Annex 5 Study Area 5 (Eastern Nigeria) Report

Programme Against African Trypanosomosis

Options For Tsetse Fly Eradication in the

Moist Savannah Zone of West Africa:

Technical and Economic Feasibility Study,

Phase 1 (EASTERN NIGERIA)

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ANNEX 8 STUDY AREA 5 (EASTERN NIGERIA) REPORT

1 INTRODUCTION

As a result of the renewed interest in large-scale tsetse eradication in Africa, the experience of Nigeria's early programme in tsetse reclamation provides a good source on which to build any future large-scale eradication in Nigeria, and of course in West Africa and probably in other parts of Africa. This is more so because of the varieties of ecological zones that exist, the varied agricultural practices and the demographic pressure present in the country to drive the development process following tsetse eradication. Therefore, some of the "Shadow Projects" which were designed to compare the economic benefits of tsetse eradication and ensuing agricultural development, derivable from the level of scales, be it small (6000 sq. km), medium (60,000 sq. km) or large (600,000 sq. km) were to be tested in Nigeria. As a starting point, however, it was decided to use the small-scale approach and build on that later.

1. GEOGRAPHY

Nigeria lies between longitudes 2 and 15 degrees East and Latitudes 4 to 14 degrees North, occupying a land surface area of some 924,000 sq. kilometers. It covers seven widely varied ecological zones which range from swamp vegetation in the South to the Sahel in the North. The varied ecological conditions are reflected in the different systems of agriculture practised throughout the country, from arable to pastoral. All the ecological zones, except the Sahel and high plateaux of Jos and Mambila, support the existence of tsetse fly (*Glossina sp.*), the vector of animal and human trypanosomosis. Thus, animal trypanosomosis is fairly widespread in the country. Following the large-scale tsetse reclamation programme executed in the 60s and 70s, against particularly the Savannah tsetse, arable farmers have moved in to take advantage of the resulting opportunity. This has led to increased agricultural activities coupled with in-migration to the cleared areas, particularly along river basins when onchocerciasis became less of a threat. Most of the tsetse infestations that still persist, however, are found along river courses especially in the riparian vegetation and these are the riverine species (*G.palpalis palpalis and G.tachinoides).*

Study Areas

Two Study Areas in Nigeria were selected based on the PAAT-GIS, using the 1991 map of *Glossina* distribution and reclaimed areas, produced by the Federal Department of Livestock and Pest Control Services, and other parameters. Since the map was last updated, however, several developments have taken place including the changing patterns of tsetse distribution and agricultural activities, which are revealed in this study.

The first project area covering a total of 13,161 sq. km is along the River Ka on the Niger River System in the North-Western part of Nigeria and lies mainly in Kebbi State, projecting into Zamfara State. The area was chosen because of "the persistence of riverine species at the ecological limit, the high demographic pressure and a high level of resource exploitation".

The second project area covering a total of 19,858 sq. km is at the foot of the Mambila Plateau in the mid-North-Eastern part of Nigeria located in Taraba State. It was chosen "to represent particular land use and socio-economic aspects of the area". Other factors were the pressure on cattle in transit to the Mambila Plateau and the expansion pressure for cultivation from areas associated with the Benue River System, mainly River Donga which runs throughout the project site.

The results for Study Area 5 are given in tables 1 - 7..

Figure 1 Location of Study Area 5

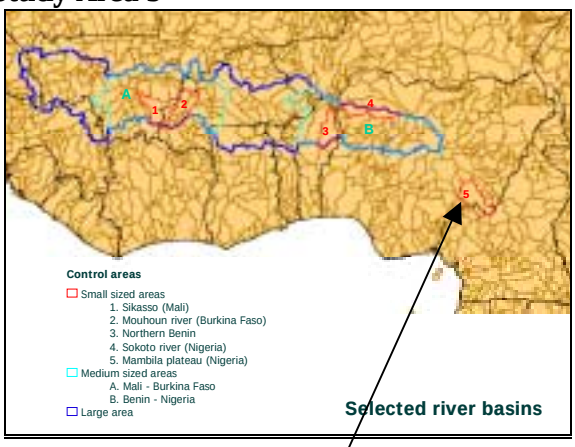
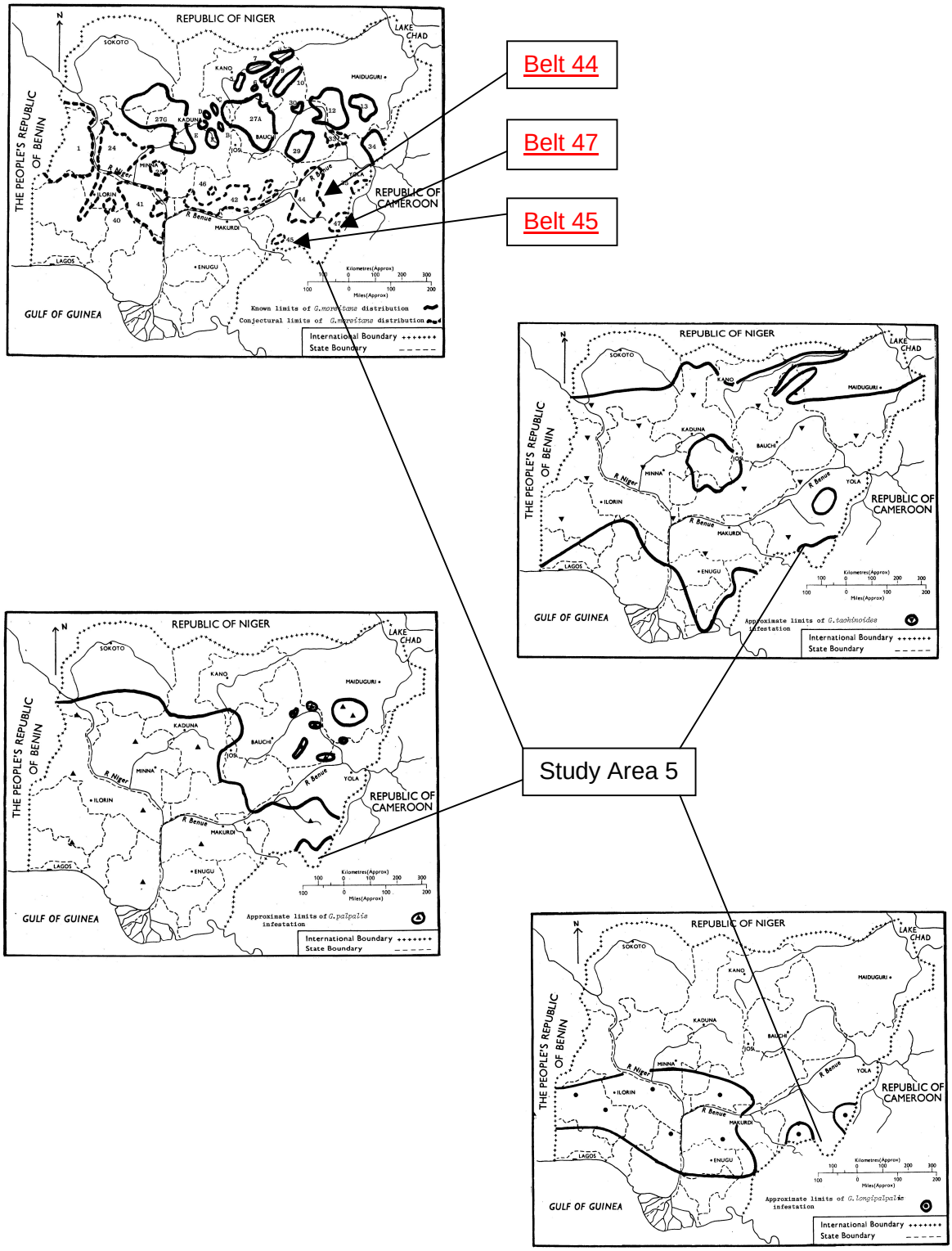


Figure 2 Study Area 5

1.2 Tsetse Distribution

Glossina palpalis palpalis and *Glossina tachinoides* are present along the fringes of River Donga and its tributaries and are responsible in the main for the high incidence of animal trypanosomosis in this zone. However, reports exist of relic *G.morsitans submorsitans* in Belt 44, 45 and 47 and its presence has also been recorded in the Gashaka Game Reserve, all these sites are located East of the zone. They may therefore constitute a reservoir of re-invasion for reclaimed land unless demographic pressure and agricultural activities in the area continue to expand. The good news is that expansion of agricultural activities and human migration into the area should occur as soon as tsetse is eliminated, thereby removing its natural habitat and thus hindering its re-establishment in the area. One other notable constraint however, is the presence of tsetse across the Nigerian border with Cameroon, requiring bilateral approach if tsetse is to be totally eradicated from the zone.

Figure 3 Distribution of Tsetse species in Nigeria



Source: Putt *et al*, 1980

1.3 Statistical description of Study Area

As no information is available for Wakiri and the Cameroon other LGSs need to be adjusted to estimate the characteristics of the whole study area. This assumption presumes that the whole of the study area is uniform.

Table 1 Area 5 Conversion Factors

Local Government Area (LGA)	% of total project area a	% of LGA in Study area b	Information available c	Inflation Factor d	Adjustment Factor b x d
Bali	10	20	Yes	1.3	26%
Dunga	15	100	Yes	1.3	130%
Takum	5	40	Yes	1.3	52%
Sarduana	47	90	Yes	1.3	117%
Wakiri	8	50	No	-	
Cameroon	15	?	No	-	
Total	100	-	77%	-	

Table 2 Demography and Human Diseases, Study Area 5

Local Govt Authority. (LGA) **	**Population**				**Presence of**	
	1991	**2000**	Adjustment Factor (Table 1)		**Onchocerciasis**	**Sleeping Sickness foci**
Bali	318,761	412,297	26%	107192	Present	Present
Dunga	84,626	106,305	130%	138196	Present	Present
Takum	95,478	123,644	52%	64294	Present	Present
Sardauna	226,467	284,941	117%	333381	Present	Present
			Adjusted Total (2000)	643063		

******All in Taraba State

Table 2. Land Use and Natural Resources – Study Area 5

Local Govt Authority. (LGA)	Land Use	Soil Type	Crop Index	Risk Index
Bali	Agropastoral/Semi-nomadic	Yellowish sandy loam	6	5
Dunga	Agropastoral/Semi-nomadic	Yellowish sandy loam	6	5
Takum	Agropastoral/Semi-nomadic	Yellowish sandy loam	6	4
Sardauna*	Agropastoral/Semi-nomadic	Yellow Ferruginous	6**	6**

*Gashaka Park, one of the largest in West Africa, and Filingo Grazing Reserve are located near this LGA.
**Gully erosion due to overgrazing, flooding from River Donga and desert encroachment..

Table 3. Range of Crops Grown and Productivity, Study Area 5.

Crops	Yield/Ha (Tonne) 1992	1998	$/100Kg	Input	Diseases*	Control
Maize	2.5	1.06	17.2	Chemical fertilizers and herbicides	Maize streak virus etc.	Pesticides application and cultural practices
Sorghum	1.30	1.10	17.4	-do-	Smuts etc.	-do-
Groundnut	0.56	1.09	49.6	-do-	Rosette virus	-do-
Cowpea	2.50	0.50	42.4	-do-	Pod borer etc.	-do-
Rice	2.18	1.00	45.5	-do-	Rice blast etc.	-do-
Millet	0.88	1.20	16.25	-do-	Downy mildew	-do-
Cassava	7.89	7.20	22.32	-do-	Cassava mosaic virus etc.	-do-

* List of complete crop diseases can be provided if desired
US$1 = Naira 112

Table 4 Animal Productivity in Study Area 5

Breed	Herd Size	Calving %	Oxen %	Herd Growth	Offtake		Mortality	Movement
					Milk (l)	Animal Sale		
White Fulani Rahaji Adamawa Gudali	47.5 (35-60)	19	15 -18	15	520	10%	9%	Mostly sedentary and some semi-trans-humant

Table 5 Livestock Diseases – Study Area 5

LGA	Trypano-somosis	Prevalence	Year	Vector	Other diseases	Year	Parks
Bali	Present	Not determined	-	*G. morsitans* *sub-morsitans* *G. p. palpalis*	Helminthosis Piroplamosis, FMD, Black quarter	2000	Gashaka Game Reserve (Outside the Core Area)
Donga*	Present	16.1%	1996	*G. p. palpalis*, *G.tachinoides*	-do-	2000	
Takum*	Present	46.6%	1996	*G. p. palpalis*, *G.tachinoides*	-do-	2000	
Sardauna	Present	Not determined	-	*G. p. palpalis*, *G.tachinoides*, *G. morsitans* *sub-morsitans*	-do-	2000	Gashaka Game Reserve and Fly Belt 44 (Outside the Core Area)

- Prevalence studies carried out by NITR. Tsetse apparent density is 2.05 flies/trap/day in Donga LGA and 0.48/flies/trap/day in Takum LGA.

Table 6 Use of Animal Traction, Study Area 5

LGA	No. of trained oxen	% Household using animal power for cultivation	% Household using animal power for transport
Bali	N/A	40	N/A
Donga	N/A	10	N/A
Takum	N/A	N/A	N/A
Sardauna	N/A	40	N/A

Table 7 Range of Crops Grown in Study Area 5

CASH CROPS	FOOD CROPS	HORTICULTURAL CROPS
Groundnut Tea Coffee Cocoa	Maize Millet Sorghum Cassava Yam Cowpea	Mango Banana Pawpaw Orange

2. PROPOSED STRATEGY FOR ERADICATION

Given the nature of the environment and the ecology of the tsetse species present, the logical first step would be population reduction by trapping and deployment of insecticide-impregnated screens and targets along the river courses where cattle are watered, accompanied by limited ground spraying. These should then be followed by release of sterile males to mop up remnants of tsetse in the zone. This approach was successful in the Feferuwa river systems in the Lafia BICOT project in the 1980s and should, all things being equal, succeed in this area given the similarity in terrain and ecological requirements. In the case of the Belts 44, 45 and 47, sequential aerosol technique (SAT) using non-residual insecticide may be required.

3. PROTECTION AGAINST RE-INVASION OF CLEARED AREAS

Because of lack of natural barriers which can prevent re-invasion, it will be necessary to maintain an artificial barrier until agricultural activities and demographic pressure reach a point where no flies can survive and transmit disease. However, if the cleared area were left unprotected, and given the experience of the cited case of BICOT, it would take between 10 and 15 years before significant re-invasion, requiring intervention, would take place.

4. ERADICATION v CONTROL

Assuming that eradication is not feasible in the area, a strategy based on living with the problem, i.e. control, will have to be adopted. This will consist of a combination of anti-tsetse and anti-trypanosomal measures - the use of traps and insecticide-impregnated screens and live baits and the use of chemotherapy in infected animals.

5. EFFECTS OF TSETSE ELIMINATION

5.1 Short term.

The incidence of animal trypanosomosis will drop dramatically, allowing for improved animal productivity in terms of reduced abortion and calf mortality and, of course, reduced incidence of sleeping sickness. These would be expected to accompany reduced morbidity and treatment costs.

5.2 Medium term.

The economic loss caused by the presence of tsetse is reflected in the loss of potential production that could be realised if such land were tsetse-free. Therefore, removal of tsetse will lead to increased use of draught oxen for ploughing and for moving produce to markets and serve rural transportation generally. This will invariably increase the number of trained oxen, increased use of draught oxen for ploughing and the percentage increase of households using animal power from 20-40% to about 60-65%. It is expected that significant expansion of agriculture, especially crop agriculture, which should lead to improved income and therefore, human welfare will take place. Herd size will increase significantly, just as calving rate, shorter calving intervals, reduced calf and adult mortality and increased milk yield. This improvement is bound to result in increased offtake of both milk and animals, but will require more land for pasture, which will ultimately lead to overgrazing and possible land degradation in the long term.

5.3 Long term.

Removal of tsetse should enhance livestock and crop agriculture, reduce land usage distortion caused by the presence of tsetse and trypanosomosis, encourage population migration to areas hitherto regarded a no-go area because of tsetse and therefore expand agricultural production. Unless there is a regulated land use, clashes can be expected between pastoralists and farmers. Since there is a regular flooding of the plains by the Benue river systems, of which River Donga is one, the flood plains may become veritable sources of liver flukes for cattle that graze on the plains and therefore, a major health hazard. Already, flooding in this area has caused soil erosion and increased livestock without controlled grazing is bound to lead to soil degradation.

Eradication will provide opportunity to deal more effectively with other diseases, e.g. sleeping sickness.

But more importantly is the fact that these developments will lead to generation of employment for the rural community thus reducing rural poverty in the zone.

6. CONSTRAINTS

Some of the major constraints that may not allow farmers to realise the full benefits of the new area cleared of tsetse include:

i) **Lack of timely provision of farm inputs – implements, fertilizers, improved seeds and herbicides.** Successful agricultural practice requires timely provision of appropriate inputs at the particular season of the year when they must be applied, failing which such inputs may not achieve the desired effects.

ii) **Availability and affordability of veterinary drugs.** If maximum benefits are to be derived from tsetse-cleared areas, it is of crucial importance that veterinary drugs be regularly available. It is frequently the case that veterinary drugs are not always available in the quantity needed, and when they are, they may not be affordable.

iii) **Extension Services**. The State Government is expected to provide extension services to the farmers so that their agricultural output can improve. However, apart from what the Agricultural Development Project (ADP) provides, no arm of Government is actively involved in extension work. The Taraba ADP is currently providing extension services to farmers, primarily in crop agriculture. Unless this project extends its activities to animal agriculture, the combined benefits of crop and animal agriculture may not be fully realised.

iv) **Lack of farm credit**. The lack of credit facilities limit the hectareage of land that farmers can reasonably cultivate irrespective of the increased number of work oxen available.

v) **Lack of markets**. Both (iv) and (v) constitute major constraints to maximizing the benefits of cleared land. In many cases, milk can only be sold on market days which means that what is produced during the intervals between market days must be converted to sour milk and cheese which can be avoided were markets easily available to the producers. This also reduces the chances of livestock agriculture becoming serious commercial enterprises in the local area, thus the low percentage of animal offtake and the need for livestock farmers to keep old bulls in their herds longer than they need to.

Most of these constraints can however, be overcome through the setting up of Farmers' Co-operative Schemes. In addition Governments would need to continue to support the ADP in order to provide extension services to farmers and ensure that Banks, especially Agricultural and Co-operative Bank and also Commercial and Community banks, extend soft and timely loans to farmers under the Agricultural Credit Scheme of the Central Bank of Nigeria.

7. LAND TENURE SYSTEM

The land tenure system in the area favours the crop farmers who are sedentary more than the agro-pastoralists/pastoralists. It is for this very reason that bloody clashes have taken place between crop farmers and pastoralists in the past, with the latter coming off worse. Thus, while the eradication of tsetse would benefit both crop farmers and agro-pastoralists/pastoralists, it is the former who would benefit the more because by virtue of their settled nature, they are closer to political power and its influence than the latter. It must be said, however, that since pastoralists started settling down, they seem to have learned the ropes very fast and are becoming used to political manoeuvring .