan: focus on Arua*. Institute of Development Policy and Management, University of Antwerp (DRAFT)

Tothill, J.D. ed. 1948. *Agriculture in the Sudan*. London: Oxford University Press.

Tronsden. T., 2007. *The strategic role of the value chain in fish marketing*. Paper presented at Marketing of Seafood products: Trends and Challenges. Zaragoza, 12-15 November 2007

Uganda Bureau of Statistics. 2010. *Statistical Abstract 2010*. Kampala: Uganda Bureau of Statistics.

Uganda Bureau of Statistics. 2011. *Statistical Abstract 2011*. Kampala: Uganda Bureau of Statistics.

Uganda Bureau of Statistics. 2012. *Statistical Abstract 2012*. Kampala: Uganda Bureau of Statistics.

Ugwu. L; H. Nwamba, and L. Kannio 2005 *Effect of Dermestes maculates infestation on some nutritional composition of smoked African catfish*. Animal Research International 2005 2(1): 246 – 251 246

United Kingdom House of Commons International Development Committee. 2012. *South Sudan: Prospects for Peace and Development. Fifteenth Report of Session 2010–12. Volume I: Report, together with formal minutes, oral and written evidence.* HC 1570 Published on 12 April 2012 by authority of the House of Commons. London: The Stationery Office Limited

United Nations Development Programme. 2011. *Seeds for Development: UNDP Sudan in action*. Juba: UNDP.

United Nations Development Programme. 2012. *Community Consultation Report. Upper Nile State.* Published by South Sudan Bureau for Community Security and Small Arms Control, South Sudan Peace and Reconciliation Commission & United Nations Development Programme May 2012

United Nations Development Programme. Improved Fish Smoking - Ghana. In: *Sharing Innovative Experiences Volume 5 Agriculture and Rural Development in the South. Chapter 3 Pgs 240-254*. (Unknown) Special Unit for South-South Cooperation in the United Nations Development Programme.

United Nations Environment Programme. 2007. *Sudan Post-Conflict Environmental Assessment*. Nairobi: UNEP.

United Nations Environment Programme. 2007. Sudan post-conflict environmental assessment. Nairobi: UNEP.

United Nations Environment Programme http://www.unep.org

United Nations High Commissioner for Refugees. 23-27 June 2014. *South Sudan Refugee Situation, UNHCR Regional Update, 21.* Juba: UNHCR.

United Nations High Commissioner for Refugees (UNHCR). http://www.unhcr.org/pages/49c3646c125.html

United Nations High Commissioner for Refugees (UNHCR). Refugees in South Sudan, Information Sharing Portal. http://data.unhcr.org/SouthSudan/country.php?id=251

United Nations Mission in South Sudan. 8 May 2014. *Conflict in South Sudan: A Human Rights Report*. Juba: UNMISS.

United Nations Office for the Coordination of Humanitarian Affairs. June 2013. *Humanitarian Bulletin South Sudan*. Juba.

United Nations Office for the Coordination of Humanitarian Affairs. *Mid-Year Review of the Consolidated Appeal for South Sudan 2012*. Juba: OCHA

United Nations Office for the Coordination of Humanitarian Affairs. 3 July 2014. *South Sudan Crisis Situation Report. No.43. http://reliefweb.int/sites/reliefweb.int/files/resources/South%20Sudan%20Crisis%20Situation%20Report%20No.%2043.pdf*

United Nations Office for the Coordination of Humanitarian Affairs. 2014. *South Sudan Crisis Response Plan (revised June 2014).* https://docs.unocha.org/sites/dms/CAP/Revision_2014_South_Sudan_CRP_June_2014.pdf

United Nations Programme on HIV and AIDS. 2012. *Together we will end AIDS.* UNAIDS / JC2296E

United Nations, and Government of the Republic of South Sudan. 2011. Joint Programme on Creating Opportunities for Youth Employment in South Sudan. 2011. *Standard and Harmonized Draft Vocational Training Programmes*. Juba.

United States Agency for International Development /Fintrac. 2014. *Partnering for Innovation: From Smallholders to Shareholders – A Guide to Optimizing Partnerships with the Private Sector for Smallholder Impact.* http://www.partneringforinnovation.org/smallholders-shareholders.aspx

United States Agency for International Development South Sudan. 2011. *South Sudan Transition Strategy 2011-13*. USAID and http://transition.usaid.gov/locations/sub-saharan_africa/countries/south_sudan/docs/south_sudan_transition_strategy_full.pdf

United States Agency for International Development South Sudan. 2013. *The Food, Agribusiness and Rural Markets (FARM) Project. Annual Work Plan October 2012 – September 2013*. Maryland.

University of Juba. 2013. *College of Natural Resources and Environmental Studies Registrar's Office.* Unpublished.

University of Juba. 2013. *College of Natural Resources and Environmental Studies. Revised Curriculum.* Juba.

University of Juba*. College of Natural Resources and Environmental Studies. Department of Animal Production.* Unpublished.

VAM Food Security Analysis. 2012. *Report on Food Security and Nutrition in South Sudan: how a new country can feed its people.* Juba.

VAM Food Security Analysis. Round 9, February 2013. *South Sudan Food Security Monitoring: A Collaborative Activity of FSTS, RRC, MAF, MoH, FAO, WFP, UNICEF, and UNHCR.* Juba.

Van Anrooy, R.; Mena Millar, A.; Spreij, M. (eds) 2006 *Fisheries and aquaculture in Georgia – Current status and planning.* FAO Fisheries Circular. No. 1007. Rome, FAO. 2006. 160p. Contains a) the Review of the Current Status of Fisheries Resources and Utilization in Georgia, b) the Master Plan for Fishery Sector Development in Georgia (2005– 2020), c) the Action Plan for Fishery Sector Management and Development in Georgia (2005– 2008)

Vétérinaires Sans Frontières Belgium website http://www.vsf-belgium.org/en/south-sudan

Vétérinaires Sans Frontières Germany website http://www.vsfg.org/projects/by-location/south-sudan#

Vétérinaires Sans Frontières Suisse website http://www.vsf-suisse.ch/vsf/web/en/Index.asp?UID=&QString=69

Wainaina, A. 2012 *A Report on South Sudan Market Survey. 22nd April to 27th April 2012* Horticultural Crops Development Authority. PO Box 42601, Nairobi. Kenya.

Wang. C. 2012 *A Guide for Local Benefit Sharing in Hydropower Projects.* The World Bank Social Development 1818 H Street, NW Washington, DC 20433

Wani, Abdalla Keri. 2010. Nzara Scheme, Its Revival Will Be Economically Viable. *Sudan Vision*. September 28. http://www.sudanvisiondaily.com/

Ward. A. 2003. *A study in the trade in smoked dried fish from West Africa to the United Kingdom* FAO Fisheries Circular 901

Warner P 2000 *Conflict Management in Community-Based Natural Resource Projects: Experiences from Fiji and Papua New Guinea*. ODI Working Paper 135

Wikipedia. 2012. Sudd. http://en.wikipedia.org/wiki/Sudd

Wikipedia. 2012. Bahr el Ghazel http://en.wikipedia.org/wiki/Bahr_el_Ghazal_River

Wikipedia. 2012. History of Sudan http://en.wikipedia.org/wiki/History_of_Sudan

Wikipedia. 2012. Machar Marshes http://en.wikipedia.org/wiki/Machar_Marshes

Wikipedia. University of Juba. *http://en.wikipedia.org/wiki/University_of_Juba#History*

World Animal Health Information Database. April 2013. Paris:

Worldclimate.Com http://www.worldclimate.com

World Bank. May 23, 2013. *Agricultural Potential, Rural Roads, and Farm Competitiveness in South Sudan.* Report No. 68399-SS. Washington D.C.

World Bank. 2011. *Doing Business in Juba*. A co-publication of the World Bank and the International Finance Corporation. The International Bank for Reconstruction and Development / The World Bank, 1818 H Street NW, Washington, D.C. 20433

World Bank/International Finance Corporation. 2011. *Doing Business in Juba 2011*. http://www.doingbusiness.org/~/media/GIAWB/Doing%20Business/Documents/Subnational-Reports/DB11-Sub-Juba.pdf

World Bank. October 2011. *Strategic Choices for Realizing South Sudan's Agricultural Potential*. Washington D.C.: World Bank.

World Bank. 1973. *Sudan - Economic Development of Southern Sudan*. Washington, DC: World Bank.

World Bank. 2003. *Sudan - Stabilization and Reconstruction: Country Economic Memorandum*. Washington D.C.: World Bank.

World Bank. 2007. *Final Proposal for a Multi Donor-Trust Fund Grant to the Government of Southern Sudan for the Support to Agriculture and Forestry Development Project (SAFDP)*, Washington D.C.: World Bank.

World Bank. March 2013. *Growing Africa: Unlocking the Potential of Agribusiness*, Washington D.C.

World Bank. 2009. *Roots for good forest outcomes: an analytical framework for good governance reforms.* Washington, DC: World Bank.

World Bank. 2009. *Sudan - The Road toward Sustainable and Broad-based Growth*. Washington D.C.: World Bank

World Bank. 2010. *A legal and institutional policy framework for sustainable management of forest resources in Southern Sudan - a policy note*. Washington DC: World Bank.

World Bank. 2011. *Profile for the Southern States of Sudan*. Washington, Washington D.C.

World Bank. 2011. *Strategic Choice for Realizing South Sudan's Agricultural Potential*. Juba: World Bank

World Bank. 2012. *Education in the Republic of South Sudan*: Status and Challenges for a New System. http://documents.worldbank.org/curated/en/2012/01/16439140/education-republic-south-sudan-status-challenges-new-system (accessed on 9th June 2013)

World Bank. Rural Transport, Rural Access Index (RAI). http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTTRANSPORT/EXTRURALT/0,,contentMDK:22590482~menuPK:2997966~pagePK:210058~piPK:210062~theSitePK:515370~isCURL:Y,00.html. Accessed in November 20, 2013.

World Bank. 2012. *Inflation in South Sudan*. South Sudan Economic Brief Issue No. 1. Washington D.C.: World Bank.

World Bank. 2013. *Agricultural potential, Rural Roads, and Farm Competitiveness in South Sudan,* Washington D.C.: World Bank.

World Bank. 2012. *Agricultural Potential, Rural Roads, and Farm Competitiveness in South Sudan*. Washington, DC.: World Bank. https://openknowledge.worldbank.org/handle/10986/11885

World Bank. 2013. *World Development Report 2014: Risk and Opportunity - Managing Risk for Development*. Washington, DC: World Bank.

World Bank. 2013. *Public Expenditures In South Sudan: Are They Delivering?* South Sudan Economic Brief Issue No. 2, Washington D.C.: World Bank.

World Bank. 2013. *Uganda Economic Update: Bridges across Borders Unleashing Uganda's Regional Trade Potential*. Washington, D.C.: World Bank.

World Bank. 23 May, 2012. *Country Department AFCE4, Africa Region, Report No. 68399-SS,* Agriculture and Rural Development Unit, Sustainable Development Department, Washington D.C: WB.

World Bank. May 2011. *Annual Report to the Southern Sudan Multi Donor Trust Fund (MDTF) Administrator 1st Quarter Report – 1 January – 31 March 2011*. Washington, D.C.

World Bank. February 15, 2013. *Implementation Completion and Results Report on a Multi Donor Trust Fund-South Sudan (MDTF-SS) Grant in the Amount of US $40 Million to the Republic of South Sudan for a Southern Sudan Roads Maintenance Project.* Report No: ICR2564. Washington D.C.

World Bank. 2013. *South Sudan - MDTF South Sudan Private Sector Development Project*. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/2013/03/17539288/south-sudan-mdtf-south-sudan-private-sector-development-project

World Bank. World Development Indicators. http://databank.worldbank.org/

World Bank, Food and Agriculture Organization and International Fund for Agricultural Development. 2009. *Gender in Agriculture Sourcebook.* USA: World Bank.

World Concern http://www.worldconcern.org/feedsudan/

World Food Programme of the Uinited Nations /VAM, March 2013. *Rapid Market Assessment Report in Western Equatoria State.* Western Equatoria State, Juba.

World Food Programme of the United Nations, *Purchase for Progress in South Sudan*, Juba.

World Food Programme of the United Nations. 2012. *Report on Food Security and Nutrition in South Sudan.* World Food Programme, South Sudan.

World Food Programme of the United Nations. 2013. *Annual Needs and Livelihood Analysis 2012/2013*. South Sudan. Juba: WFP.

World Health Organization. *Trade, foreign policy diplomacy and health:* http://www.who.int/trade/glossary/story028/en/

World Vision International http://wvi.org/south-sudan/our-work

World Organisation for Animal Health (OIE). 2012. *Terrestrial Animal Health Code*. OIE

World Vision International. 2004. *A study of customary law in contemporary Southern Sudan*. Juba: World Vision International.

World's Newest Country.2012. *Presentation to the 2012 African Green Revolution Forum*. 27 September

World Fish Centre. 2006. *Responding to HIV and AIDS in the Fishery Sector in Africa: Proceedings of the International Workshop, February 20-21 2006, Lusaka, Zambia* World Fish Centre, 2006

Wild, J. W. G. 1949. *The Zande Scheme. Sudan Notes and Records*, Volume XXX, 1949, pp. 47-57.

Yassin, A.M. 1974. Root-knot nematodes in the Sudan and their chemical control. *Nematol. Medit.* 1. pp. 103-112.

Yei Agricultural Research Centre. 2013. *Progress Report on the Mushroom Production Trial Research Project: Narrative Progress report covering the period of Jan-March 2013.* Yei. Unpublished.

Yongo-Bure, Benaiah. 2007. *Economic Development of Southern Sudan*. Lanham: University Press of America.

Yoshino, Yutaka, Grace Ngungi and Ephrem Asebe. 2012. *Enhancing the Recent Growth of Cross-border Trade between South Sudan and Uganda*. In Brenton, Paul. and Gözde Isik eds. *De-fragmenting Africa: Deepening regional trade integration in goods and services*. Washington D.C.: World Bank.

Yutaka Yoshino, Grace Ngungi and Ephrem Asebe, June 2011, *Africa Trade Policy Notes, Notes #21. Enhancing the Recent Growth of Cross-Border Trade between South Sudan and Uganda.*