KEY SECTOR ANALYSIS: FORESTRY (Mitigation)

By

Jato S. Sillah

Table of Content

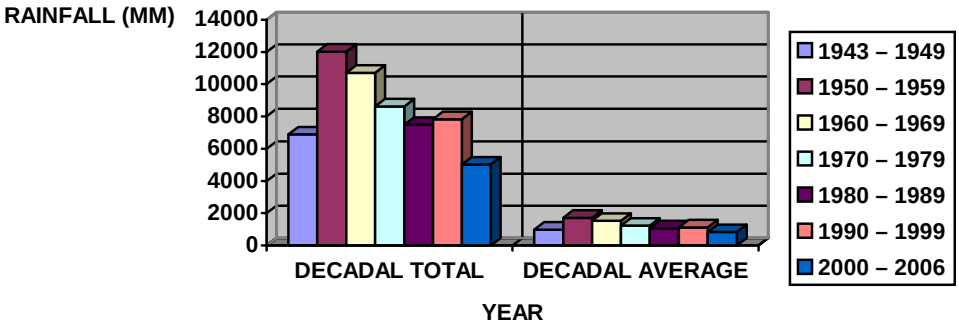
1. Introduction

1.1 Physical features

The Gambia is a small country with a total land area of approximately 10, 689 km^2, but with a very high relative population of 1.6 million inhabitants and a population growth rate of 2.7% per annum.

The climate of the Gambia is a Sudano-Sahelian type characterised by a short rainy season (June to October) and a long dry season (November to May). The average annual rainfall is about 900mm. Although there are indications of a reversal of the trend, there has been an average reduction of 27% in the annual average rainfall since 1951.

Figure 1: Decadal Rainfall of The Gambia 1943 - 2006



Sources: Data from Water Resources

The Gambia is a flat land and the country is divided into four main agro-ecological zones viz. sahelian (70.4 km^2), sudano-sahelian (8,035.31 km^2) Sudanian (2,070.37 km^2) and Guinean (506.92 km^2) zones with four corresponding vegetation types: open savannah, savannah woodlands, savannah woodlands/woodlands transitional and woodlands. The sudano sahelian zone with its characteristic savannah woodlands constitutes about 75% of the total land area. Thus its geopolitical location in the largely semi-arid Sahel may afford some strategic advantage but poses a serious agricultural, food and environmental fragility that makes the country highly vulnerable to desertification.

1.2 Socio-economic features relevant to forestry

Forestry sector accounts for around 0.8% of GDP. Though 85% of the populations derive their daily energy supply from forest resources, this domestic consumption of forest resources are not considered in the overall economic performance of the country.

Tourism is of vital importance to The Gambia, second to agriculture in its place in the economy. It is a major source of foreign exchange, comprises a significant proportion of GDP and is an important source of wage earning employment. According to the Tourism Masterplan (2006), priority market niches for exploitation includes eco-tourism, cultural tourism and the further development of bird watching.

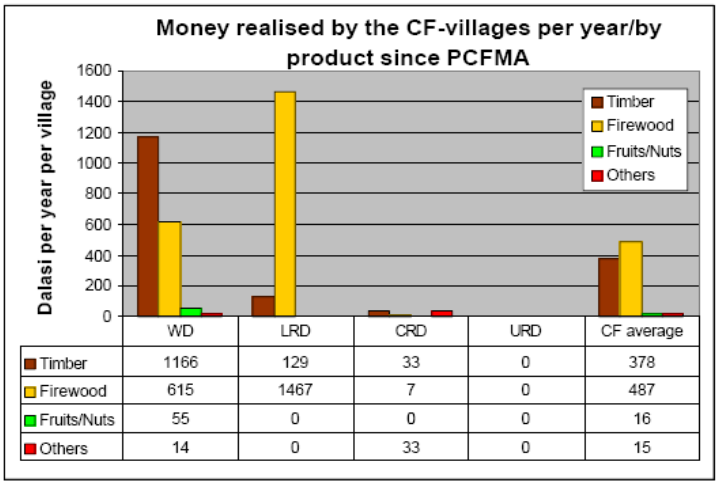
Women are highly involved in small –scale forest product commercialisation. They sell firewood (branched firewood in particular), fruits, herbs and leaves. Though these are of low economic value in comparison with high value products like timber and splitted firewood sold by men, they provide an important alternative source of income for the women folk. The Gambia depends heavily on importation of commercial construction wood and processed boards both from the sub-region and Europe. The local productions certify more than 70% of wood requirements for furniture and other household requirements. Charcoal production is banned in The Gambia and therefore wholly imported.

Forest park management offers employment opportunities albeit on seasonal basis. Planting season and establishment of firebreaks around the parks at the beginning of the dry season are peak periods for forest related employment. It is important to note that though jobs in the forest parks are seasonal and often low paid, they act as a big relief for the local communities; coming at a time when other employment opportunities are rare in the villages and the crops are not yet sold.

Forest reserves are de facto common properties, which are used by local communities to satisfy their daily needs in terms of fuel wood, medicinal products and construction materials. Local communities also derive a lot food items, ranging from leaves, root-tubers and bush meat from forest reserves especially during hunger season.

The enterprise development component of the participatory forest management approach has in the past five years catalyzed many village development initiatives. Interest groups have been formed in selected villages to undertake small-scale forest enterprises like beekeeping, firewood and timber production, handicraft making and eco-tourism. The impact analysis of participatory forestry management on income of local communities is presented in the graph below.

Figure 2: Incomes at community level



	WD	LRD	CRD	URD	CF average
Timber	1166	129	33	0	378
Firewood	615	1467	7	0	487
Fruits/Nuts	55	0	0	0	16
Others	14	0	33	0	15

Note: WD = Western Division, LRD = Lower River Division, CRD = Central River Division, URD = Upper River Division, CF = Community Forestry and PCFMA = Participatory Community Forestry Management Agreement

Sources: Department of Forestry, Impact monitoring & assessment of Community Forestry in The Gambia, 2003

It can be said that the income arising from forest product commercialization at a community level is still low and joint commercialization activities did not begin yet in a lot of villages for

various reasons (ecological and marketing constraints). In the categories inclusive others has eco-tourism as the major component.

While one may argue that the benefit of community forestry to local communities does not directly trickle down to the households, we can convincingly state that by improving village infrastructures, the individual households have possibilities which were not hitherto available to engage themselves in income generating activities. Most of the forest management committees run soft loan for their members especially in the rainy season either to buy food or pay school fees at the beginning of the school calendar year.

The revenue from forests and forestry activities for the Department stem from royalties, licensing, and permits for sale of logs, trees, service payments. The average yearly revenue is about D3,877,000.00 (est. $150,000). The Department of Forestry is mandated to retain 50% of the revenue earnings in a bank account with the Department of State for Finance called the National Forestry Fund (NFF). The NFF is a parliamentary enactment meant to be used for forestry activities through a budget submission. The other part of the revenue is from contributions from community forests, ecotourism tickets, plantation and plantations, which are directly paid in full to the NFF bank account. The average yearly revenue is about D2,500,000.00 (est. $100,000).

1.3 Forestry and Greenhouse Gas Emissions/Removals

Environmental degradation is a serious problem in The Gambia arising from a combination of factors including: inappropriate land use practices, over-grazing of pasture lands, deforestationion from over-felling of trees and bush-fires, increased sediment flow and salinity in the lowlands and erosion in the uplands and along the coastline. Soil erosion on the upland and severe sedimentation in the lowland are grave, especially through the clearing of gallery forests and forests immediately along the river for the purpose of rice production.

Table 1: Degree of land degradation

Types of Land-use	**1990 - 1999**		**2000 - 2003**	
	000'ha	% of total area	000'ha	% of total area
Closed woodland	12,000	1.1	9,600	0.9
Open woodland	88,800	7.8	56,000	4.9
Tree & shrub savannah	360,800	31.9	441,200	38.8
Agriculture with trees	85,200	7.5	86,400	7.6
Agriculture without trees	241,200	21.3	256,000	22.5
Fallow lands	89,200	7.9	39,600	3.5
Plantations	1,300	.13	1300	.13
Mangrove	59,600	5.3	51,200	4.6

Sources: J. S. Sillah, Ecology and Climate Change of the Mangrove Ecosystems, 2007

It has to be accepted that the land degradation figures are estimates based on the inventory analysis. Based on degree of degradation and inventory data, the expected forest cover change is projected below.

Table 2: Percentage Changes in the forest cover by Forest type since 1946 Projected to 2015

Forest Type	1946	1968	1980	1993	1998	2005	2015
Closed Woodland	60.1	8.0	1.3	1.1	0.7	1.5	2.8
Open Woodland	13.3	14.6	10.7	7.8	6.2	12.0	12.2
Savannah	7.8	31.6	24.8	31.8	34.6	31.5	25.0
Total Forest Cover	81.2	57.3	36.8	40.7	41.5	45.0	40.0

Sources: NAD-Gambia: Action Plan on Forest and Wildlife Management (1999),
FAO-Gambia: Forest Resources and Plantations (1999)

Land-use changes also result in GHG emissions through the disturbance of forest soils. In converting forests to croplands a large quantity of the soil carbon can be released as well. As well, loss of forests results in the potential of reducing/loss of the absorbing capacity as sink of atmospheric gases such as CH4.

The Gambia is a small and developing country, but highly endowed with forest cover, which is about 43% of the total land area. The trend analysis based on National Greenhouse Inventory (July, 2008) shows only slight reduction as change in the total area of forest cover but of greater significant is the rate of forest degradation which is apparently on increase thus reducing it's absorptive capacity of the Greenhouse gases. The rate of emissions from the soils and forest burning has also increased in the recent periods.

2. Overview of Forestry Sector

The Department of Forestry is the technical agency responsible for the protection, conservation and sustainable use of The Gambian forests and forest resources. Within the framework of its mandate, the Department ensures the sustainable management and protection of all forests excluding private plantations. To cope with the integrated forest management approach of the Gambia Forest Management Concept (GFMC), which is the national forest management strategy, and its requirement for decentralized forest administration, the organizational set-up of the Department has been reviewed in 1995 to meet these needs. This framework establishes clear line of commands and responsibilities from the headquarters down to the field operational level. It entrusts the Regional forestry Officers with comprehensive management responsibilities within their respective regions. The provisions accommodate Government's decentralization process; and demand driven "bottom-up approach" strategy as of the Local Government Act, 2002. This Act places also management responsibilities on the Local Government Area Councils for a range of natural resources under their jurisdiction. Forestry decentralization paved the way for decentralized and ideal governance in natural resources management in The Gambia.

2.1 Forest Management in The Gambia

The Gambia is a small and developing country, but highly endowed with forest cover. From the total land area of 1,062,000 ha, about 43% are in one form or the other still forested, although most of those forests are heavily degraded, according to the two forest inventories carried out in 1981 and 1997. Thus the Department since early 1980 changed its focus from plantation to natural forest management, After a trial of about 14 years, a natural forest management model called "The Gambian Forest Management Concept (GFMC)" was developed (1995) and revised in 2001. The concept is an approach to conserve and improve the forest resources of The Gambia in order to supply as much of the country's demand for forest products as possible through sustainable management. The concept is an integrated approach based on six tangible strategies. Over 800 villages covering an area of more than 40, 000 ha are participating in the sustainable forest management scheme since the inception of the concept about 12 years ago.

2.1.1 The Vision and Present situation

The GFMC's long-term vision is that at least 30% of the land cover will be gazetted as permanent forest cover and managed according to the objectives defined by management plans. The permanent forest areas are categorized into:

- Forest Park (FP): The management responsibility of forest parks lies entirely with the DoF. Management models for state management have been developed and tested. The concept of joint forest park management with the adjacent population has been developed and introduced.
- Forest Reserve (FR): FRs are state forests and as such under the management responsibility of the DoF. Since the DoF does not have the capacity of managing all FRs, the concept of "Community Controlled State Forests (CCSF)" was developed.
- Community Forest (CF): Local communities based on a Community Forest Management Agreement (CFMA) manage community forests. The CF-concept is fully developed and is already institutionalized.

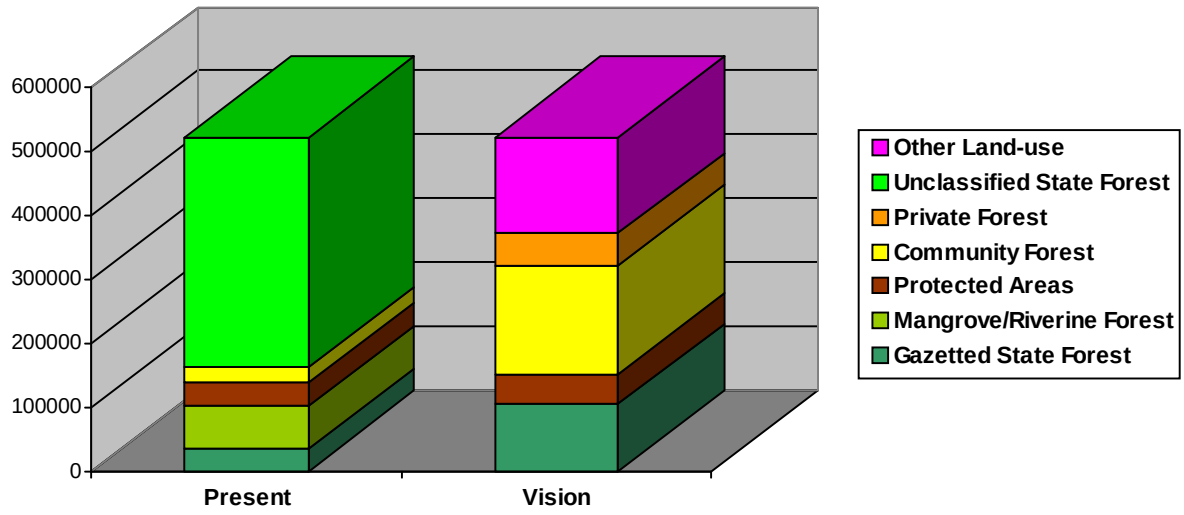
- Private Forest: The ownership of the land and trees is a private person or enterprise. Management is up to the objectives of the owner, but the provisions of the Forest Act need to be observed.
- Protected areas (under the management of Department of Parks & Wildlife).

The identification of these permanent forest areas is based on an iterative planning process on village level taking into account the needs and requirements of the local population, customary land rights, land capability and environmental needs. It is expected that atleast about 200,000 ha of community forests and 10,000 ha of private forests will be established and managed sustainably by 2015.

The fragile ecosystems of mangrove and riverine forests belong to the permanent forest area (protected forests, Forest Act 9 (8)) and shall, therefore, become the status of forest parks (i.e. legally gazetted state forest). The total forest park or gazetted state forest area will increase to about 105,000 ha with the inclusion of mangroves and riverine forests.

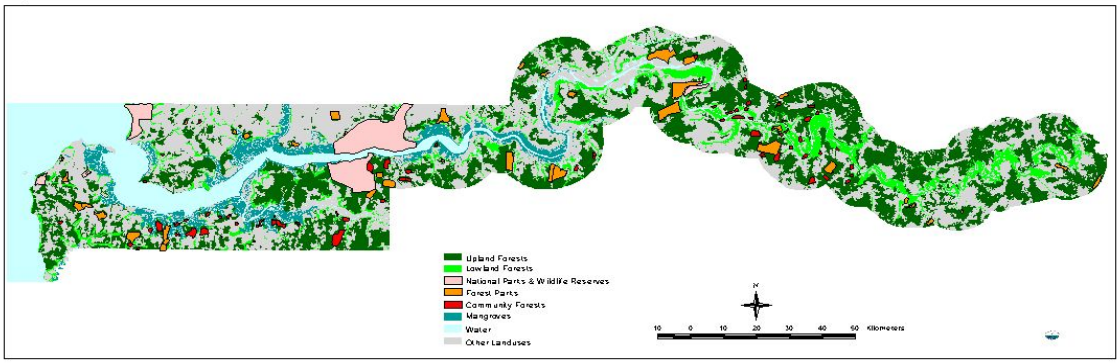
The remaining unclassified forests thereafter called forest reserves, shall be conserved and managed as long as they are not converted to other land uses or protected areas. As such the final forest cover of The Gambia will be possible to be retained at the present level about 40% and thus more than the minimum policy target of 30%.

Figure 3: **Present and future distribution of forest categories**



Sources: Department of Forestry, GFMC, 2001

Figure 4: FOREST COVER OF THE GAMBIA AS OF 1993



Sources: NAP, 1999

Table 3: Forests under controlled management

Regions	Forested land (ha)	Controlled management (ha)					
		Forest parks	CCSF	community forests	private forests	Total	
						Ha	%
Western	73,300	3,355	500	2,2979	100	26,934	36.7
Lower River	66,500	1,758	0	6,680	0	8,438	12.7
Central River	154,600	7,233	0	26,965	0	34,195	22.12
Upper River	113,200	858	0	14,209	0	15,067	13.31
North Bank	41,200	0	0	2,300	0	2,300	5.58
The Gambia	448,800	13,204	500	73,130	100	86,934	19.37

Sources: Department of Forestry Regional Reports

The 1995 Forest Policy has been reviewed and will be sent to Cabinet for approval by the 1st quarter of 2009. The new policy (2006 - 2016) aims at maintaining at least 30% of the total land area under forest cover and to manage at least 75% of this area, for environmental and socio-economic development, including the fulfillment of MDG goals. It has been designed to contribute to the environmental and socio-economic policy objective for sustainable development, and poverty alleviation of the government as formulated in the PRSP and vision

2020, by calling for the involvement of the local communities and the private sector in the management and development of forest.

In line with the policy, the Department of Forestry will review the 1998 legislative frameworks (Forest Act & Regulation) in 2009 as a requirement of the policy and that would ensure the sustainable management of The Gambian forests and thus contribute to improved livelihoods of the rural population. After nine years of the implementation of the National Forestry Action Plan (NFAP 2000 - 2010), there still remains a strong case for support to the Department of Forestry to consolidate the gains attained so far especially in the Regions where the forest resources are most threatened.

2.2 Forestry, Climate change and Sustainable Development

In addition to the changes in rainfall, climate change affects all atmospheric variabilities such as atmospheric pressure, temperatures, evaporation, hydrological regimes, sea level, magnitude and frequency of storms and carbon dioxide concentration. Bringing the trend of decline in forest cover and the anthropogenic impacts in the equation makes it obvious that The Gambia forest ecosystems is very threaten. Therefore, positive management, conservation and rehabilitation could contribute substantially to the management and sequestration of carbon dioxide. This combined with rapid population growth, high poverty, low development indices, inadequate natural resources governance and unregulated utilization of coastal resources calls for urgent, holistic and coordinated action needed to ensure the sustainable management of these must threaten resources.

Land use changes between 1980 and 1993 observed by the Forestry Department in a recent monitoring exercise concluded the following results:

- The total area under forest increased. This is due to a reversion of former agricultural land (mainly marginal fallow land) into tree and shrub savannah compared to previous inventory data. All Regions, with the exception of North Bank Region (NBR), registered an increase in tree and shrub savannah.
- Closed and open woodland was reduced by 3.1% per year due to forest degradation and conversion into agricultural land. Most severe degradation can be observed round middle and the eastern part of the country.
- Mangroves suffered a slight but nevertheless alarming decrease in total surface area; the causes are die-backs due to disturbed water exchange, illegal exploitation and conversion of tidal areas into shrimp and fish farms.
- The fallow areas have decreased by almost 4.4% due to conversion into tree and shrub savannah, agriculture with no trees or to a lesser extent into agriculture with trees.
- Agriculture with trees remained relatively unchanged and agriculture with no trees increased by 1.3% per year.

The overall area under rangeland remained stable as well, but considerable changes in plant species composition can be observed. There is a general decrease in species of high palatability, such as *Andropogon* grasses and fodder trees such as *Pterocarpus erinaceus* and *Prosopis africana*.

The main influencing factors contributing to destruction and degradation of the forest resources include bushfires and forest utilization (mainly as energy resources).

The Gambia's main household energy resources are fuelwood comprising firewood and wood charcoal; petroleum products comprising kerosene and liquefied petroleum gas; electricity derived from thermal generation and solar energy; and, renewable energy resources comprising wind solar and biomass.

Table 4: Predicted Fuelwood Resources

Region	Area (ha)	Total Volume per ha. M^3 ($1000m^3$)	Fuelwood Volume M^3 ($1000M^3$)	%
Western Region	149017	29	21	72.4
Central River Region	115370	28	20	71.4
North Bank Region	149582	25	16	64
Lower River Region	253002	13	9	69.2
Upper River Region	178859	9	8	88.9
Non forest	845830	19	14	73.7
Total	1691660	123	88	71.5

Sources: Department of Energy, National Household energy consumption survey in The Gambia, 2004

Fuelwood contributes about 97% of the country's total household energy needs, constituting about 98% of rural household consumption and about 95.5% of urban household consumption. These statistics eloquently express the all importance of fuelwood in the Gambia's household energy basket. The resource-base of the energy, the country's forest cover has been under severe pressure since the 1960s. The forest cover reduced from 81.2% of the land area in 1946 to just about 42.55% in 1993. The reduction in the closed forest type has been most dramatic, plummeting from 60.1% in 1946 to 0.7% in 1993. In effect, closed forest has almost disappeared from the Gambia's vegetation map within a period of 50 years. During this same period the country's population density grew from 35/ km^2 to about 108/km^2.

Population pressure and its attendant consequences on the natural base have contributed to the rapid depletion of the forest cover. Bushfires, agricultural expansion, clearing land for human settlement, over harvesting of the forest products, overgrazing, management of forestry resources have the major causes of this phenomenon.

Interventions with other energy sources like biomass and solar energy are very necessary to ensure the sustainable management of forests and thus increase its carbon sequestration.

Table 5: Fuel Consumption in Tons of Oil Equivalent (TOE) Value Dalasi (D)

Terms	Physical			Value (D)		
	Urban	Rural	Total	Urban	Rural	Total
Fuelwood	206186	354738	561745.8	188845998	219170834	357916832
Firewood	186946	352339	539283.8	79078747	147438498	226517245
Charcoal	19240	2429	22462	109767251	71632336	181399587
LPG	2091.48	606.17	2697.64	67779394	19644259	87423653
Kerosene	832.55	3820.69	4625.25	11095033	50916573	62011606
Electricity	4211.12	414.41	4625.54	222308263	21877078	244185342
Biomass	1638.61	740.43	2379.04	21836927	9867379	31704307
Total	214959.76	360349.70	576101.27	511865615	321376123	833241740

Sources: Department of Energy, National Household energy consumption survey in The Gambia, 2004

* Conversation factors of firewood to tones of oil equivalent in annual firewood consumption in tonnes/0.64966 x 0.44

** Conversion factors of charcoal to tones of oil equivalent is annual consumption in tones / 0.46 to get the firewood equivalent in tones / that by 0.64966 x 0.44.

Table 5 presents a detailed estimation of charcoal consumption in both physical and value terms. This detailed picture can be summarized as follows:

- Total national consumption of charcoal in physical terms is estimated at 15,132 metric tones;
- Out of this total national consumption, about 13,068 tones (89%) are consumed by urban households and 1649 tonnes (11%) are consumed by rural households;
- At current charcoal market prices, the total national consumption in value terms is established at D181, 399,587, representing a per/capita expenditure of D133.38;
- Off the estimated national charcoal consumption in value terms, D109.767, 251 (60.51%) was spent by urban households and D71, 632,336 (39.49%) was spent by rural households; and,

Renewable energy resources consist of solar energy, wind energy and biomass. These energy forms, in particular solar and wind belong to the modern sector. Wind is yet to be acceptably tested in The Gambia. Solar energy is in the market and a number of Solar energy device companies are operating in the country. However, the high investment costs exclude the local country-wide coverage. The best energy source to substitute fuelwood for the case of The Gambia is considered to be the biomass energy. Excluding grasses, which is abundant and exceeds all other biomass in terms of quantity, the availability of biomass is indicated in the table below.

Table 6: 5-Year Projection of Biomass Availability as at 2004 in Metric Tons

Material	Year 0	Year 1	Year 2	Year3	Year 4
Groundnut Shells	19,900	21,300	22,800	24,400	26,100
Millet Stalks	78,500	83,200	88,200	93,500	99,100
Maize Stalks/Cobs	18,800	20,500	22,300	24,300	26,500
Sorghum Stalks	31,500	34,600	38,100	41,900	46,100
Rice Straws/Husks	6,900+	7,300	7,800	8,300	8,800
Cotton Stalks	1,270	1,300	1,330	1,360	3,400
Total	155,600	166,900	179,200	192,400	206,600

Sources: Department of Energy, National Household energy consumption survey in The Gambia, 2004

The value of urban electricity consumption is higher than that of fuelwood. This also confirms the high cost of fossil fuels, which is an impediment to socio- economic development. Thus, if size of percentage consumption is a criterion for importance, then fuelwood is the most important. The rest trail far behind fuelwood, electricity and kerosene. LPG and biomass trail well below.

To address these issues and concerns it is obvious that interventions are required in revisiting policy frameworks (forest governance), implementation of sustainable forest management (GFMC), agroforestry, research and institutional strengthening (human & material resources).

2.2.1. Changes in forest and other woody biomass stocks

The forests of The Gambia like all other countries of the subregion are going under the same pressure of illegal utilization, high population demand, pollution and bushfire calamities, so much that some of their must valuable functions are being gradually lost including carbon sequestration. In the case of lost of forest areas, the carbon sink capacity per area is also being negatively affected.

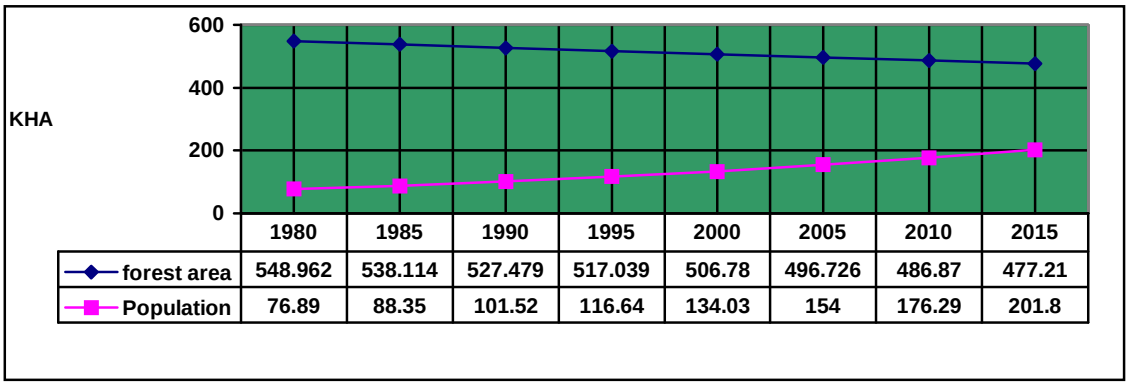
Table 7: The biomass and CO_2 annual emission

Year	Area of forests/ biomass stock (kha)	carbon uptake increment (kt C)	Commercial harvest (1000 m^3)	Traditional fuelwood consumption (kt dm)	Biomass consumption (kt dm)	CO_2 annual emission (Gg CO_2)
1994	521.135	941.05	113.45	824.18	646.45	2,265.37
1995	519.135	940.42	113.45	848.91	672.34	2215.57
1996	517.135	939.81	119.93	874.37	988.30	2153.33
1997	515.135	939.22	123.31	900.61	1017.75	2095.18
1998	513.135	938.62	126.78	927.62	1048.06	2035.40
1999	511.135	938.20	130.35	955.45	1079.28	1973.95
2000	509.135	937.35	134.03	984.12	1111.44	2421.31

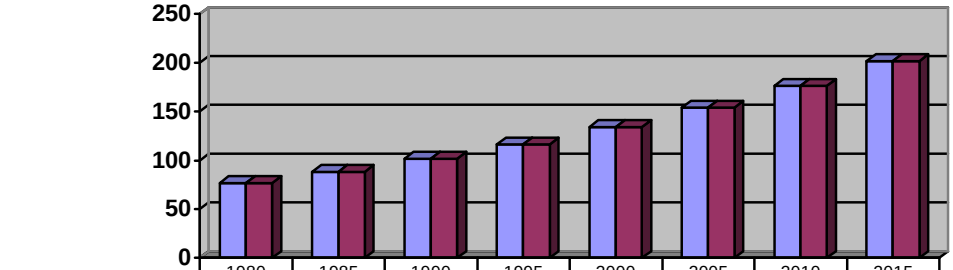
Sousrces: National Green House Gas Inventory, Land use change and forestry, 2008

The forest area decrease and the increase in utilization of The Gambia are highly attributed to rapid increase in population, in particular the rapid growth of settlements along the coast. This can be confirmed from the graphs below.

Figure 5: The relation of forest area, population and utilization



	1980	1985	1990	1995	2000	2005	2010	2015
forest area	548.962	538.114	527.479	517.039	506.78	496.726	486.87	477.21
Population	76.89	88.35	101.52	116.64	134.03	154	176.29	201.8



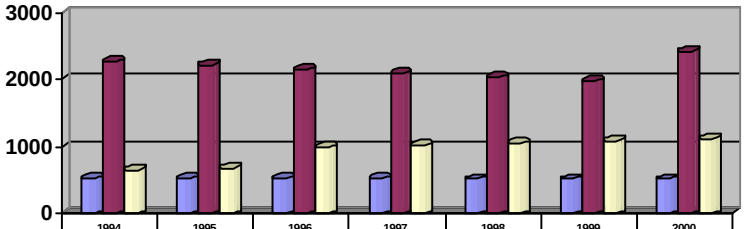
	1980	1985	1990	1995	2000	2005	2010	2015
commercial utilization	76.89	88.35	101.52	116.64	134.03	154	176.29	201.8
Population	76.89	88.35	101.52	116.64	134.03	154	176.29	201.8

Sousrces: National Green House Gas Inventory, Land use change and forestry, 2008

The graphs above show a continues population growth and a decreasing forest cover, while the utilization obviously increases through the years.

As mentioned above, The Gambia highly depends on wood energy as apparent in the traditional fuelwood consumption. Considering the biomass stock available, the country needs urgent attention in the consumption trend to offset the increasing demand.

Figure 6: The biomass and CO_2 annual emission

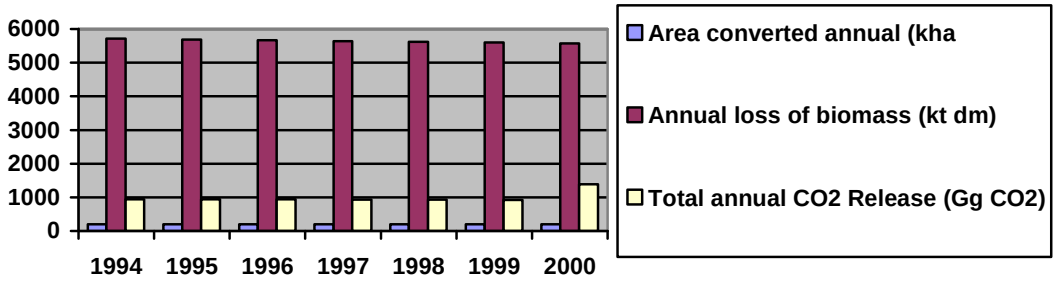


	1994	1995	1996	1997	1998	1999	2000
Forest area/biomass stock (kha)	521	519	517	515	513	511	509
CO2 emission (Gg CO2)	2,265.00	2216	2153	2095	2035	1974	2421
Biomass consumption (kt dm)	646.45	672.34	988.3	1017.75	1048.06	1079.28	1111.44

Sousrces: National Green House Gas Inventory, Land use change and forestry, 2008

In considering the trend from the graph, though all the parameters are in average constant, but forest biomass is decreasing while others are in the increase. However, it should be realized that the variables are denoted with different parameters. The forest management of The Gambia is faced with the problem of encroachments of forests for agricultural production. The process usually involves clearing of forests and burning whatever is felled. The exercise interprets waste of biomass and pollution.

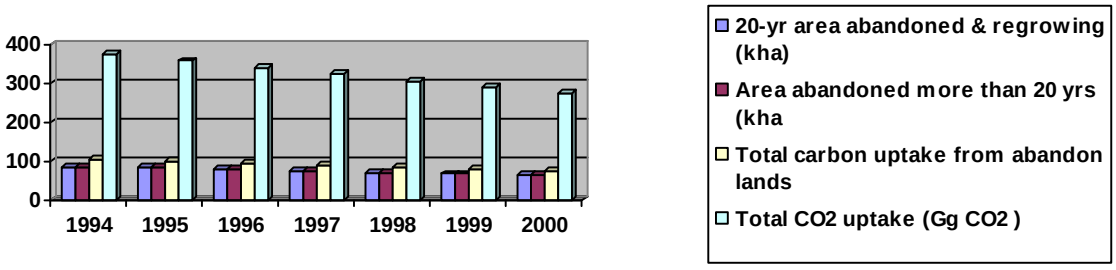
Figure 7: CO_2 release in relation to conversion of vegetations



Sousrces: National Green House Gas Inventory, Land use change and forestry, 2008

Almost similar to the other graphs, the trend shows there is very little change within the years for all the variables. Here, the conversion of forests and grasslands are having a sight remarkable increase yearly. To the advantage of carbon stock and CO_2 uptake due to regrowing of forests is the abandonment and regrowing of used lands. The rural urban drift has a favourable correlation with the abandonment of agricultural areas also.

Figure 8: CO_2 uptake and forests



Sousrces: National Green House Gas Inventory, Land use change and forestry, 2008

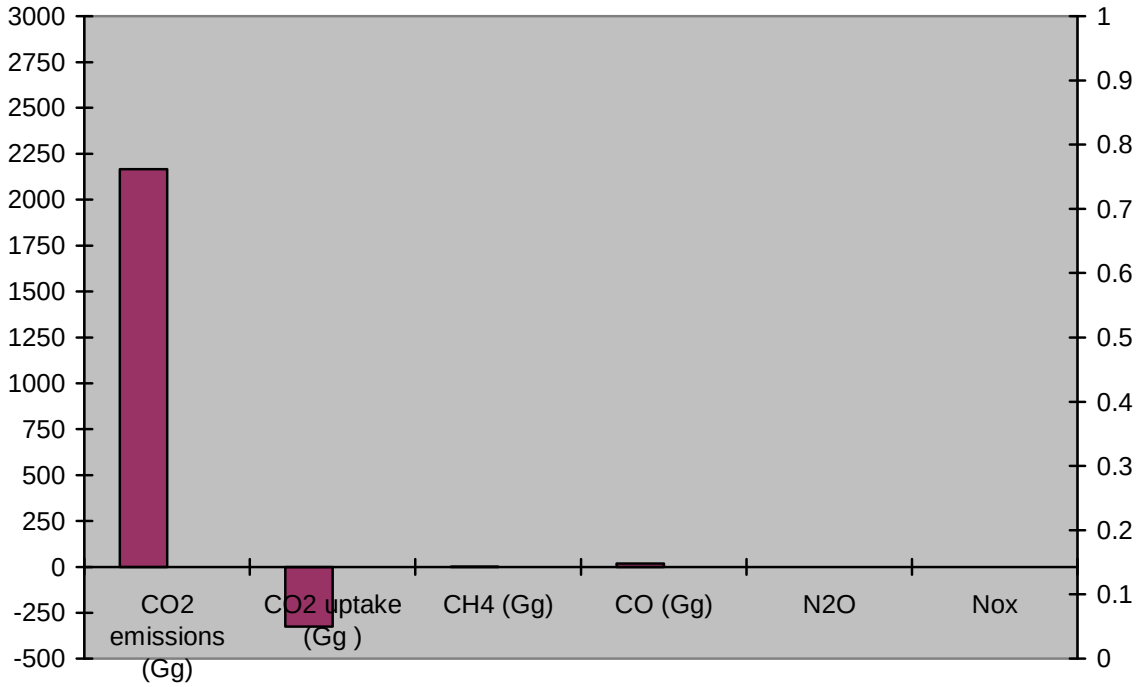
2.2.2. Greenhouse gases

However, Climate change and land use management are intrinsically linked. Land use change is a major cause of increasing greenhouse gas-emissions. The productivity of systems reflects its mitigation potential for carbon sequestration or e.g. biomass energy generation.

The trend analysis from 1994 to2000 shows that our forest cover in terms of total area has only slightly reduced but of greater significant is the rate of forest degradation which is apparently on increase thus reducing it's absorptive capacity of the Greenhouse gases. The rate of emissions from the soils and forest burning has also increased during the period. Though all forms of

greenhouse gas emissions in The Gambia are definitely negligible compared to industrialized and developed countries. The results obtained from the analysis of data for the forestry sector for the various Greenhouse gas (Carbodioxide, etc) is given as a yearly average in the graph below.

Figure 9: Average Greenhouse Gases



Sousrces: National Green House Gas Inventory, Land use change and forestry, 2008

It is clear that our forest cover has reduced due to forest degradation mainly as a result of annual forest burning and over dependence on fuelwood thus reducing our potential for greater contribution of reducing emissions of Greenhouse gases. Reduction in the quality of our forests and number of trees per hectare continues. The linkages between agents and causes of this are often complex. Whilst the immediate effects may appear technical, both the underlying causes and consequences are undoubtedly social, environmental and economic. In The Gambia, potentials for atmospheric GHG reductions through sequestration and use of modern biomass energy technologies are available, considering the influence of water and forests.

3. Mitigation measures for the Forestry Sector

3.1 Forest Management frameworks

The Gambia is a small and developing country, but highly endowed with forest cover. From the total land area of 1,062,000 ha, about 43% are in one form or the other still forested, although most of those forests are heavily degraded as detailed above. Thus the Department since early 1980 change its focus from plantation to natural forest management, after a trial of about 14 years, a natural forest management model called "The Gambian Forest Management Concept (GFMC)" was developed in 1995 and revised in 2001. The intention is not to increase the forest in terms of area but improve the forest cover and heavily undertake agroforestry and energy saving.

The 1995 Forest Policy has been reviewed and will be sent to Cabinet for approval by the 1st quarter of 2009. The new policy (2006 - 2016) aims at maintaining at least 30% of the total land area under forest cover and to manage at least 75% of this area, for environmental and socio-economic development, including the fulfillment of MDG goals by involving and committing the local communities and the private sector in the management and development of forest.

In line with the policy, the Department of Forestry will review the 1998 legislative frameworks (Forest Act & Regulation) in 2009 as a requirement of the policy and that would ensure the sustainable management of The Gambian forests and thus contribute to improved livelihoods of the rural population. After nine years of the implementation of the National Forestry Action Plan (NFAP), there still remains a strong case for support to the Department of Forestry to consolidate the gains attained so far especially in the Regions where the forest resources are most threatened.

3.2 Mitigation Measures

Multi-decadal trends in loss of forest cover through bush fires, irrational exploitation and land use changes are exacerbated by slow survival rate of natural regeneration.. Social forestry is one of the new approaches in natural resources management that has proven a success in the management of the forests. The global objective is to enhance the management of forest resources for continuous supply of products and various environmental services for sustainable livelihood based on the GFMC. The mitigation measures must be geared towards increase of forest cover, management of existing forests and heavy reduction of energy dependency on wood resources. It must be ensured that the survival rate of planted seedlings remain above minimum of 60%. The relevant measures for mitigation are proposed below.

Table 8: Mitigation measures

Measures	Activities	Output/Target	Duration	Est. budget ($)
Maintaining productive functions of forest and woodland ecosystems	- Continues seasonal bushfires campaign & sensitization - Establishment of community fire control breaks - Survey & Demarcation of forest areas to discourage encroachment - Promotion of targeted natural regeneration through temporal protection	- Bushfires incidences are reduced annually by 30% - Available forested areas of 43% are maintained - Woodlands are increased by 3% annually to halt the degradation	5 years 5 years 5 years	100,000.00 40,000.00 60,000.00
Improving productive functions of forest and woodland ecosystems	- Implementation of GFMC country wide - Expansion & consolidation of participatory forest management - Promotion of One Million Tree Planting initiative	- Forests under control & sustainable management increase by 10% of total forest cover - One Million Trees planted yearly with survival rate of minimum 60%	5 years 5 years	120,000.00 200,000.00
Improving biological diversity in ecosystems	- Promotion of natural regeneration through temporal protection - Control fire belting of forest parks & protected forests	- Woodlands are increased by 3% annually to halt the degradation	5 years	Catered for
Minimizing soil desiccation and soil movement caused by water and wind erosion	- Sensitization & awareness creation campaigns - Planting on slopes and along farm land borders	- Areas protected - Areas planted	4 years 5 years	30,000.00 40,000.00
Empowering communities over/in their forest resource management through the step-wise transfer of legal ownership	- Review/streamlining of legislative frameworks - Expansion & consolidation of participatory forest management - Establishment of management plans - Ensuring timely Gazattement	- All relevant legislative frameworks takes concern of forestry issues - Forests under control & sustainable management increase by 10% of total forest cover	1 year 5 years	26,000.00 64,000.00
Enhancing capacity of local communities in forest management	- Capacity building in managerial functions - Capacity building in forest management techniques - Capacity building in enterprise development (MA&D)	- Yearly 15 committees functional - Yearly 15 communities trained - Yearly 15 communities market and conduct book-keeping independently	5 years 5 years 5 years	40,000.00 40,000.00 80,000.00
Promotion and adoption of appropriate agro-forestry systems	- diagnostic study of technical problem for agro-forestry - implementation of appropriate	- Technical manual available for different localities/regions - 20 communities are engaged yearly - 50 communities equipped with functional	1 year 5 years	30,000.00 96,000.00

	technology packages - Provision of requirements for the production and training for multipurpose tree seedlings	tree nurseries	5 years	60,000.00 Catered for
Promotion and adoption of appropriate reforestation/afforestation systems	- implementation of appropriate technology packages - Provision of requirements for the production and training for multipurpose tree seedlings - Promotion of tree planting - Protection of both targeted natural regenerations and planted seedlings	- 200 ha in Forest Parks & 2000 ha in community forests yearly - Strengthening available tree nurseries (15) - One Million Trees planted yearly with survival rate of minimum 60% - Provision of 10,000 r.m of fence & fencing material	5 years 2 years 5 years 2 years	150,000.00 60,000.00 Catered for 30,000.00
Briquette and carbonization of biomass and the use of energy saving devices	- Provision of adaptable equipment and machineries - Establishment of plants - Training of local technicians	- 6 Agglomerating machineries, mills established & functional - 6 fully functional plant established - 30 technicians trained	3 year 3 years	1,400,000.00 15,000.00
Employment of renewable energy sources on pilot bases: solar, capturing Methane gas, and Jatropha	- Provision of equipment - Installation of energy supply systems - Establishment of Jatropha processing plants - Provision & planting of seedlings - Training of local technicians	- 10 communities benefit from solar energy systems yearly - 25 household benefit from capturing Methane gas from septic tanks yearly - 2 Jatropha processing machine established - 30,000 seedlings Jatropha planted yearly - 32 technicians trained	3 years 5 years 5 years 3 years 2 years	800,000.00 200,000.00 400,000.00 180,000 25,000.00
Strengthening the capacity of national forestry & collaborating institutions	- Implementing institutions are functional - Programme implementation sustainable	- Yearly 12 professionals trained - Data acquisition, analysis, training & modeling; building database (GIS) - Provision of 24 vehicles - Provisions of 48 motor cycles - Provision of materials/equipments	5 years 5 Yrs/6 monthly 2 years 2 years 5 years	1,200,000.00 400,000.00 2,400,000.00 195,000.00 500,000.00
Total				**8,981,000.00**

The financing will involve both investment and financial flows to ensure the fulfilment of mitigation goals. The forests and farm lands will be planted under the one million tree planting initiative. The farm land planting will take the form of agroforestry, in particular in the northern bank of the River Gambia where forests are concentrated only along the river and depressions.

Forest development, energy and biofuel enterprise require long term investments and financial flows for any meaningful results to be achieved. The envisaged period for the mitigation programme will be 5 years in two phases. The first phase of 2 years will include must of the initial investment and financial flow. The estimated 5 years programme cost amounts to $8,981,000 (GMD 242,487,000). Some activity areas will require technical assistance and short term consultancy as well as research work which are estimated in the budget. However, proper project detail costings and planning would be required at inception.

There has been no modeling undertaken to ascertain the real impact values of the programme on GHG emissions/reductions in The Gambia. Also relevant data are so scattered that immediate strengthening of the database within the National Environment Agency (NEA) right at project inception. Forest Resources Inventory project 2009/10 is a good venue for interlinking. However, with the implementation of the programme, it is targeted to reduce or enhance CO_2 capture as follows:

1. reduction of loss of biomass by about 900 kt dm annually,
2. reduction of annual CO_2 release by about 600 Gg CO_2 , and
3. finally, the CO_2 capturing capacity will be enhanced resulting to and additional of about 400 Gg annually.

Thus the programme will also enhance good livelihood for local population through provision of clean and readily available energy and thus reduce pressure on forests.

4. National and International investment and financial flows

Currently, there is virtually no active international support in implementing mitigation issues relevant to forestry after the withdrawal of the German – Gambian bilateral cooperation in 2006. After the finalization of the NFAP document, series of support proposals were formulated and sent to potential donors for funding. The department is presently benefiting from a Region programme on Mangrove management funded by MAVA through Wetlands International and IUCN. The project phase is for three years (2007-2009) and covering only three pilot villages nationwide with an annual budget of less than 10, 000 Euros. FAO – Gambia Government collaboration has just launched 18 months forest resources inventory in October, 2008. One particular observation in terms of support to forestry is the clear absence of NGOs and other civil society organizations in implementing activities

There are two financial sources of national financing, the Government annual budgetary allocations and the National Forestry Fund (NFF). About 96% of the Government allocated budget is used for personnel and overhead costs. The NFF allocation is used for routine forestry activities only. Almost all external resources hitherto are from or through the UN-Systems, mainly UNFCCC, GEF, UNEP, FAO and UNDP. These resources made available in support of climate change process are of the free-standing coorperation type, which were channeled directly through mainly by the focal institution except FAO and none of these sofar include financing of field activities or investments towards mitigating climate change. Similarly, except the national budget all other existing local sources of funding are very specific and are not available for funding climate change mitigation issues and nor accessible to local actors for exclusive investment of local initiatives in forestry mitigation process.

The external financial machineries have sofar shown very little interest in providing funding for the forestry sector mainly due to priority settings of the donor. Transparently, detail information and right contact on funds and funding agencies are not readily available. The funds are not more readily available for the protracted negotiation process is proving a bottleneck to accessing them. Here, public diplomacy and collective bargaining has a fundamental role to play. Integration of broad social and economic policy issues in a new climate policy would certainly create greater understanding an appreciation of adaptation among policy- and decision-makers. Putting the right policy frameworks in place will further encourage and facilitate effective adaptation by households, communities, and the private sector in the medium- to longterm.

Whereas inadequate technical, equipment and human capacities are the main requirements. The true extent of the human capacity deficit is determine in the NFAP and the thematic National Self-Assessment Capacity Study by Sillah (2003). Sectoral linkages must be well recognized, and the arguments for integration well founded.

The approach for the investment and financial flow for the sustainable management of forests will include:

i. Review of policy documents to encompass national policy and MDG global objectives;
ii. Align forestry issues with potential donor profiles and criteria, both bilateral and multilateral, towards the sustainable forest resources management;
iii. mainstream the benefits of better forest resources management in national economies and policies for better involvement of women, alleviation of poverty and meeting the MDGs; and
iv. Development of bankable project proposals for investment in the sector.

5. Approach for Investment and Financial flows to address Climate Change Mitigation in the Forestry Sector

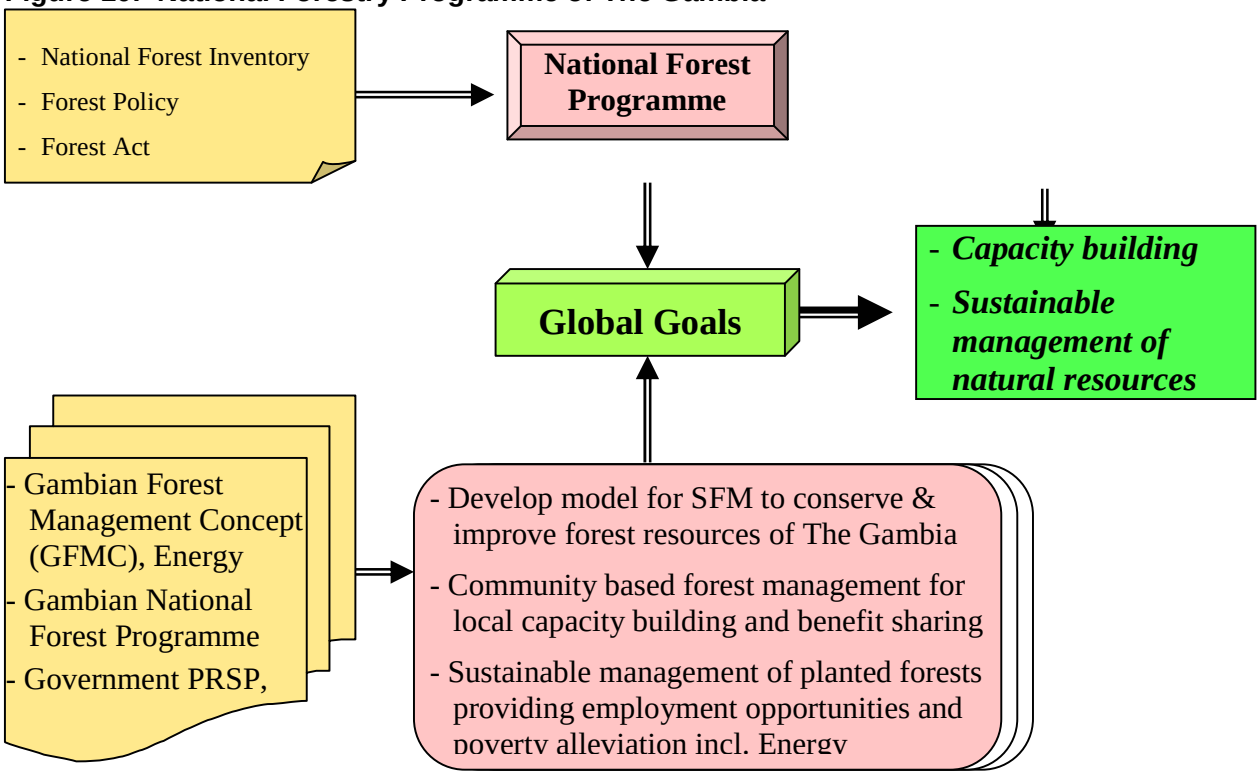
5.1. National Forestry Programme

This programme which aims at supporting the National Forest Programme is part of the Government broad policy particularly in the context of the national strategy for growth and poverty alleviation, the action plan for environment and the action plan for biodiversity conservation. The Government overall policy endeavour to achieve the Millennium Development Goals, mainly the fight against hunger, the reduction of poverty and the protection of the environmental as foundation for the sustainable development and well-being of present and future generations. The programme will therefore support the government's efforts to strengthen the forestry sector, improve integrated management of ecosystems and build the capacity of the national institutions for monitoring and assessment through adoption of guidelines or innovative and internationally recognized approaches.

The programme aim includes also strengthening DOF to enable it to carry out future updating of forestry information, promote modern techniques and integrated approaches, support exchange and sharing of information and expertise, ensure transfer of technology, provide training when required, develop national norms of forest inventory, assessment and monitoring.

The improved capacity of the Department of Forestry and the formulated/adapted sectoral policy and Forest act will indisputably contribute to the sustainable management of the forest and trees outside forest resources and to the wider development agenda of the country through sustainably secured social, economic and environmental benefits of the resources. The implementation of the programme with focus on landscape, livelihoods and national policy dialogue, particularly when addressing the broader development agenda, combating poverty, facilitating mainstreaming of forestry and reporting to the international agreements and conventions, e.g. Convention to Combat Desertification (CCD), Biological Diversity (CBD), Climate Change Convention (UNFCCC), United Nations Forum on Forest (UNFF) etc will raise the profile of the forestry sector in terms of economic, social and environmental added values.

Figure 10: National Forestry Programme of The Gambia



5.2 Institutional Arrangements

The project will be anchored within the Department of Forestry of the Gambia. The Department of State for Forestry and the Environment (DOSFEN) through the Department of Forestry (DoF) will be the national implementing institution of the project and will have the overall responsibility for its implementation in close coordination with the National Focal Institution for Climate Change and other relevant collaborating stakeholders

The Department of Forestry will nominate a National Forestry officer as National Programme Coordinator (NPC), who will be the national focal point and will be fully dedicated to the programme, have the overall responsibility for planning, managing, coordinating and supervising the activities. He will also have the responsibility of establishing a Programme Technical Unit (PTU) at the onset and ensuring that the programme is adequately manned and the mandate is achieved. It is neccessary to include in the PTU national and international consultants and their counterpart personnel and support staff, in particular with the consideration of transfer of technology (technical assistance) and South – South cooperation exchange experiences.

The Department of Forestry will set up a Steering Committee (SC) whose responsibility will be to oversee the programme implementation, facilitate inputs to the programme in all phases, ensure wider dissemination of the results and provide guidance to the Department as how to ensure sustainability of the programme outcomes at the long run. The SC will be composed of representatives from Department of Forestry as the principal actor and implementing agency, representatives from National Climate Steering Committee, all Focal Points of Rio Conventions, forest related sectors, partners/donors and stakeholders. The DoF will ensure wide representation of all concerned parties in the SC.

Under these supervisory instruments, the progress of the prograrmme will be reviewed and scrutinized, its achievements assessed against the planned outputs, its work plan for the next periods analyzed, actions to take in case of constraints identified and responsibilities assigned. At its discretion, the SC may recommend to DoF/donors and DOSFEN that amendments be made to the content, location, timing and implementation arrangements of programme activities.

The overall strategy of the programme will be to work in close collaboration and commitment of all stakeholders to develop, promote and implement management tools to bridge the gap between knowledge generation, policy processes and implementation with emphasis on inter-sectoral coordination. This would help to improve sustainable forest management, to mainstream forestry within the national efforts to eradicate extreme poverty and hunger, achieve sustainable water and land use, mitigate climate change, combat more efficiently desertification affecting most of the country and achieve the Millennium Development Goals, while insuring coherence between global, regional, sub-regional and the underlying country priorities.

In line with REDD objectives, the programme strategy is to collaborate with the national forest programmes (NFP), to assist the Department of State for Forestry and Environment in better integrating forestry issues within the larger context of sustainable development like poverty reduction strategies in order to enhance the contributions of forestry to poverty alleviation and sustainable livelihoods.

Furthermore, after the phase out of the programme, the sustainability of the outcomes will be guaranteed by the Government with funds from the National Forestry Fund (NFF) and National

Budet Systems. The NFF has been established through the Forestry Act of 1998 and funding source is 50% of all revenues collected on forest products/services and 100% from the forest parks and plantations. The resources in this fund are annually allocated according to the sector priorities in which the national forest programme is among the highest.

This NFF account is accessed every financial year to supplement government budgetary allocation for forestry activities. In addition, the implementing staff's capacity will be built during programme implementation who will continue to implement the programme to ensure continuity and sustainability.

5.3 Collaborating Institutions

Conservation, management and development of natural resources have been the shared responsibility of a multitude of actors since the passing of the Banjul Declaration in 1977. The main players include Governmental and Non-Governmental Organizations along with numerous projects and programmes. Noteworthy however, is the almost complete lack of direct private-sector involvement.

Five line Departments of State and their technical departments are of particular importance for the programme implementation. These are the Department of State for Forestry and the Environment, Department of State for Energy, Department of State for Agriculture, the Department of State for Local Government and Lands and the Department of State for Fisheries and Water Resources. These departments of state execute their field level development functions through their technical departments of which, seven have been in the forefront of natural resource conservation during the last years: these are:

- The **Department of Forestry**, responsible for the sustainable management and development of forests and forest resources, including initiatives to introduce community forestry and to transfer management responsibilities for State Forest to village-based organisations. The Deapartment will be the main implementing agency for mitigation measures in the forestry sector.
- **Natinal Environment Agency** is the umbrella institution on environment and natural resources management issues in the country. It has relatively well developed database and database capacity. The implementation of the mitigation measures will require collaboration in database management.
- The **Department of Agricultural Services**, responsible for the promotion of sustainable farming practices, agricultural extension and soil and water conservation. The Agriculture sector will be among the collaborating institutions in delineating permanent forest areas and agro-forestry
- The **Department of Parks and Wildlife Management**, the custodian of protected areas and wildlife in The Gambia. This Department will be full integrated in habitat management and fauna.
- The **Department of Livestock Services**, responsible for livestock development and rangeland management and maintaining a sustainable equilibrium between carrying capacities and stocking rates. The Department is very instrumental in the agroforestry programmes,

- **National Agricultural Research Institute (NARI)**: The institute is the main research body on agroforestry and agricultural aspects.
- The **Department of Water Resources**, which is responsible for metrological and hydrological service and it is as well the focal instititution for Climate Change issues.

All Departments, in spite of remarkable efforts in the past, are constrained by severe budgetary problems and inadequate qualified staff.

The involvement of NGOs in natural resources management has been on the increase in recent years. About one third of the overall external development support to the sector is currently provided and administered by NGOs. Important for the programme implementations are:

- **Association of Farmers, Educators and Traders (AFET):** AFET represents the interest of farmers in the purchase of farm implements, farm requirements, marketing of farm products and policy areas. The association will be incooperated in sensitizations and campaigns.
- **National Consultants (NaCo):** Community-based natural resources extension and advocacy. The services been particularly active in supporting forestry extension for past 15 years; The institution will be incooperated in community based advocacy programmes.
- **National Beekeepers Association The Gambia (NBAG):** Represents the association of beekeepers. The association assists its members in production and marketing and also conducts trainings on beekeeping. The association will be used for training of communities in bee-keeping.
- **Youth Parliament:** A national platform of youths in the whole country collaborating with institutions on the involvement and sensitization of youths in national development. The institution mobilizes youths to assist government in ensuring positive youth participation in all affairs of national development on voluntary bases. The will be used in youth mobilizations.

References

1. Department of Forestry, GFMC, 2001
2. Department of Forestry: National Green House Gas Inventory, Land use change and forestry, 2008
3. Department of Forestry, Impact monitoring & assessment of Community Forestry in The Gambia, 2003
4. Department of State for Tourism and Culture, GTA Masterplan, 2006
5. GOTG, NAP-Gambia: Action Plan on Forest and Wildlife Management (1999)
6. J. S. Sillah, Ecology and Climate Change of the Mangrove Ecosystems, Wetlands International, 2007
7. J. S. Sillah, FAO-Gambia: Forest Resources and Plantations (1999)
8. Niasse, M. 2002. Dialogue on Water and Climate in West Africa. IUCN/Global Water Partnership