

Towards Implementation of an Action Plan for Reviving Agroforestry Systems for Achieving Sustainable Development in Yobe State

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Abstract— The presence of environmental problems remains a threat to achieving sustainable development in Yobe state. “Although Agro forestry is increasingly promoted for restoring forest, degraded environment, reducing greenhouse gases, and gaining other co-benefits, its implementation in parts of Nigeria is poorly understood” (Richards et al, 2009). Agroforestry has suffered neglect and its implementation has been low in Yobe state, this may be attributed to lack of its inclusion in policy making and implementation. However environmental improvement through agro forestry has the potential for resolving the enormous environmental and socioeconomic challenges bedeviling the achievement of sustainable development in the state. Therefore the government needs to support agroforestry in the state through organizing annual campaign and integrate articulated research findings and recommendations on land-management systems and agroforestry into policies for implementation in order to achieve sustainable development. To successfully implement an effective agroforestry programme in Yobe state. It is imperative for the government to make agroforestry appealing to farmers and unemployed youth alike through enlightenment programmes on the benefits of practicing agroforestry. Additionally there is need for the government to partner and task stakeholders, ministries, departments and agencies, to designed long term strategies on agroforestry to achieve sustainable development in Yobe state.

Keywords: Agroforestry, Sustainable development, Desertification, Environmental degradation.

INTRODUCTION

Today there is increased concern at the highest international policy levels about the sustainability of agricultural development, in the light of the apparent rapid depletion of the natural resources base, has brought agroforestry even further into the limelight (FAO, 2004a). ICRAF, (2004) noted that agroforestry is a natural resources management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels. Agroforestry practices offer practical ways of applying various specialized knowledge and skills to the development of sustainable rural production systems. Agro-forestry is recognized as a land use option in which trees provide both products and environmental services. In agroforestry systems, the trees grown on different farmlands in the same locality when aggregated can bring about improved wooded situation thereby enhancing environmental protection (Otegbeye, 2002).

The practice of agroforestry systems by farmers may supplement government efforts in establishing tree plantation in its campaign against environmental degradation. However the plantations in most agroforestry systems, are usually not in inline with silvicultural traditions (Owonubi, 2002). In fact with the current low level of agroforestry practice among the farmers, in the state, there is need to improve on the existing agroforestry practices in the face of dwindling environmental quality and natural resources.

The paper aims at improving the adoption and practices of agroforestry and highlights the potentials and importance of agroforestry systems as a genuine way of achieving sustainable socioeconomic development and environmental management in Yobe state.

Environmental Challenges and Issues Affecting Livelihood

The importance of small scale agroforestry practices in both sustainable food production and environmental management services such as biodiversity conservation and carbon sequestration cannot be over emphasised (Kumar, 2005a; 2006). Land degradation and desertification are two key processes, which render agricultural lands unproductive and threaten food security in northern parts of the state. The presence of woody species can enhance nutrient cycling, and can improve soil productivity, soil conservation and soil biotic and faunal activities. However there's a low agroforestry practices in northern parts of the state particularly in Yunusari, Yusufari, Geidam, Nguru and Machina local government areas of Yobe state. Most rural communities lack the capital resources to invest in agroforestry to reclaim degraded lands. In fact the increasing incidence of desertification in these areas is one of the most challenging ecological problems. As a signatory to the Convention on Biological Diversity and the United Nations Convention to Combat Desertification, the federal government has committed to sustainable natural resource management and use (land, water, air, minerals, forests, fisheries, and wild flora and fauna) to produce ecosystem

services that underpin the existence and welfare of human life. The National Action Program to combat Desertification which was produced by the government in 2001 has reported that “Between 50% and 75 % of Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Yobe, and Zamfara States in Nigeria are being affected by desertification. In these areas, population pressure resulting in over grazing and over exploitation of marginal lands have aggravated desertification and drought. Entire villages and major access roads have been buried under sand dunes in the extreme northern parts of Katsina, Sokoto, Jigawa, Borno, and Yobe States”. According to Ayuba (2008) “illiteracy and poverty are exerting more pressure on the Yobe environment”. (See table 1 below). Yobe state with highest incidence of poverty)

Table 1. States with Highest Incidence of Poverty

	INCIDENCE OF POVERTY	OF POVERTY GAP
STATE	Po	P1
JIGAWA	92.1	0.4967
KEBBI	90.4	0.4322
KOGI	88.6	0.5713
BAUCHI	82.2	0.3573
YOBE	81.1	0.3563
KWARA	79.3	0.4413

Source NBS, (2005)

Harmful environmental practices such as unsustainable land use practices, over-exploitation of natural resources and weak protected area management in some parts of the state have resulted into the loss of valuable top soil directly impacting on the ecosystems and threatening the agricultural productivity base of communities. According to Zhaomin and Ling, (1991) in dry climates, growing trees to serve as windbreaks and shelterbelts contribute in moderating the effects of hot, dry winds, which increase evaporation and plant transpiration. Activities of soil organisms, which determine several key processes, are also expected to be high in agroforestry (e.g., homegardens; Kumar, 2005b). However most agroforestry systems are also complementary to other crop production enterprises, as they provide green manure, fodder, and fuel (Kumar, 2005a; Wiersum, 2006). Although agroforestry production (e.g., edible fruits, nuts, grain, rhizomes and tubers, leaves, flowers, fodder, mushrooms, medicinal plants and other non-timber forest products including fuels, livestock products etc.), also promote enhanced and/or sustained production (soil fertility improvement, soil and water conservation, hydrological benefits, microclimatic modification, etc. This complementary and sustainable use of environmental resources differentiates food production through agroforestry from that through intensive arable cropping and makes agroforestry particularly attractive.

Rational for Developing Agroforestry Systems in Yobe State

Kang and Akinnifesib (2000) stated that agroforestry systems are widely considered as alternative land uses for solving some of the food and environmental problems for example problems of deforestation, environmental degradation and hunger and for raising farmers’ standards of living. The practices of agroforestry systems in various parts of Nigeria are poorly understood. However the patterns of agroforestry implementation in Nigeria’s 36 states and capital territory was studied using geodemographic and spatial analysis, it was found that per capita implementation of agro forestry (populations of farmers and totals by states) have been low nationally and varies among constituent states/territory (see table 2 and 3 below). Therefore, policy makers and key players of the Nigerian agricultural sector have not considered and include agro-forestry in farming/agricultural systems programming and implementation in the country. (Richard, et al, 2009). Conversely, in the past the role of government is acknowledged regarding the push towards intensive monospecific commercial production of some agroforestry tree crops particularly Gum Arabic trees and the like. This has decimated many traditional agroforestry systems, partly because policy instruments which promote agroforestry adoption are either lacking or inadequate. “The multiple benefits which agro-forestry is capable of providing to Nigeria are yet to be fully described to policy makers and farmers”. (Richards et al, 2009)

Table 2: Per capita agroforestry based on farmers’ population in Nigeria by states

S. No	State/Territory	2006 Population	Agric. Population (% of total)	Agroforestry (Ha)	Farmer population	Per capita agroforestry (in Ha)
1	Abia	2,833,999	20.28	2051	574735	0.003569
2	Adamawa	3,168,101	31.23	2374	989397.9	0.002399
3	Akwa Ibom	3,920,208	21.24	25800	832652.2	0.030985
4	Anambra	4,182,032	24.27	5332	1014979	0.005253
5	Bauchi	4,676,465	27.76	1200	1298187	0.000924
6	Bayelsa	1,703,358	28.93	Na	492781.5	
7	Benue	4,219,244	46.92	2234	1979669	0.001128
8	Borno	4,151,193	35.53	432052	1474919	0.292933
9	Cross River	2,888,966	29.97	19000	865823.1	0.021944
10	Delta	4,098,391	20.09	2000	823366.8	0.002429
11	Ebonyi	2,173,501	34.53	Na	750509.9	
12	Edo	3,218,332	17.3	150000	556771.4	0.26941
13	Ekiti	2,384,212	19.91	Na	474696.6	
14	Enugu	3,257,298	28.28	7498	921163.9	0.00814
15	Gombe	2,353,879	24.5	Na	578818.8	
16	Imo	3,934,899	27.59	1160	1085639	0.001068
17	Jigawa	4,348,649	38.34	3000	1667272	0.001799
18	Kaduna	6,066,562	13.83	6146	839005.5	0.007325
19	Kano	9,383,682	10.59	2186	993731.9	0.0022
20	Katsina	5,792,578	24.54	18900	1421499	0.013296
21	Kebbi	3,238,628	31.66	17750	1025350	0.017311
22	Kogi	3,278,487	16.84	5000	552097.2	0.009056
23	Kwarra	2,371,089	8.34	6000	197748.8	0.030342
24	Lagos	9,013,534	0.79	2000	71206.92	0.028087
25	Nasarawa	1,863,275	23.32	Na	434515.7	
26	Niger	3,950,249	22.93	4956	905792.1	0.005471
27	Ogun	3,728,098	9.94	35000	370572.9	0.094448
28	Ondo	3,441,024	21.67	27153	745669.9	0.036414
29	Osun	3,423,535	7.93	6381	271486.3	0.023504
30	Oyo	5,591,589	10.56	8031	590471.8	0.013601
31	Plateau	3,178,712	31.95	6800	1015598	0.006696
32	Rivers	5,185,400	15.94	231	826552.8	0.000279
33	Sokoto	3,696,999	26.7	10943	987098.7	0.011086
34	Taraba	2,300,736	27.64	1359	635923.4	0.002137
35	Yobe	2,321,591	34.15	Na	792823.3	
36	Zamfara	3,259,846	30.33	Na	988711.3	
37	Abuja, FCT	1,405,201	19.27	Na	270782.2	
38	NIGERIA	40,00?		812537	30318019	0.0268

Source: Richards et al (2009)

In addition the Per capita agro-forestry practice for farmers and total population by states and Federal Capital Territory (Abuja), as well as the national average were consistently less than a hectare as shown in tables (2 and 3). However agriculture sector being the largest job provider, employing about 70% of the total population in the 1960s and 1970s the government often overlooks the swift decline in the ratio of

youths actively working in the sector. Perhaps it is due to a combination of factors including being downplayed by economic planners the percentage of the nation's total population engaged in agriculture has dropped recently to considerable levels. (Richards et al, 2009). With the current low level of agroforestry development in Yobe state, indicate that there is ample room for the adoption of agroforestry by farmers in the state. Additionally, in view of the large proportion of youth population in the state, the per capita agroforestry for the total population indicates the unexploited potential for agroforestry development i.e. including unemployed youth, who are not currently engaged in agriculture, among other strata of the population. Therefore, it means that if agroforestry is made attractive through incentivisation schemes, it is capable of attracting unemployed and underemployed youth thereby contributing towards rapid achievement of sustainable development.

Role of Agroforestry in Environmental Resuscitation

In Nigeria traditional farming practice such as monoculture is carried out on mostly marginal soils to achieve high yield of farm produce, the farmers generally succumb to the practice of intensive application of fertilizers for best possible performance of the crops. However the consequences of this current farming practice are that it seldom leaves the soil exhausted and degraded. While the peasant farmers are faced with the challenges of low farm produce. Most agroforestry systems constitute ecologically and bio-physically sustainable land use systems which have the potentials for solving some of the food and environmental problems for example problems of deforestation, environmental degradation and hunger and for raising farmers' standards of living. (Kang and Akinnifesib, 2000).

Table 3. Per Capita Agro-forestry by Total Population (including farmers and others) by States /Territory

S. No	State/Territory	Agro forest (Hectares)	2006 Population	Per capita agro forest (Hectares)	Per capita agroforestry (in Ha)
1	Abia	2051	2,833,999	0.000723712	7.23712
2	Adamawa	2374	3,168,101	0.000749345	7.49345
3	Akwa Ibom	25800	3,920,208	0.006581283	65.81283
4	Anambra	5332	4,182,032	0.001274978	12.74978
5	Bauchi	1200	4,676,465	0.000256604	2.56604
6	Bayelsa	na	1,703,358	0	0
7	Benue	2234	4,219,244	0.000529479	5.29479
8	Borno	432052	4,151,193	0.104078996	1040.78996
9	Cross River	19000	2,888,966	0.006576748	65.76748
10	Delta	2000	4,098,391	0.000487996	4.87996
11	Ebonyi	na	2,173,501	0	0
12	Edo	150000	3,218,332	0.046607994	466.07994
13	Ekiti	na	2,384,212	0	0
14	Enugu	7498	3,257,298	0.002301908	23.01908
15	Gombe	na	2,353,879	0	0
16	Imo	1160	3,934,899	0.000294798	2.94798
17	Jigawa	3000	4,348,649	0.000689869	6.89869
18	Kaduna	6146	6,066,562	0.001013094	10.13094
19	Kano	2186	9,383,682	0.000232958	2.32958
20	Katsina	18900	5,792,578	0.003262796	32.62796
21	Kebbi	17750	3,238,628	0.005480716	54.80716
22	Kogi	5000	3,278,487	0.001525094	15.25094
23	Kwarra	6000	2,371,089	0.002530483	25.30483
24	Lagos	2000	9,013,534	0.000221889	2.21889
25	Nasarawa	na	1,863,275	0	0
26	Niger	4956	3,950,249	0.001254604	12.54604
27	Ogun	35000	3,728,098	0.009388165	93.88165
28	Ondo	27153	3,441,024	0.007890965	78.90965
29	Osun	6381	3,423,535	0.001863863	18.63863
30	Oyo	8031	5,591,589	0.001436264	14.36264
31	Plateau	6800	3,178,712	0.002139231	21.39231
32	Rivers	231	5,185,400	4.45482E-05	0.44582
33	Sokoto	10943	3,696,999	0.002959968	29.59968
34	Taraba	1359	2,300,736	0.000590681	5.90681
35	Yobe	na	2,321,591	0	0
36	Zamfara	na	3,259,846	0	0
37	Abuja, FCT	na	1,405,201	0	0
38	NIGERIA	812537	140,003,542	0.005803689	58.03689

Source: Richards et al, (2009)

Agroforestry as a system can be employed to revive degraded land. Onwusu, 1993; Unruh et al 1993; Hanson et al 1995; Shultz et al 1995 mentioned that the practice of correct agroforestry systems may serve as a breakthrough in achieving sustainable environmental quality. Thus agroforestry systems are considered to be valuable approach in providing long term response to environmental problems, increase farmers revenue and guaranty sufficient food supply

Ecological Benefits of Agroforestry

The cultivation of perennial trees and shrubs play enormous role in improving ecological conditions. These conditions are realized through leaf litter fall from various trees and shrubs growing on the same land with the cultivated crops. The decomposition of these leaves provides nutrients such as nitrogen, phosphorus, calcium and magnesium to the soil (Charley and West, 1977) the canopy provide shade which serve as protection from direct sun rays also complement nutrient conservation. as a consequence there is reduction in the rate of oxidation of soil nutrient. This is in addition to the protection from erosion and fire protection provided by the trees (Hochbeg et al, 1994). Agroforestry therefore contributes towards maintenance of the ecological balance which is the basis for

environmental sustainability. Furthermore, climatic changes, global warming or the greenhouse effect caused by environmental degradation can be checked with Agroforestry practices. Anderson (1990) emphasized that Agroforestry plays a major role in reclamation of degraded or abandoned lands and is a workable approach to mimic natural succession and increased biodiversity. Ostyina (1993) gave a detailed account of how deforestation occurred in Shinyanga but soil conservation and afforestation programmes reclaim the vegetation. The recognition of the potentialities of Agroforestry has inspired the Portuguese and French governments to pass legislations that are aimed at protecting forest areas and natural habitats (OECD, 1991). The main concept here is allowing soil stability by reducing the extent of clearing and tillage thereby reverting the trend of environmental disequilibrium. It should be noted that there is a tolerance limit to human interference for soil substrates, surface and underground water, the flora, fauna and microorganism (Otzen, 1992). The role of the soil in providing a base for the sustenance of life in all forms needs to be appreciated. Hence, the role of Agroforestry in ensuring sustainable use of the land, upholding ecological equilibrium and maintaining the environment should be put in the right perspective.

Nitrogen-fixing and non-nitrogen-fixing trees thrive adequately in agroforestry with annual crops, presents a farming system in which arable crop yields can be enhanced. The tree rooting system brings about stability that can lead to soil conservation. What is needed would be mutual interaction and proper management techniques that would reduce the adverse effects that may result when trees are integrated into agro-ecosystem (Connor, 1983). Various authors (Kang et al., 1990; Young, 1986; Rocheleau and Dianne, 1987) were of the view that successful agroforestry practices benefits the farmers in the following ways:

- Consistent restoration of the fertility status of the soil through the recycled litter deposition and nitrogen fixing mechanism of trees.
- A variety of products, firewood, poles, woodcraft, fodder, medicinal herbs and food for livestock and man respectively.
- Prevention of wind and water erosion by trees acting as wind break and intercepting the raindrop impact on the soil respectively.
- Improving the micro-climate effect of the immediate and adjoining environment.
- Restoration of water table to an absorbable level for crops use.
- Increased income opportunities.
- Increased economic stability
- Reduce cost for establishing plantation
- Increased ability to manage for sustained yield.

CONCLUSION

In conclusion the "per capita agroforestry, based on populations of farmers, all people and land area have been and remain very low" (Richards et al 2009). This low record

of agroforestry development may be attributed to the neglect it has suffered over the years and due to its lack of inclusion in policy making and implementation, therefore resulting in widespread of socioeconomic and environmental problems. However agroforestry have the potential and may play a vital role in addressing the enormous challenges of poverty, unemployment, environmental degradation, deforestation and desertification etc. In fact agroforestry is said to be a natural resources management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels (ICRAF, 2004). In view of the prevailing situation it is necessary for the government to embrace these ample opportunities and revitalize agroforestry in the state.

Additionally the government needs to support agroforestry in the state through organizing annual campaign. The government should integrate articulated research findings and recommendations on land-management systems and agroforestry into policies for implementation in order to achieve sustainable development. To successfully implement an effective agroforestry programme in Yobe state. It is imperative for the government to make agroforestry appealing to farmers and unemployed youth alike through enlightenment programmes on the benefits of practicing agroforestry. Furthermore there is need for the government to partner and task stakeholders, ministries, departments and agencies, to designed long term strategies on agroforestry to resolve the challenges bedeviling the achievement of sustainable development in Yobe state.

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