PD-BAN-295

9/16

NOTICE OF MEETING

TO: See Distribution

FROM: AFR/PD, Norman Cohen

SUBJECT: Issues Meeting and ECPR

698-0502

Issues:

Wednesday, September 14, 1983
9:30 A.M.
Room 2722A N.S.

ECPR:

Friday, September 16, 1983
3:00 P.M.
Room 2722A N.S.

AGENDA

Rwanda - AFRICARE Refugee Resettlement Project Proposal

Distribution:
A/AA/AFR:ARLove (6936 N.S.)
A/DAA/AFR:JJohnson (6944 N.S.)
AFR/PD:NCohen (2497 N.S.)
AFR/PD:LHausman (2497 N.S.)
AFR/PD/IPS:GRublee (2497 N.S.)
AFR/PMR:CCChristian (2744 N.S.)
AFR/PMR/RCS:DFBrown (2) (2744 N.S.)
M/SER/CM/ROD:SHeishman (731 - SA-14)
SAA/S&T:NCBrady (2) (4942 N.S.)
GC/AFR:DRobertson (6891 N.S.)
AA/PRE:ECHarrell (5897 N.S.)
M/SER/CM/ROD:SHeishman (731 - SA-14)
AFR/CA:BBeyer (2678 N.S.)
AFR/DP:DWilson (3918 N.S.)
SER/COM/ALI:PHagan (511 - SA-14)
STATE/RP:MMcKelvey
AFR/TR/ARD:LAbel (2941 N.S.)
AFR/TR/ARD:HFarnham (2637 N.S.)
AFR/TR/ARD:JRann (2941 N.S.)
PPC/PDPR:JAtherton (2937 N.S.)
AFR/TR/ARD:RApodaca (2637 N.S.)

REFUGEE RESETTLEMENT PROJECT PROPOSAL

SUBMITTED TO:
USAID/RWANDA

SUBMITTED BY:
AFRICARE
JULY, 1983

REFUGEE RESETTLEMENT PROJECT
NASHO, RWANDA

Page No.

I. PROJECT SUMMARY 1

II PROJECT BACKGROUND 3

A. General..... 3
B. Description of Project Area 5
C. Refugee Situation 6
D. Africare Experience 13

III. PROJECT DESIGN 16

A. Development of Ranches 16
B. Potable Water Supply 18
C. Tsetse Fly Eradication Program 20
D. Natural Resource Conservation 21
E. Health Center Construction 21
F. Technical Assistance 22

IV. PROJECT ANALYSIS 24

A. Livestock Components 24
B. Tsetse Eradication Program 36
C. Water Supply Systems 38
D. Natural Resource Conservation 61
E. Social Analysis 63
F. Economic Analysis 73
G. Administrative Considerations 78
H. Environmental Considerations 80
I. Related Activities..... 83

V. EVALUATION 90

VI. BUDGET 94

ANNEXES

1. Logframe
2. Waiver Request
3. Tsetse Fly Control Study
4. Requests from GOR

I. PROJECT SUMMARY

Africare is requesting $3,861,721 to support the establishment of a refugee resettlement program in the Lake Nasho area of Rwanda. The purpose of the project is to enable some 2,800 refugees from Uganda to support themselves through intensive livestock production on ranches to be set up under the project.

Emphasis will be placed upon activities that will improve the health of the refugees and their cattle and that will encourage efficient production, thus increasing the refugees' self-sufficiency. Also, through the construction of potable water systems and the development of a tsetse fly eradication program the nearly 8000 Rwandans who live in the project area will have the quality of their lives improved.

In October 1982, approximately 45,000 refugees fled Uganda into Rwanda. A third of the refugees were cattle herders who arrived with about 55,000 head of livestock. These herders ended up in two refugee camps, in Mehaga and in Nasho. This project focuses on the Nasho settlement where there are approximately 5500 refugees with 12,000 head of cattle. Though the Nasho area in southeastern Rwanda is relatively unpopulated for Rwanda and the land is considered good for pasture only, the present concentration of cattle is too great for the land and the pasture is rapidly being degraded. Tsetse fly present in the area affects the health of both humans and animals through the transmission of trypanosomiasis. In addition, the lack of potable water has had a detrimental effect on the health of the refugees.

Under the project 4,000 hectares of pasture will be improved by planting legumes and taking out non-nutritious plant material. The area will then be

organized into 20 ranches of 250 hectares each, including a village, pasture, and land for food crop and forage production. There will be 20 families on each ranch with about 15 head of cattle per family. The number of cattle will expand not at all or only slightly so as to maintain adequate improved pasture per animal. A pasture rotation scheme will be implemented to supplement an improved animal health care program that includes regular dipping, vaccinations and treatment. The tsetse fly will be eradicated from an area of 250 sq. kms. through a program of clearing the area of acacias, spraying, and creating buffer zones.

A major component of the project is the construction of 4 gravity flow potable water systems. These systems will provide potable water to the refugees, their cattle and the Rwandans living in the area. In all, some 13,000 people will be served by these systems.

By the end of the project 400 refugee families will be established on ranches on which the pasture has been improved and to which potable water is provided. Each family will sell an average of 2-3 head of cattle per year and 2,500 liters of milk, and will produce their own food crops. The population of the entire area, about 40,000 people, will benefit from the tsetse eradication program and the potable water supply system. In addition a biogas and reforestation component will be included to provide energy and protect the environment. A health center will be constructed to meet the needs of both the refugees and the Rwandan population. The extension of social and technical services in support of economically viable activities will have a positive and immediate effect on the development of a previously neglected region of Rwanda.

II. PROJECT BACKGROUND

A. General

Rwanda is a small, landlocked country covering an area of about 26,000 sq. kms. It borders on Uganda to the north, Tanzania to the east, Burundi to the south and Zaire to the west. Almost all imports and exports are trucked to and from Mombasa, the nearest seaport, 1700 km. by road from Kigali. With a per capita GDP of around US $230 in 1980, Rwanda is one of the poorest countries in the world. Its population, about 5.5 million, has been increasing at an annual rate of about 3.6%. Kigali (population 118,000) and Butare (population 22,000) are the two major cities: population densities vary widely, from 111 per sq. km. in the savannah areas of eastern Rwanda, to 328 per sq. km. in Butare prefecture. Ninety-five percent of the population is rural. The population is relatively homogenous, both ethnically and in terms of income, living conditions, and average land holdings.

The country is largely hilly, with elevation and rainfall gradually increasing from east to west. There are three major ecological zones. The eastern zone is a savannah region with low rainfall (700-1,000 mm a year) and a long dry season; altitudes average between 1,000 and 1,500 m. The natural vegetation consists mostly of tall grasses and acacia trees. This zone, which contains the proposed project area, is uncharacteristic of Rwanda, due primarily to its semi-arid nature, low soil fertility and its rapidly growing immigrant population (migrants are from other, more densely populated areas of Rwanda). Until recently, this was the least populated area of Rwanda, principally because of its lower rainfall and the presence of tsetse fly. The 2,000 m. in elevation) and annual rainfall varies between 1,000-1,400 mm. The

mountainous western zone includes the Zaire-Nile Divide and a volcanic region to the north. The average altitude in this zone is above 2,000 m, except along Lake Kivu, where elevation is between 1,400 and 1,800 m. Overall, the zone has an annual rainfall of 1,300 mm-2,000 mm, and a cool climate; parts of this zone have population densities in excess of 350 per sq. km. Only about 30% (8,000 sq. kms.) of Rwanda is suitable cropping, and virtually all of this area is already under intensive cultivation. Another 22% of the land area is taken up with marginal grazing, 6% is forest, and the remainder has no agricultural potential. Subsistence crops occupy about 95% of the cultivated areas, and the remaining 5% is planted in commercial crops, mainly coffee.

Rwanda has a traditional and overwhelmingly rural economy. In 1980, agriculture contributed about 50% of GDP, three-quarters of which was from subsistence crops. The country is largely self-sufficient in basic foods, but there is serious doubt about the ability of agricultural production to keep up with the rapidly growing population. Almost all agricultural activities are carried out by small holders on plots averaging about one hectare in size. Basic hand tools include the hoe, pick and machete. The use of improved seeds, fertilizers or compost is still extremely limited.

Total exports in 1980 represented about 12% of GDP; of these, coffee contributed about 55% and other agricultural products another 14%. Medium-term prospects for increasing exports are not encouraging. There are few possibilities for expanding the range of exports and limited scope for increased volumes of the existing ones; medium-term prospects for improvement in the terms of trade for the major exports are poor. Food imports about RF 1,865 million (US $20 million) in 1980 consisted mainly of products consumed by the urban population: wheat (20%), rice (17%), cooking oils (10%) and malt for beer.

B. Description of Project Area

The project area (see maps, pages 5a, 5b, and 5c) lies in the Eastern Plains zone of Rwanda, characterized by relatively level topography with low hills and broad valleys. The elevation of the upland area is betwen 1500 and 1,700 m, while the valleys, bordering on large swamps and lakes, lie between 1,300 and 1,500 m. This zone is the driest part of Rwanda with annual average rainfall ranging from 700-1,000 m falling in two seasons, September-December and February-May.

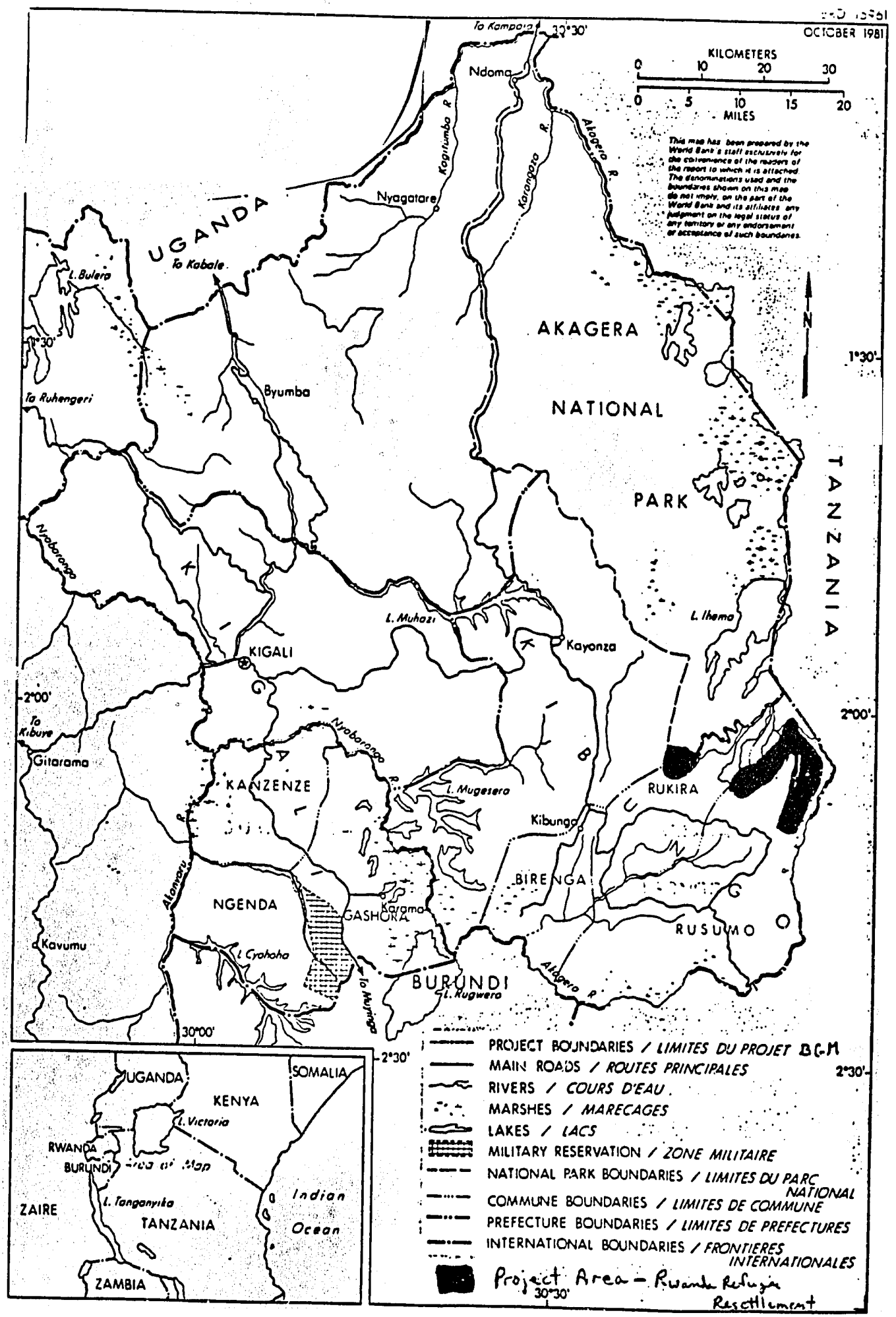
The project area is a narrow savannah-covered plain some 34 kms. in length that slopes eastward from cuirasse-topped meas down to the Akagera River which forms the border with Tanzania.

The area is bordered to the north by a lake region and the Akagera National Park and to the south by the Rusumo Basin and covers a total area of some 7,400 ha.

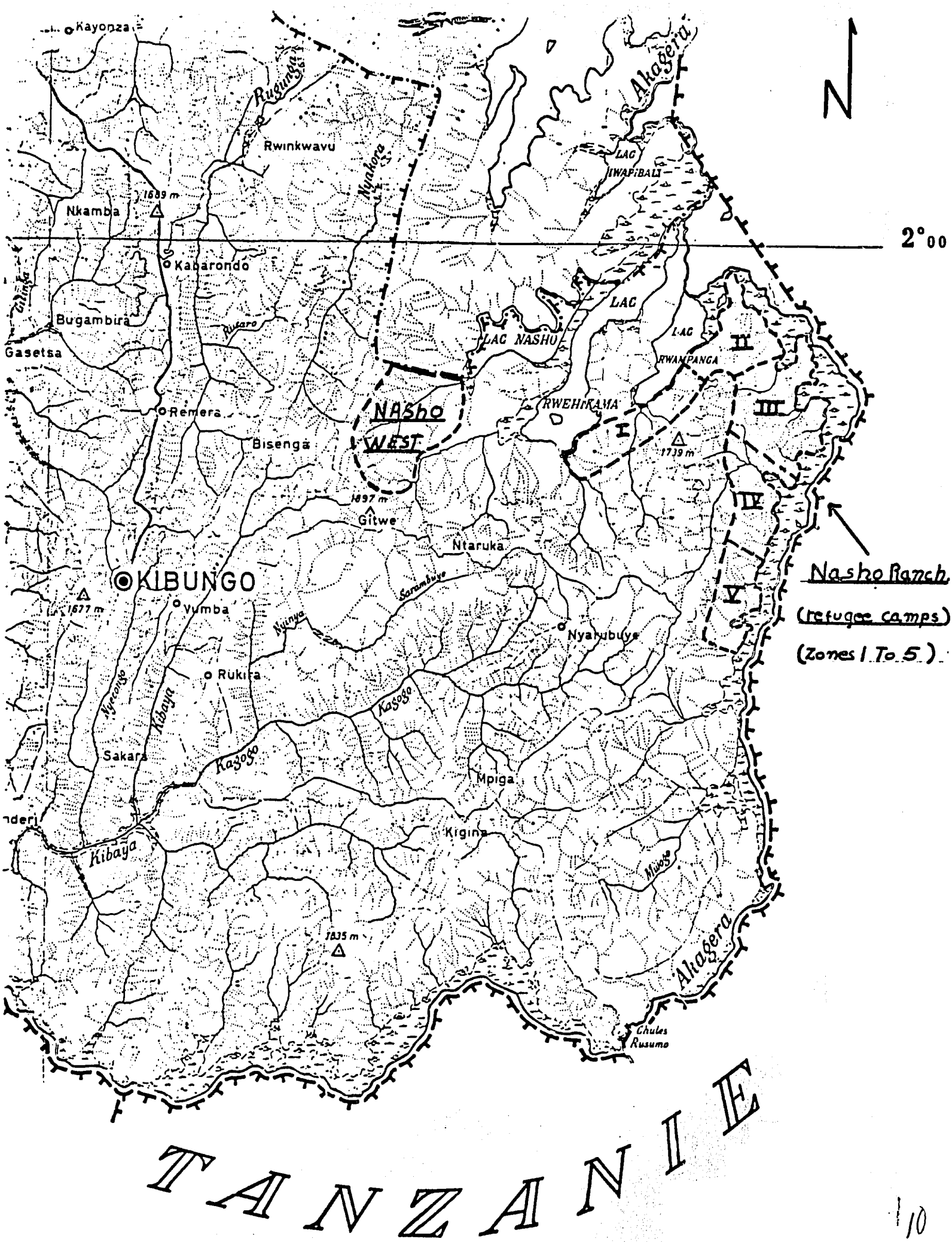
The lakes to the north were formed by recent tectonic damming of the older river courses. The Akagera River is bordered by papyrus swamps which vary from 5 to 2 km. wide.

Basically, the entire land mass consists of Precambrian rocks from which harder lithologies have obtruded and softer ones been eroded. However, faulting and tectonic movement have altered much of the basement structure, and alluvial deposition has masked certain parts. Much of the area is underlain by Burundian quartz and schist. Long sinuous veins of purely Burundian schist occur along the western part of the project area. These punctuate the more complex Burundian series rocks and the young quarternary deposits of fluvial and alluvial origin. These veins are of particular interest

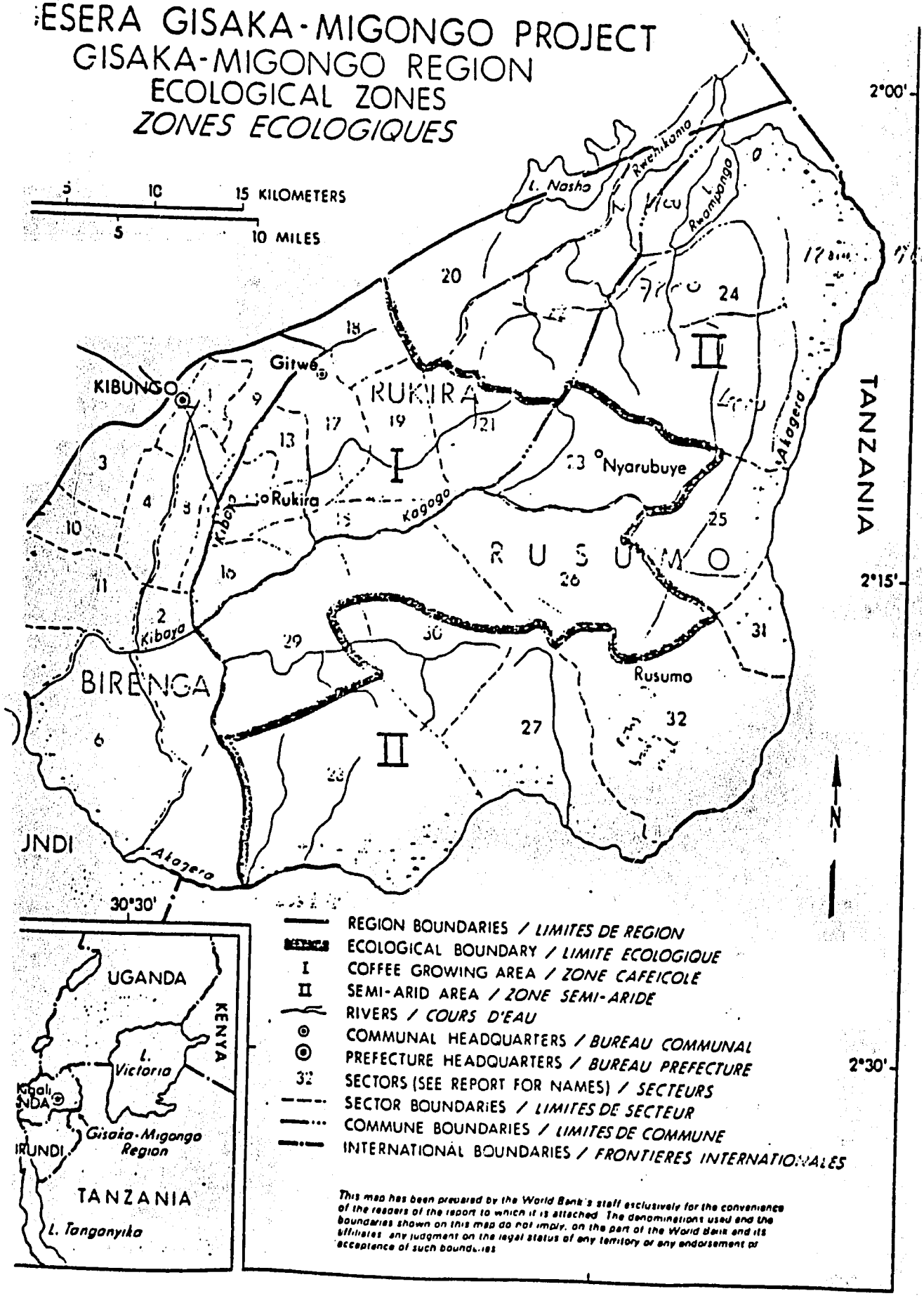
8


OCTOBER 1981
KILOMETERS
0 10 20 30
0 5 10 15 20
MILES
This map has been prepared by the World Bank's staff exclusively for the convenience of the readers of the report to which it is attached. The denominations used and the boundaries shown on this map do not imply, on the part of the World Bank and its affiliates, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.
N
To Kampala
33°30'
Ndoma
Kagitumba R.
Kanyonza R.
Akagera R.
Nyagatare
UGANDA
To Kabale
L. Bulera
1°30'
To Ruhengeri
Byumba
AKAGERA
NATIONAL
PARK
TANZANIA
Nyabarongo
L. Muhazi
L. Ihema
KIGALI
Kayonza
2°00'
To Kibuye
Gitarama
Nyabarongo R.
KANZENZE
L. Mugesera
RUKIRA
Kibungo
Akanyaru R.
NGENDA
GASHORA
Karama
BIRENGA
RUSUMO
Kavumu
L. Cohoha
To Muhinga
BURUNDI
L. Rugwero
Akagera R.
30°00'
2°30'
30°30'
PROJECT BOUNDARIES / LIMITES DU PROJET B.C.M
MAIN ROADS / ROUTES PRINCIPALES
RIVERS / COURS D'EAU
MARSHES / MARECAGES
LAKES / LACS
MILITARY RESERVATION / ZONE MILITAIRE
NATIONAL PARK BOUNDARIES / LIMITES DU PARC NATIONAL
COMMUNE BOUNDARIES / LIMITES DE COMMUNE
PREFECTURE BOUNDARIES / LIMITES DE PREFECTURES
INTERNATIONAL BOUNDARIES / FRONTIERES INTERNATIONALES
Project Area - Rwanda Refugee Resettlement
UGANDA
SOMALIA
KENYA
L. Victoria
RWANDA
BURUNDI
Area of Map
L. Tanganyika
ZAIRE
TANZANIA
Indian Ocean
ZAMBIA

9


Kayonza
Rwinkwavu
Nkamba
1689 m
Kabarondo
Bugambira
Gasetsa
Remera
Bisenga
NASHO
WEST
1897 m
Gitwe
Ntaruka
KIBUNGO
1677 m
Vumba
Rukira
Sakara
Kasogo
Mpiga
Kigina
Kibaya
Nyakora
Rugunga
Akagera
LAC
IWAPIBALI
2°00
LAC NASHU
LAC
RWAMPANGA
RWEHIKAMA
1739 m
Nyarubuye
Mwogo
1835 m
Chutes
Rusumo
Nasho Ranch
(refugee camps)
(Zones I To 5)
TANZANIE

ESERA GISAKA-MIGONGO PROJECT
GISAKA-MIGONGO REGION
ECOLOGICAL ZONES
ZONES ECOLOGIQUES



11

because the higher permeability of the schist allows found water to feed small springs along its course.

Soils in this region are derived from granites, gneiss, schists, dolerites , and quartzites which give rise to a wide range of soil types. Due to the high iron content of many of these soils and progressive laterization, lateritic hard pans and outcrops are frequent, particularly on ridges near the escarpment which separates the upland from the lower region. In the lower altitude areas, colluvial and alluvial deposits of the Akagera River have created large areas of of relatively fertile soils. A soil survey carried out by ISAR (mid-1970) indicates that about one half the soils in the Akagera Valley and one-third along the lake are suitable for crop production. However, low and unpredictable rainfall limits the agricultural potential of these relatively fertile soils. The natural vegetation is the wooded savannah type with acacia as the dominant tree species. Different combinations of grasses are indicative of variations in soil quality. Hyparrhenia species indicate, in general, good soils. The poorer soils, with association of Loudetia simplex and Eragrostis species, have been classified as suitable for grazing.

C. Refugee Situation

1. The Origin of the Refugee Problem

Beginning in the first week of October 1982 an estimated 45,000 refugees with 55,000 head of cattle came across the border from Uganda, driven out by the actions of the Youth Movement of the ruling People's Congress Party, President Obote, absent at the time these actions started, later declared that all speakers of Kinyarwanda who had entered Uganda before 1959 were foreigners and all those who entered after that date were refugees, whether registered as such or not. While the border has been closed to further refugees and negotiations are underway to determine the citizenship status of

all those involved, some 80,000 more Kinyarwanda speakers are gathered into camps in Uganda.

The origins of the some 600,000 speakers of Kinyarwanda in Uganda and the reasons for their present persecution are complex. Both in 1896, when Rwanda became a German protectorate, and in 1910 territories inhabited by Kinyarwanda speakers were ceded to Uganda. From 1920 to 1940, Rwandans (both Hutu and Tutsi) emigrated to Uganda in search of land and work. As a consequence of the revolution in Rwanda from 1959-62, many Tutsi fled to Uganda, and in the 1970's others went because the school quotas excluded them from educational opportunities.

Early Rwandan government estimates were that only 13% of the refugees represented worker migrants from the 30's and refugees from the revolution of 1959-62. At any rate, according to the Ugandan census of 1959, taken before the Rwanda revolution, 378,656 persons were listed as people of Rwandan origin (5.9% of the total population). They became citizens of Uganda at independence as speakers of one of 25 officially recognized languages. This number apparently did not include the migrant workers on the coffee and tea plantations. Like so many other ethnic groups in Uganda, the Rwandans have retained their cultural and linguistic identity while becoming involved in national political conflicts. Many were supporters of Idi Amin and have supported the Democratic Party, which is primarily Catholic, whereas the ruling People's Congress Party of Obote is primarily Protestant.

Whether the present persecution of the Kinyarwanda speakers reflects a conscious policy on the part of the Ugandan government or its inability to control the different factions in the army and country at large, the situation is perilous for these people and one for which no satisfactory solution is in sight.

Most unfortunately, there is no country in Africa less able to absorb refugees than Rwanda. With a territory of 26,000 sq. km. and a population of

some 5,500,000, 95% of whom are agricultural, it is already vastly overpopulated. Rwanda is the most densely populated country in Africa and its population continues to grow at a rate of over 3% a year. In 1972, Rwanda accepted refugees from the Tutsi repression of Hutus in Burundi and some 18,000 of them are still in the country in various capacities and occupations. By now, however, the population pressure has made it impossible to absorb significant additional numbers. Indeed, negotiations have been underway for some time to resettle 1,000,000 Rwandans in Tanzania.

There appear to have been as many as 6,000 of the refugees with Rwandan citizenship. Two to three thousand of these seem to have left and the government hopes to reintegrate the rest in their communes of origin. With the national average holding of land per family below one hectare, however, this will be very difficult. For the rest of the refugees a number of temporary solutions have been taken or proposed.

2. Present Distribution of the Refugees and the Creation of the Nasho Settlement

About two thirds of the refugees, some 26,000, who are primarily agriculturalists, are at the Kibondo refugee camp in the northeast (Mutara); perhaps 6,000 herders are in nearby Mahega Refugee Camp and its environs, with 10,000 head of cattle. About 5,500 herders with about 12,000 cattle are at the Nasho Refugee Camp in the southeast. When the herders first came across the border the animals were put in the Hunting Reserve bordering the National Park. However, they soon exhausted the pasture there and it was decided to split them up and send those families with over thirty head to Nasho, where grazing land was available.

A state ranch had been started in the area under the BGM project, but was abandoned for reasons of poor management and expense associated with the elimination of the tsetse fly. The area was then reserved as pasture for

the animals of peasants living to the west, but this plan was suspended with the arrival of the refugees.

In February of this year the heads of 639 families started trekking about 13,000 head of cattle south through Akagera Park. They reached Nasho some 38 days later, but only after losing considerable numbers of cattle to malnutrition, disease, and lions. The rest of their families were transported to Nasho by the United Nations High Commissioner for Refugees (UNHCR) in March. In the order of their arrival the herders were grouped into five zones, from south to north, where they have built their own huts in 11 nucleated camps.

3. Current Situation at Nasho

All families at Nasho were supposed to have had more than thirty head of cattle each. Whether the numbers were not carefully controlled in Mutara, or large numbers were lost on the way down, a census taken at Nasho* shows 639 families holding 11,596 cattle, an average of only 18 per family. Reducing the number of cattle by half, the present aim of the government, would leave an average of 9 per family. These numbers are furthermore quite unevenly distributed both with respect for individual families and the zones; with zone 5 by far the most overcharged (see Table 1).

*Current UNHCR records show a higher total number of persons (5,500), but their distribution into families is not known.

Table 1: Distribution of Families & Cattle at Nasho Refugee Camp

	Ha.	No. of Cattle	Head/ Ha.	Cattle /Fmly.	No. of Fmls.	No. of Pers.	Av. Pers. /Fmly.
Zone 1	1935	2708	1.40	16.41	165	1107	6.71
Zone 2	1310	2030	1.55	16.24	125	927	7.42
Zone 3	2160	2443	1.13	16.4	149	915	6.14
Zone 4	1035	1562	1.51	17.6	91	585	6.43
Zone 5	935	2853	2.99	26.17	109	888	8.15
Total	7395	11596	1.57	18.15	639	4422	692

The distribution according to those families which possess at least twenty or thirty head of cattle is as follows:

	Total	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total Families
20+ =	7,713	1,516	1,375	1,544	1,091	2,187	189
30+ =	5,830	1,179	951	1,107	834	1,759	168

Gravity fed potable water is available in zones 4 and 5, but the people and their cattle in the remaining zones must depend on lakes or the papyrus swamps along the Akagera River for their water. The water is both unsafe and frequently at a considerable distance from the camps. Furthermore, as the dry season progresses, it will be increasingly difficult to reach the river waters as they recede.

Medical help is presently available at a temporary dispensary at the southern edge of zone 5, some 34 km distant from the furthest camp in zone 1,

the dispensary is reported to be constantly out of medicines. The principal health risks that the refugees appear to be running are from sleeping sickness, malaria, water-borne diseases, vitamin deficiencies, and snakes, venomous varieties of which are quite common.

The people are currently being supplied clothing and food by the UNHCR. At present, there is a veterinary center on the border between zones 1 and 2 and a new one is under construction on the boundary between zones 3 and 4. Areas are being cleared for growing fodder, but the pastures are in poor condition, especially in zone 5, where the animal density is double that of the other zones. Already some of the cattle have been allowed to climb on to the plateau and graze on the harvested fields of the peasants. Conditions are expected to get much worse as the dry season progresses.

4. Health of the Refugee Cattle

Reportedly when a sample of the refugee herd was tested for TB and brucellosis upon entering Rwanda, it was discovered that 30% of them were tubercular. When discussing this issue with English speaking refugees, it emerged that some TB testing had been done in Uganda, and that the refugees are fully aware that cattle showing positive to the TB test must be destroyed immediately.

BGM field staff expressed the opinion that testing the whole herd for TB and brucellosis would be too expensive. In addition, the material for testing was not on hand and difficult to obtain; therefore, it was not the intention of BGM to test the herd for these diseases before reducing the number.

As it has been decided that the herd must be reduced in number, a preliminary effort should be made to determine those animals positive to these diseases and eliminate them by destroying the TB positive and sending the brucellosis positive to the butcher. Adequate quantities of test material can be obtained from Kenya, where the vaccines are made.

Since BGM is planning to purchase a number of this herd to be transferred to another area, such testing and elimination would insure that BGM would not purchase any diseased cattle. No veterinarian will knowingly purchase diseased cattle and the most certain way to avoid it is to test the cattle.

Such a move would be the beginning of a clean herd which is a necessity for the export of cattle, alive or in carcass. Since the country does not appear to have a problem with hoof and mouth disease, it could easily meet many export standards.

By eliminating cattle with brucellosis and tuberculosis, the first group to benefit would be the refugees. The refugees are extremely susceptible to infection because:

1. They are handling and living among the herd.
2. Their nutritional intake at this time is low.
3. Many are drinking polluted water, which further weakens them.

If no effective measures are taken, there is the risk that the refugees will spread the diseases through their contacts with the general public.

Brucellosis in the herd results in a low reproduction rate in the herd since it induces abortions. Once brucellosis has been eradicated, and the physical environment is improved, there should be an increase in the birth rate.

The elimination of the disease will also reduce the possibility of the herders contracting undulant fever. This disease is easily transmitted from cattle to humans. While it does not always kill, it debilitates and lingers, causing a great deal of suffering. In the tropics where fevers are common, it is seldom positively diagnosed.

After eliminating the adult carriers of the disease, a calf vaccination program should be instituted. Under such a program, the animals would be vaccinated once in their lifetime at about nine months of age.

These steps would ensure a clean herd, and would help maximize the contribution of the refugees and their herds to the Rwandan economy.

D. Africare's Experience

Africare is a private, non-profit organization working to improve the quality of life in rural Africa through water resource development, food production, health services delivery, literacy training, and emergency refugee assistance. Based in Washington, D.C., Africare was established in 1971 and is now operating more than 30 programs throughout Africa, ranging in budget from $2,500 to $5.9 million. Africare field offices are located in Chad, Mali, Niger, Senegal, Somalia, Upper Volta, Zambia and Zimbabwe. Africare is funded by foundations, corporations, small businesses, churches and national denominational organizations, private voluntary organizations, US governmental agencies, the UN High Commission for Refugees, and many thousands of individual donors; and is a member of International Service Agencies, a part of the Combined Federal Campaign.

Africare's experience with refugee and displaced persons began in 1973 at the height of the drought in the Sahel. Africare mounted programs of short term and intermediate assistance programs in Niger, Chad and Mali. The emergency assistance included purchasing dried fish, meats, grains, medicines, etc., while the intermediate programs included such activities as deepening and constructing wells and supplying motor pumps for vegetable gardening. When the drought ended and the needs changed, Africare programs evolved into long term development programs throughout the entire Sahel, and subsequently to countries in East and Southern Africa.

The long range development programs range from village well construction to provide water for human and animal consumption, to simple water systems

for vegetable gardening, to dam construction for large scale irrigation and agricultural programs. Food production activities include livestock and poultry production, fisheries development, small scale vegetable production and irrigated rice schemes. Health programs have includled the construction of clinics and dispensaries, and the development of primalry health care programs.

In 1978, Africare joined the Zambia Refugee Commission and the Lutheran World Federation in supporting a refugee resettlement program at Meheba, in northwest Zambia. In this scheme, to resettle approximately 15,000 refugees, each family was given five hectares of land, built their own houses, and then were provided support — food, seeds, fertilizers, agricultural extension services — for two years. At the end of that period they were to have become self-sufficient. Africare, through the $1.1 million grant provided by AID, provided blankets, medicines, vehicles, farm equipment, school books for primary school children and agricultural elxtension service to students and the farmers. In 1982, all parties involved concluded that the refugees have indeed become self-sufficient, and no additional extension assistance was needed.

In 1980, Africare designed and mounted a refugee support program in Somalia. This $537,000 project was funded by the Refugee Assistance Office of the U.S. State Department. Africare placed four persons as advisors to the Somalia National Refugee Commission: a social welfare planner, two water/construction engineers, and a logistics specialist. Africare also provided a short term bio-medical equipment specialist to assist in the installation of hospital equipment which Africare had provided to the refugee camps. Later Africare provided a pharmacist whose major responsibility was to visit the refugee camps and establish a drug recording and distribution system.

In 1982, with funding of $1.1 million from the United Nations High Commission on Refugees, Africare engineers and mechanics assumed

responsibility for the water supply systems in refugee camps in the south-western part of the country, and responsibility for the maintenance of pumps and training of refugees in maintenance and repair of pumps which had been installed on bore holes.

Other activities included the completion of a waterproof, mudbrick library for refugee education programs in Qorioli camp. The building was designed and constructed under the supervision of Africare's Construction/Irrigation Advisor to the NRC, also involved in the design and construction of numerous other structures. Africare provided 24 animal drawn plows and funding for the purchase of oxen, to help reduce Somali farmers' dependence upon capital and energy-intensive tractors.

Africare also provided partial funding for a pharmacy storekeepers' workshop, in the capital city of Mogadishu, May 12-15, which was coordinated by Africare's Pharmacist Advisor assigned to the governmental Refugee Health Unit. The workshop's purpose was to standardize pharmacy methods, polish skills, and plan coordination of refugee regional pharmacy stores — all important aspects of refugee health care. Partial funding from Africare also went to a program to train 20 urban refugees in basic mechanical skills, thereby increasing their employment potential. The Ministry of Labor and Social Affairs training division conducted the course in cooperation with UNHCR. These small scale projects were funded by American private donors.

More recently, in May 1983, Africare was provided a grant of $659,000 by USAID/Somalia to work with the National Range Agency, and the National Refugee Commission in developing a reforestation program in the Jalalaqsi refugee camps. Africare has also provided refugee assistance to the refugees in Chad and Rwanda.

III. PROJECT DESCRIPTION & DESIGN

The Project proposes to assist 2800 refugee cattle herders in attaining a greater degree of self-sufficiency, while also instituting programs which will improve the quality of life of an additional 2,700 refugees and the nearly 8000 Rwandian citizens who live in the Nasho area in southeast Rwanda. Forty thousand people in all will benefit indirectly from the tsetse fly eradication program.

The project will meet these overall goals through such major activities as the establishment of ranches with controlled grazing and water systems; the development of gravity flow potable water systems; a tsetse fly eradication program, the construction of a health center, and the initiation of a biogas/reforestation program. Technical assistance and training will be provided to support the entire program.

A. Development of Ranches

Within an area of 7,500 hectares, 400 families will be settled with their cattle on 20 ranches. Each ranch will consist of a village of 20 families, 200 hectares of grazing land, one hectare per family of crop land, and one hectare per family to grow feed for their cattle during the dry season. Thus about 4,800 hectares will be improved under the project.

Approximately 4,000 hectares is available for grazing in zones 2, 3, 4, and 5. When in good condition, the carrying capacity of this pasture is about one animal unit (AU) per three hectares. At present, the carrying capacity of the overgrazed pasture is much less. The pasture must be improved and a rotational grazing system executed to raise the long term carrying capacity of the pasture to 1 AU per hectare. Each family will thus be limited to 10 AU each (about 14 or 15 head of cattle given the present herd structure). Herd size will be maintained by sales, which are expected to range between two and

three head of cattle per family per year. This will form the basis of the family's income. Milk, as the health of the herd improves, could become a major source of income.

An Africare technician will conduct a workshop on rotational grazing techniques with the project director, his assistant and the veterinary extension agents. These agents will then instruct all the herders in these techniques, explaining the advantages of the system and the necessity for careful adherence to the methods. The agents will monitor and supervise the process until the herders have mastered the system.

The concept will be then discussed thoroughly with the herders, and they will be given the opportunity to discuss the plan among themselves and with the implementing agents before being asked to sign a contract agreeing to adhere to the plan. Each village of 20 families will elect a representative who will be responsible for the performance of the families in adhering to the plans for rotational grazing, maintaining herd size, and will be the primary contact between the village and the project administration.

Each pasture (ranch) will be divided into 5 paddocks, demarcated by euphorbia hedges, to implement the rotational grazing plan. The pasture will be improved by clearing the fields of woody plants and undesirable grasses and planting strips of legumes throughout the pasture. Seed for the legumes will be reproduced by planting pure stands between the crops after the last weeding. This will add nitrogen to the crop lands as well as maintain a seed supply.

Fodder, stalk and crop residues will be stored and fed as a supplement to the cattle during the dry season. The possibility of producing silage exists, through production of significant quantities would require training oxen to pull carts, to haul plant materials and acquiring hand-operated mechanical silage cutters. The pits for storage of the silage can be hand-dug into slopes near the village compounds. Several demonstration pits will be dug to determine

the herders' interest in producing silage.

Manure will be collected from the compounds to produce biogas in demonstration biogas generators.

Water for the cattle will be provided by the system to be constructed under the project. Troughs will be placed in between the ranches, which will allow for the cattle to be watered twice daily.

The veterinary support system will be expanded to meet the needs of the ranches. There will be one veterinary extension agent assigned for each 500 head of cattle. A veterinary center will be constructed to supplement the center already existing and that being constructed by UNHCR. A system of preventative medicine will be established, including regular vaccination, dipping and worming programs. In order to keep accurate medical and treatment records, the cattle will be identified by use of numbered eartags and ear tattoos.

The herders will be presented a schedule of charges that will be applicable to all treatment and services. By the end of the program, the charges will cover the cost of renewing the stocks of medicines and supplies.

Crop extension support will be required. The extension agents should be trained at research centers as to which crops and varieties of crops will grow best in the area. The extension service should supply the seed and work with the herders and farmers to be sure the proper preparation of the land is done, the times of planting are adhered to and the cultivation necessary is carried out. This will necessitate the training of the herders and farmers by the extension workers.

B. Potable Water Systems

Water for the systems built under the project will come from springs located on the hillside bordering the project area, and will be distributed by means of a gravity flow system. Such a system is the most suitable for a

developing country because of the simplicity of design, its reliability and its low maintenance costs. The project covers four district springs and gravity-fed water supply systems grouped in two major areas, Nasho West and Nasho Ranch areas. (see map, page 19a).

(1) The Nasho Ranch Area

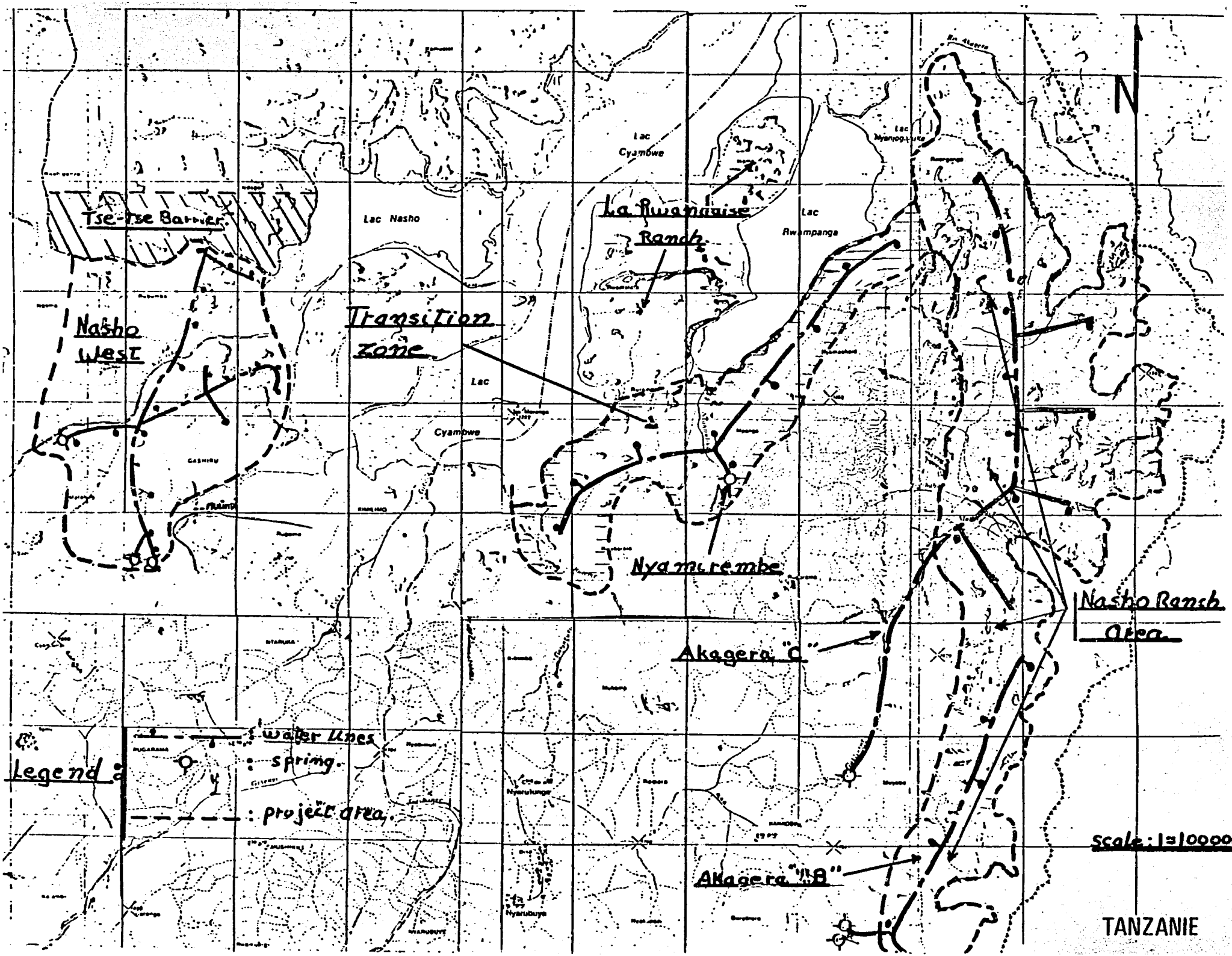
The Nasho ranch area is an L-shaped corridor 7,500 hectares in area and 34 kilometers long, extending north-south along the Akagera River, and east-west bordering Lakes Mpanga and Cyambwe. Six hundred and forty refugee families are presently settled in the area along with a few local Rwandan families living on the lake shores.

In the corridor between the escarpment and the Akagera River, water will be supplied by two systems, Akagera B and Akagera C, covering an area of approximately 5,000 hectares and providing water for 400 families and about 5,400 head of cattle in the project. The total demand for water for this area is estimated at 357,000 liters per day while the low flow rate of Akagera B and C has been established at 450,000 liters per day (5.2 liters/sec) which is sufficient for the project.

These two water supply systems are already partly in service but 19 kilometers of pipeline, 19 public taps and reservoirs, 11 watering troughs and different accessories will be needed to adapt them to the ranch uses.

To complete the water supply systems in the Nasho refugee camp area, the Nyamirembe spring will be used. Thirteen kilometers of pipeline will be constructed to provide potable wlater to an area of 2,000-2500 hectares that will serve as a transition zone during the project implementation period, and as an extensive grazing area for the remaining 240 refugee families.

The capacity of the Nyamirembe spring is evaluated at 1.8 liters/second (155,000 liters/day), while the actual demand is estimated to be 85,000 liters per day. On a ranching scheme, this system would supply water to 9 villages.


N
Tse-Tse Barrier
Lac Nasho
Lac Cyambwe
La Rwandaise Ranch
Lac Rwampanga
Nasho West
Transition zone
Lac Cyambwe
Nyamurembe
Nasho Ranch area
Akagera "C"
Akagera "B"
Legend :
: water lines
: spring.
: project area.
Scale : 1:100000
TANZANIE

2) The Nasho West Area

Located in the communes of Kigarama and Rukira, approximately 6 kilometers west of the refugee camp area, and adjacent to the village of Mulindi, this area of 3,000 hectares is bordered on the west and the south by steep cliffs, by the Akagera National Park to the north, and by Lake Nasho to the east.

The topography slopes gently downward from the foot of the cliffs toward Lake Nasho and Lake Cyambwe. The water will then be supplied by three springs (Gikombe I, Gikombe II and Kabahimba) and distrubuted through 25 kilometers of pipeline so as to provide water for some 800 to 1,300 Rwandan families either settled or to be settled in paysannats. The demand demand on the system is estimated to be 295,000 liters/day, while the capacity of the springs, as established by Hydrobat, is evaluated at 345,000 liters/day. Public taps and reservoirs will be approximately one kilometer apart.

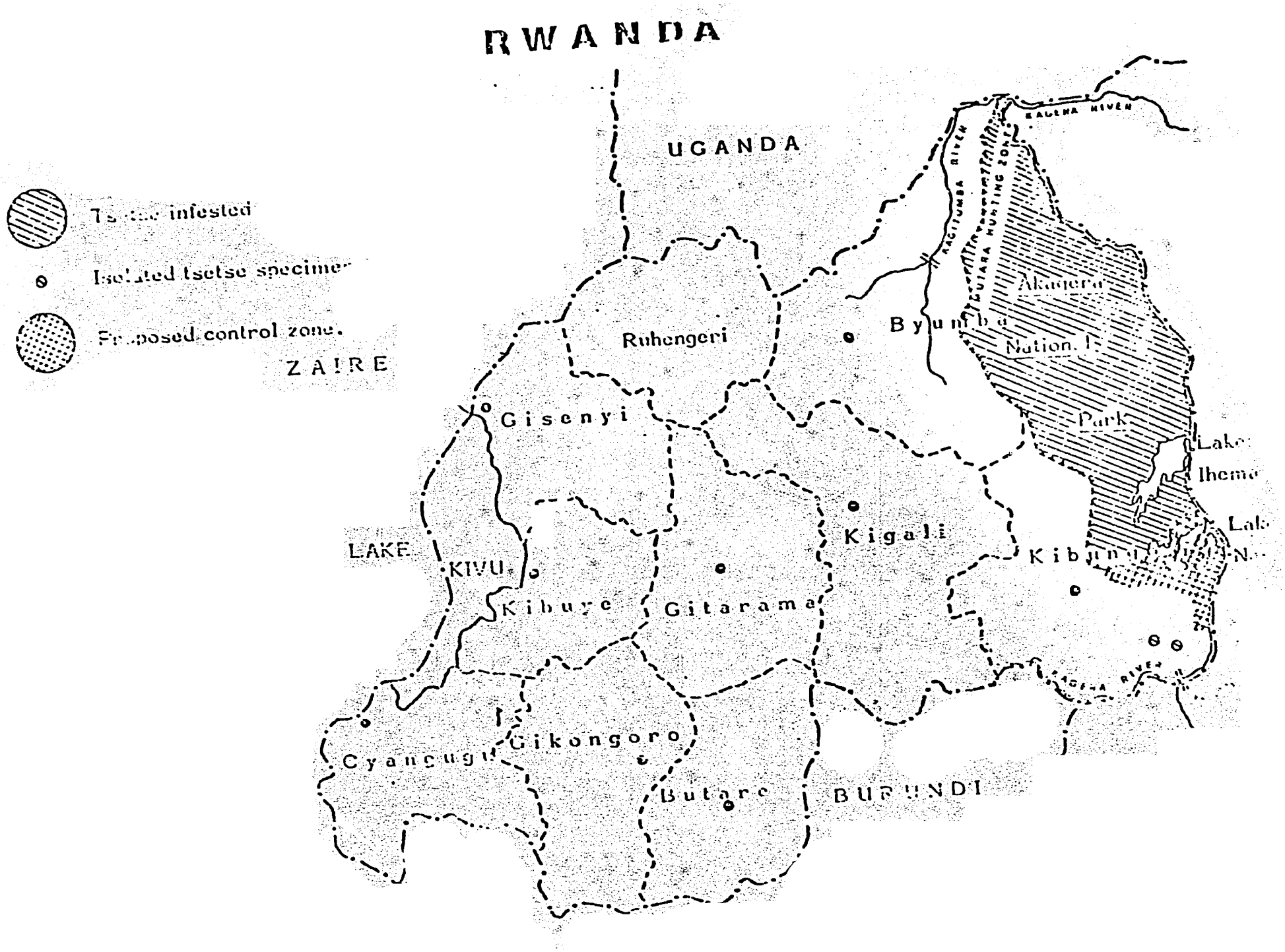
3 Implementation and Operation

Fifteen months will be necessary to complete the water supply systems. BGM will act as the implementing agency while the execution of the contract will be given to Rwandan firms already involved in the construction of water supply systems. Quality control during construction should be assured by BGM with the support of Africare Representative.

A water charge will be established to provide for salaries for local maintenance personnel as well as for major repair costs.

C. Tsetse Fly Eradication Program

Beginning in the first dry season of the project, BGM, in collaboration with ISAR, will initiate a program to eradicate the tsetse fly from the project area and the surrounding region (see map, page 20a). Over a period of 2 years, the project will create two buffer zones to protect against reinfestation from the Akagera National Park and from Tanzania, selectively clear vegetation in


RWANDA
UGANDA
Tsetse infested
Isolated tsetse specimen
Proposed control zone.
ZAIRE
Ruhengeri
Gisenyi
LAKE KIVU
Kibuye
Gitarama
Kigali
Byumba
Akanera
National
Park
Lake
Ihema
Kibungo
Cyangugu
Gikongoro
Butare
BURUNDI
KAGERA RIVER
KAGERA RIVER
KAGITUMBA RIVER
MUTARA HUNTING ZONE

areas favoring reproduction of the tsetse fly, and spray infested areas (for detailed analysis of the tsetse fly situation and recommendations upon which the present program is based, see Annex 3). The program will be followed up by spraying residual areas of infestation in the third year.

D. Natural Resource Conservation

Due to the heavy influx of people into an area until now relatively sparsely populated, forestry reserves will come under increasing pressure once the initial clearing activities are completed. The following components have been included in the project to help maintain the forest cover:

1. Fifty hectares of woodlots, 2.5 hectares per ranch, will be planted, primarily in years 2, 3, and 4, to serve as a renewable reserve of firewood and building material.
2. Improved cook stoves will be introduced that will save as much as 50% of fuelwood consumption over that of the traditional 3-stone hearth.
3. Four pilot biogas plants (one in each zone) will be constructed, using self-help labor, to provide fuel and fertilizer, using animal, and possibly human, waste. The plants will vary in size from one able to serve three or four families to one able to serve an entire village. If successful, the project will encourage and give technical assistance on the construction of other biogas plants.

E. Health Center Construction

At present the refugees only have access to a temporary dispensary in zone 5, 34 kilometers from the northernmost camp, for medical treatment. To

meet the health needs of the refugee and the adjacent Rwandan population, two health centers of standard Ministry of Health design will be constructed. To assure the accessibility of social services to Rwandans as well as to the refugees, these health centers will be constructed towards the northern and southern limits of the refugee settlement.

F. Technical Assistance

Africare will provide the technical assistance necessary to maintain timely implementation of the project, and to provide for the formulation of implementation path adjustments necessary to meet project purposes.

1. In year one, an agricultural marketing specialist will investigate the meat and milk marketing situation in Rwanda and make recommendations as to the possible strategies that would provide for maximum returns to the efforts of the herders. Special attention would be given to the project operated by La Rwandis, a private company, that intends to operate feedlot operation to produce export quality beef and a dairy. In year 3 the economist would do a follow-up study and develop further the marketing plan for the project in light of the development of the first two years.

2. In order both to facilitate the implementation of the project and to monitor its progress so that appropriate modifications may be made as necessary, a socio-economic study of the population will be necessary. A thorough census of the participating population and its socio-economic background should be made as soon as possible to provide a basis for understanding the kinds and extent of changes with which the refugees will be confronted in adapting to the project. More intensive analysis should continue throughout the first year of the project based on participant observation and sample interviews to gauge the success of the project and discover the reasons for whatever failures it may encounter.

Since intimate contact with the population will be a necessity, it is recommended that a Rwandan with social science training be employed for this purpose who would work under the direction of a professional anthropologist. The latter should spend one month in the field at the beginning of the project, and a second month at the end of the first year. Further visits would be determined as necessary by the subsequent development of the project. The work of the social analyst would be crucial not only for understanding the development of the project, but also in acting as intermediaries between the population and the project administrators.

3. A civil engineer will make one site visit per year to assure that the work accomplished has corresponded to the system design specified in the contracts. The engineer will also formulate a schedule of inspections to be carried out by the Africare technician and BGM to certify work done under the contracts.

4. A range management specialist will be present during the initial activities pertaining to settlement on to the project site and development of the improved pasture. The specialist will provide training to the chef du ranch, his assistant and the veterinary extension agents on the methods to be introduced under the project, including rotational pasture rotation. With the BGM staff, the specialist will hold meetings with the herders to discuss the elements of the settlement contract with them and to assure that, to the extent possible, adjustments are made to accommodate their concerns. Initially, the specialist will work closely with the social scientist. Subsequent visits will focus on the performamance of BGM staff, and the degree to which the herders are successfully adopting to the ranching system.

IV. PROJECT ANALYSIS

A. Livestock Components

Because of the dwindling grazing areas, the government is emphasizing intensive means of livestock production. The trend is toward raising sheep and goats, which provide most of the meat consumed in the rural areas. The national sheep and goat herds are estimated at 295,000 and 885,000 head, respectively. The government is encouraging farmers to pen the sheep and goats, collect the manure and use it as fertilizer on the crops.

In 1980 the national cattle herd was estimated to be about 638,000 head, a decrease of more than 1.5% per year since the 1971 level of 748,000 head. At present, with the growth of population and limited land, less than a third of all farm families own cattle. The majority of the cattle are owned by individual farmers scattered throughout Rwanda, each owning from 3-12 head. The cattle are primarily pure Ankole, with some Ankkole-Sahiwal crosses.

BGM has attempted 2 commercial ranching efforts. The ranch in Nasho, the site of the present project, failed due to the low resistance of the hybrid cattle to trypanosomiasis and the lack of qualified management.

In Rusomo, a breeding ranch was started in 1960 with Belgian financing and was expanded in the first phase of the BGM project. At present there are 2,300 animals on the ranch and the herd is expected to expand to 3,500. The ranch covers a total of 5,200 hectares, of which 4,200 are

exploitable.The BGM project has focussed on 1) The production of quality heiffers for distribution to farmers and quality bulls for the stud services in the vet centers and 2)production of beef cattle and culled cows for the Kigali slaughter house. In the future it is expected that the ranch will be able to be run as a self-sustaining operation. Revenues generated from the sale of livestock will remain in the Rusumo account for financing ranch operations.

North of the project site, La Rwandaise, a private company, is in the process of establishing a fattening ranch. The ranch would buy up local cattle and fatten them for export to Greece, Belgium, Congo, and Gabon. They are presently constructing corrals, a slaughterhouse, a cold storage, and a dairy. They plan to conform to the health standards as set by the European countries to qualify for exporting meat to Europe. The milk will be marketed locally. As long as the herds are healthy the refugees should find a ready market for their cattle and milk.

The cattle owned by the refugees have been settled in the area of the former Nasho fatting ranch. The area has been divided in five zones with potable water in zones 4 and 5, and parts of zone 3. In zone 2 water must be obtained from the river while the lake is the source of water in zone 1. The cattle were distributed in the following manner:

Zone	Cattle	Land Area	Cattle/ha
1	2,708	1,935 ha	1.4
2	2,030	1,310	1.55
3	2,443	2,160	1.13
4	1,562	1,035	1.51
5	2,853	955	2.99
Total	11,595	7,395	

It can be seen that zone 5 is extremely overstocked. Additionally, there are too many cattle overall for the number of hectares. This project will attempt to alter this situation by reducing the size of the herd, improving the pastures, introducing pasture management, and providing for dry season feed.

Because there isn't sufficient land to support this large number of cattle, many will never grow to their fullest or produce milk to their capacity. The females in the present herd weigh between 150-200 kg while the bulls weigh about 250 kg. These weights are much under those attained at the research centers which are 300 kg for females and 350-375 kg for bulls. The presence of testse fly will also prevent the cattle from attaining full productivity.

At present the veterinarian service is the only extension service in the area. There are five vet centers with 11 personnel, 8 working chutes, 2 diping tanks (one functional) and three sets of scales are presently being installed. The following preventive medical program is being conducted:

Time	Treatment Used	Against Parasite or Disease
Mid-February	Berinile	Trypanosomiasis
February	Trypamidium	Trypanosomiasis
March	Vaccination	Rinderpest (only along the Eastern border)
April	Blanthox	Black quarter Anthrax
First June	Nilvern	Worms
Mid-June	Berinile	Typanosmiasis
Begin July	Trypamidium	Trypanosomiasis
September	Blanthox	Black quarter Anthrax
October	Nilzan	Liverfluke
End October	Berinile	Trypanosomiasis
November	Trypamidium	Tryupanosomiasis

All cattle are sprayed twice per week. Using Toxaphene (Copper) Vac Dip (Bayer) or Delnav. This controls ticks, and thus controls East Coast Fever. The refugee cattle herd was spot checked for T.B. and Brucellosis upon entering Rwanda but no testing is being done at present. T.B. and Brucellosis testing is expected to be a criterion for reducing the herd and will continue to be used during the project.

In all there are 5,400 hectares of land which will be exploited in the project. In order to reach the largest number of beneficiaries the land will be divided into ranches of 250 hectares for each 20 families. Each family will own a maximum of 10 animal units (an animal unit equals one grown cow or bull, two calves, or five gots or sheep). No additional land has been allocated to allow for expansion, and it is expected that one hectare of land will support one animal unit when the pastures are improved and carefully grazed. It is expected that this stocking rate will be achieved by improving the pastures, restricting the herd size, supplemental feeding during the dry season, and rotational grazing.

It is necssary to improve the pastures because at present there is not enough feed in quanity and quality. The grass cannot produce the best nutritive values all the time. Pasture improvement will begin by removing the woody shrubs and weeds, with hoe and ax. This action means that the grasses presently growing will not have to compete as much for moisture, sunshine and soil nutrients, thus allowing more grass to grow in the same area. Acacia trees will be killed by girdling part of both the pasture improvement program and the tsetse eradication program. It is best if these chores are done during the dry season when labor is available and the sun is hottest.

At the beginning of the rainy season the legume stylosanthes (humilis or verona) will be planted in strips across the pasture 1 and 1/2 meter apart.

This legume is selected to add protein to the nutritional intake of the cattle whether in the green or dry stage. Being a legume the stylo will add nitrogen to the soil thereby aiding the growth of the other grasses. By planting 1/2 m. apart it

is expected the legume will spread. These varieties of stylo are drought tolerant. Therefore, when the grass dies these varieties should continue to grow until late in the dry season. The planting should begin in the plot that is resting for a year in the grazing plan.

If the proper innoculation does not come with the first purchased seed there are plots in Rwanda where some stylosanthes or centrocema is now or has been grown. In order to innoculate the seed, some soil from these plots should be mixed with water until slurry, stirred well, and the water then poured off. The seed must then soak in this water for a day before being planted. This procedure will improve the germination survival of the plants.

The dry season will be the critical time for the cattle. The Nasho area has a hot dry climate and even during the rainy season the rains are not reliable, thus a forage crop needs to be grown to be fed to the cattle during the dry season. With the following qualities, the pigeon pea is the ideal forage crop: it is drought resistant; once planted, if not abused it will not have to be replanted for three years; it is a legume which improves the fertility of the soil; and, whether eaten green or dry, it will add to the nutritional intake of the cattle. Since peas are grown in Rwanda the seed should be easily available.

The one hectare allotted for forage crop production should be prepared for planting during the dry season. As soon as enough rain has fallen, the pigeon pea should be planted in rows about 1 meter apart and 1 meter within the rows. The plant should spread and cover all of the ground in between. If enough rain falls, three clean cultivations should be sufficient.

Manure should be used on the hectare, before planting the crop and worked in again after the second cultivation. This will improve the friability of the soil, as many of the soils in the area are hard and compact. It will improve theability of the soil to absorb water.

The successful implementation of the rotational grazing scheme will be critical to the overall success of the project. The following scheme has been devised:

The range land will be divided into five sectors of forty hectares each. One sector will be allowed to rest each year, while four will be rotationally grazed throughout the year (see chart, page 29a).

In rotational grazing the goal is to allow livestock to consume up to 1/2 of the available green forage on a given sector, and then move to the next sector. If it is not possible to reduce the total livestock numbers they must be moved frequently to avoid overgrazing and weakening of the forage plants.

If all range sectors have been grazed to a level that still protects the amount of green leaf and stem needed for plants to maintain strength, and to store plant food in forage plants grown and roots, grazing should cease and if possible the stock moved to other feed sources, i.e. hay-silage and stored crop residues.

In the dry season when all forage plant growth has ended and the tops are no longer green, it is feasible to initiate a new cycle of grazing to utilize such standing dry forage. This grazing cycle should cease when the plant cover is grazed down to about 10 cm. This stubble is required to prevent wind erosion during the dry season, and to reduce rainfall runoff at the beginning of the rainy season.

The encroachemnt of woody shrubs and other useless plant growth should be halted by periodic clearing of rangeland during the dry season when labor is available. The roots must be dug up and exposed to the drying effect of the

5 Year Rotational Grazing Program

Code: X = grazing

Year 1

40 ha. plots	JAN		FEB		MAR		APR		MAY		JUN		JULY		AUG		SEP		OCT		NOV		DEC	
1		X				X				X				X				X				X		
2			X				X				X				X				X				X	
3				X				X				X				X				X				X
4					X				X				X				X				X			
5	REST																							

Year 2

40 ha. plots	JAN		FEB		MAR		APR		MAY		JUN		JULY		AUG		SEP		OCT		NOV		DEC	
1	REST																							
2		X				X				X				X				X				X		
3			X				X				X				X				X				X	
4				X				X				X				X				X				X
5	X				X				X				X				X				X			

Year 3

40 ha. plots	JAN		FEB		MAR		APR		MAY		JUN		JULY		AUG		SEP		OCT		NOV		DEC	
1	X				X				X				X				X				X			
2	REST																							
3		X				X				X				X				X				X		
4			X				X				X				X				X				X	
5				X				X				X				X				X				X

Year 4

40 ha. plots	JAN		FEB		MAR		APR		MAY		JUN		JULY		AUG		SEP		OCT		NOV		DEC	
1	X				X				X				X				X				X			
2		X				X				X				X				X				X		
3	REST																							
4			X				X				X				X				X				X	
5				X				X				X				X				X				X

Year 5

40 ha. plots	JAN		FEB		MAR		APR		MAY		JUN		JULY		AUG		SEP		OCT		NOV		DEC	
1	X				X				X				X				X				X			
2		X				X				X				X				X				X		
3			X				X				X				X				X				X	
4	REST																							
5				X				X				X				X				X				X

sun.

At least two days after the herd is dewormed it should be moved to a fresh pasture to avoid ingesting worm eggs. Deworming should occur just before the scheduled change of pastures.

All the cattle should be identified by numbered eartags placed in the left ear. The same number should be tatooed in the right ear, in case the tag is lost. The numbering system should include a letter preceeding the number to indicate the rance on which the cattle are located. The number of the animal will be used in recording all treatments received throughout the life of the animal.

The cows should be milked in the morning and then allowed to go out to graze. The calves should be allowed to follow there mothers into the fields each day and return with them in the evening. This should reduce the calf mortality rate.

The cows, by receiving food crop residues and being on rotational grazing of improved pastures along with the elimination of the internal and external parasites, should be in very good condition. This should enable the cows to produce enough milk to supply both the calf and the herder, thus overcoming the herders'objection to allowing the calves to run with their cows.

Cattle with large horns have a tendency to rake each other, particularly when confined in close quarters. The raking and fighting interrupts feeding, causes injuries and reduces the value of the hides. To avoid this, all calves should be dehorned by the use of a hot dehorning iron, as soon as the bud is definable. Grown cattle with large horns should have the sharp tips sawed off. The edges should be filled and rounded by using a file or rough stone. If in cutting the horn blood is drawn, a hot iron drawn over the bleeding will cauterize it and stop the bleeding.

In order to control breeding for behavior and to improve the quality of

the meat, all young bulls not selected for breeding should be castrated. Castration should be done by using rubber bands or Bradizzo. This should take place at the time of weaning.

In conducting interviews and reviewing literature about livestock production in Rwanda, some of the following problems emerged: there is inadequate nutrition for livestock; there are heavy losses of cattle due to diseases, and losses of weigh and milk due to heavy internal parasite loads; there is limited livestock extension services, personnel, equipment, and material; there is a need for minerals and salt to be added to the diets of livestock and the need for a program to upgrade local cattle.

This project will attempt to address each of these problems, except the breeding upgrading component. The problem of nutrition, loss of condition, extension services, etc. will be addressed by the pasture improvement, rotational grazing, and dry season supplemented feeding. It is believed with such overall improvements in the environment and management most of the problems will be overcome and the local or improved stock then will come nearer achieving its full potential.

In reviews of diseases in Rwanda which affect livestock it was determined that all the following diseases were prevalent: East Coast fever, other tic-borne diseases, blackleg, anthrax, trypanosomiasis, parasitism (internal), tuberculosis, brucellosis, and mineral and salt deficiencies.

In expanding upon the existing Veterinarian Extension Program, and initiating a tsetse eradication program, the project will attempt to overcome many of the diseases and parasite problems.

The cattle will continue to be sprayed or dipped twice a week to overcome the East Coast fever. The chemical used will be Toxaphene (copper), Delnar, or Vac Dip (Bayer), whichever is readily available.

The cost for dipping per 1,000 head/5 years is $13,586 or 1,250,000 Fr.

Expecting that 15% of the calves die from East Coast fever, the saving in lives on 1000 head for 5 years would be $101,902 or 9,375,000 F. This is a good return on the money spent. The increase in milk production as the result of suppressing tic-borne diseases is 15%. The increase of 15% = 3,000,000 liters over the production figure of 20,000,000 liters sold in 1978 @ 50 Fr./liter. This gives a profit of $3,260,865 in 5 years.

Black Leg and Anthrax are controlled by use of the vaccine Blanthox. Both of these are terminal diseases, therefore the savings in lives would be much greater than in the case of East Coast fever. The cost @ 20 Fr. /treatment = 100,000 Fr./5 years for 1,000 heads. This should give an estimated profit of $6,600,000.

Typanasomiasis will be controlled by the eradication of the tsetse fly. At present it is supressed by using Berinile and Tryupamidium. Even though the cattle are treated with these chemicals, reinfection takes place and prevents the animals from reaching their full growth or milk capabilities. The eradication of the tsetse fly will eliminate the possibility of reinfection and settle the trypanasomiasis problem entirely.

Parasitism (internal) worms and liver fluke are treated regularly; worms twice a year and liver fluke once a year. For worms the chemical used in Nilvern and for liver fluke it is Nilzan. Thabendazole or phenothiazine are chemicals that can be used for deworming. It is estimated that the gain for a 340 kg animal is 40 kg for which the price /kg live weight is 50 fr/kg.

The cost for 1,000 head is 120 fr/head, twice a year, or 240,000 FRW/year. The return is 40 kg/head at 50 FRW/kg = 2,000 FR/head/yr. For 1,000 head the gain is 2,000,000 FRW/year.

Milk production is expected to greatly increase under the project. Tuberculosis and brucellosis testing should be the basis for elimination of animals from the herd. This testing and elimination should continue, supported

by a calfhood brucellosis vaccination. By so doing the refugees could sell their animals to the commercial fattrening lot that la Rwandise is constructing near the project area. The company will require that the cattle be TB and brucellosis free in order to met the standards established for the European market.

Mineral and salt deficiency will be overcome by supplying these to the cattle for free choice feeding. Salt in Rwanda costs 50 FRW/miniblock. The dicalcium phosphate or bone meal can be obtained in Rwanda only in small quantities. Even then supplies are erratic. Based on 1,000 head the cost of salt feeding at 10 kg/head/year = 10,000kg at 50 FRW/kg = 500,000 FRW. An estimate of the cost of the dicalcium needed to be imported is 100 FRW/kg. This would mean at 10 kg/year 1,000 head would consume 10,000 kg for a total cost of 100,000,000FRW.

The project intends to continue the preventative medical program by purchasing more materials and veterinarian equipment, installing a dipping tank, providing support vehicles, salt and mineral mix.

The herders will be expected to pay 1/3 the cost of the treatments in the first year, 2/3 of the cost the second year and 100% of the cost the third and fourth year, thus creating a revolving fund insuring a constant supply of materials and medicines. At present the refugees are not paying anything.

With the cattle on a feed intake that does not drastically change during the dry season, using the preventative medical program, having an abundant supply of potable water, receiving a regular supply of salt and mineral mix, it is expected that cattle will improve in the following manner:

Local Cattle	Upgraded Cattle at Research Center	Refugee Cattle
Birth weight 18-20 kg	26 kg	20 kg
Weaning weight 18 months 100-110 kg	160 kg	120 kg
Weight at 3 years 250 kg	350-375 kg	300 kg
1ST breeding - 4 yrs	2 1/2 yrs	2 1/2 yrs.
Milk Production	15-20 Liters/day	5-6 Liters/day

Appropriateness of the Technology

In the livestock portion of this project, interventions such as pasture improvement, pasture rotation, growing of fodder, growing shrubs for fencing, and letting calves run with cattle, are not radical interventions.

The beneficiaries are refugees who were herders in Uganda with access to vast areas of land for which they were not responsible. This resulted in a pattern of moving to the best grass with no concern about improving the pasture.

Now as refugees in Rwanda, the situation has changed and the amount and availability of land is a constraint. Most of the land in Rwanda has been claimed and is in use. The area in which the project is located has not been occupied before because of the infertility of the soil and the presence of tsetse fly. The vagaries of the rainfall often reduces the crops or causes crop failure in adjacent areas.

It is estimated that the pastures could support one animal unit per hectare , but only on condition that the pasture be improved and that

rotational grazing be followed. This can be done without too much effort.

To improve the pasture, all woody shurbs should first be removed. This will enable the grass established to have room to spread without competition for the nutrients of the soil, rain, and sunshine. Legumes (stylosanthes) that are drought resistant and will improve the protein intake of the cattle will be planted.

Given the disadvantages of poor soil, adverse climate and limited amount of land, pasture rotation is absolutely necessary. The greatest possibility for incresing production will be through managing the available resources. The rotation is not so intricate that the herders cannot understand it. Once the principles and benefits are explained, given the fact that the refugees know there is no other land which can be utilized, one may be confident that they will use the rotation and not abuse the pasture.

The growing of fodder to be fed to the cattle during the dry season is a new intervention. Yet it is not completely new to the herders. Having farmed themselves they know their cattle will eat residues and other feeds during the dry season. Yet they have never planted any crop to be used specifically during thedry season. Again, when the advantages are explained and knowing the limitation of the productivity of the soil during the dry season, they should be willing to do this to keep their cattle in good condition.

Euphorbia grows in Uganda and Rwanda and the herder has seen it used as a fence around houses. Fences consisting of the planted Euphorbia will be permanent once established, and can easily be controlled by cutting with a machete. After being well established, with gates of thorn bush, the cattle can be allowed to graze in the area unattended, freeing someone to work elsewhere.

Allowing calves to run with their dams all day is one intervention that might meet with some objection. The purpose is to reduce calf mortality and

this will be essential since the herd must be kept to minimun. In the projections some mortality is accounted for; however, each calf born must be given the best opportunity to live. The herders' objection is that when the calf sucks the mother all day there is no milk left for the herder at night. This should be obviated by the increase in total milk production per day. More calves living than expected will improve the economic situation of the herder and encouraging adoption of the practice.

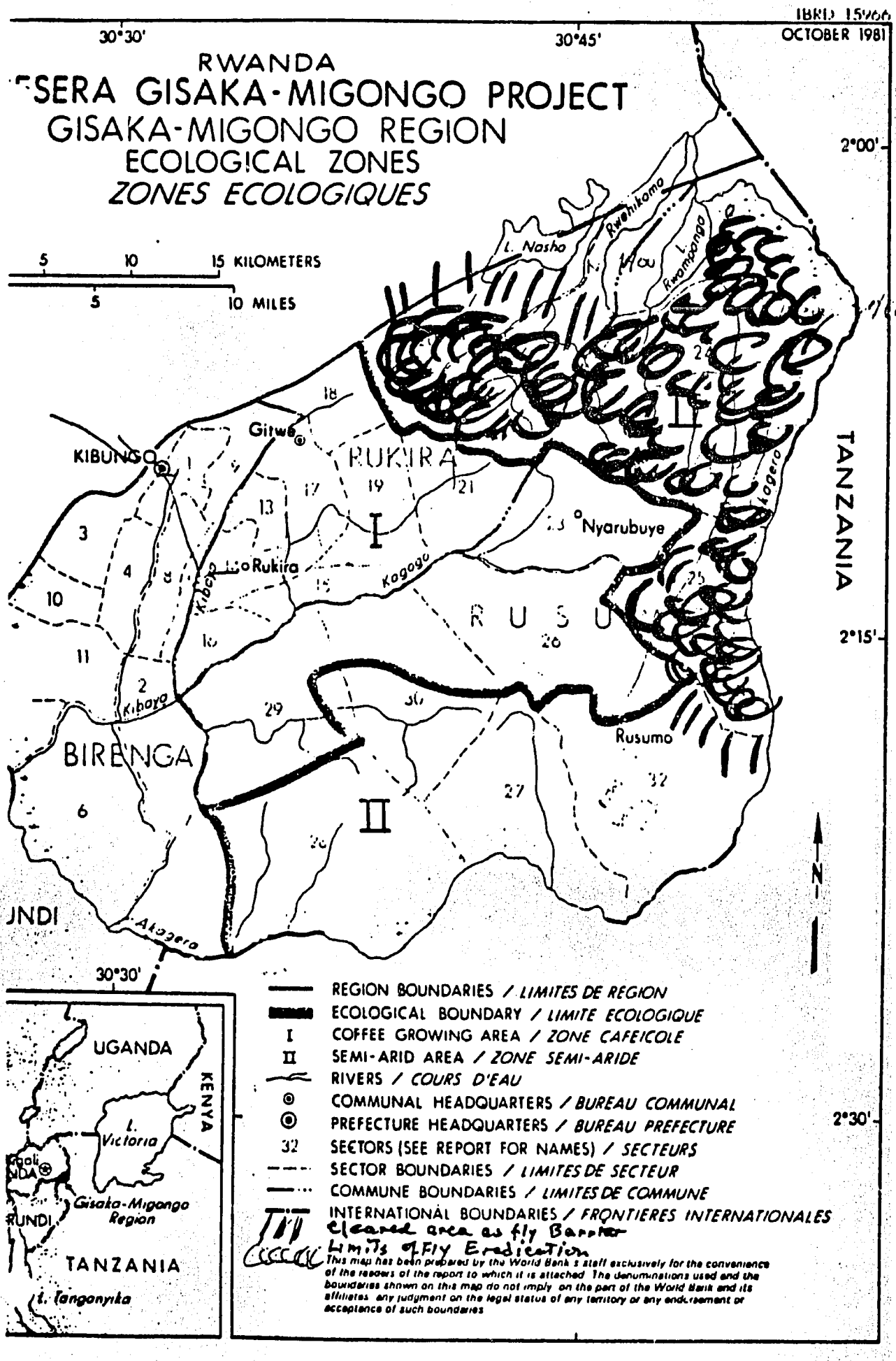
B. Tsetse Fly Eradication Program

In the corridor from Akagera National Park south to Rusumo Falls, the tsetse fly has prevented development by acting as a vector for trypanosomiasis that affects both humans and animals (see map, page 36a). Three types of tsetse have been identified in the area: Glossina morsitans, glossina pallidipes, and glossina brevipalpis. Initial efforts to eradicate the tsetse were undertaken in 1969/70 in the Rusumo area and in 1971 in the area contiguous to the National Park. Follow-up efforts took place in 1973/75, 1976, 1978, 1979/80, and 1980/81 (see Annex 3). The eradication efforts never took hold, however, because there was never a coordinated effort that treated the entire region. Consequently, reinfestation occurred from the untreated areas. In addition, the insecticide applications were inadequate and only served to temporarily diminish the tsetse fly population.

The tsetse eradication program is expected to start in about March 1984, with BGM doing the work, monitored by MINASODECO/UNHCR/MINAGRI. The work is expected to be finished by June 1986.

ISAR has personnel qualified to carry out the identification and the spraying aspects of the eradication program. BGM will provide a specialist in the control of the tsetse fly and trypanosomiasis to aid in the campaign.

Tsetse Project Area



The method of applying the insecticide in various areas must be adapted to the habits of the specific fly. It is intended to eliminate the presence of all the flies by modifying the habitat through bush clearing and ground application of a persistent insecticide (Dieldrine). These are the methods of choice for the following reasons:

- The area will be used for ranching and settlement, therefore bush clearing is necessary for agricultural pursuits and the improvement of grazing. Development along these lines is a part of the livestock project;
- Control by insecticide alone would not alter the tsetse habitat, therefore the risk of reinfestation from Tanzania across the Akagera river valley would remain high;
- The area cleared for ranching and settlement will, in itself, reinforce the barriers against reinfestation along the Akagera valley and south of the park.

Implementation Schedule

Year One

a. Bush clearing beginning at the edge of the settlement area downstream from Rusumo Falls (dry season).

b. Survey to determine tsetse distribution (rainy season).

Year Two (Dry season)

a. Completion of bush clealring.

b. Application of insecticide.

Year Three

a. Assessment of effectiveness of control measures.

b. Mopping up by respraying persistent pockets of infestation in the treatment zone (dry season).

c. Continuation of fly patrols

d. Compilation of final project report.

Bush Clearing by Hand

Axes and machetes will be used for an estimated 4,000 hectares of clearing over an 18 month period spanning two dry seasons. Clearing is not intended to denude the area completely. It is recommended that 30-40 clean bole trees be retained per hectare cleared.

Application of Inspecticide (Dieldrine)

A 3% solution of Dieldrex 15T will be applied once only with pressurized knapsack sprayers to favored resting sites of the tsetse fly from ground level to a height of 2.5 m. over an estimated area of 4000 ha. during the second dry season.

The quantity of Dieldrex 15T to be used is estimated at 5000 liters. One spray operator can cover 6 ha./day; thus 667 man days will be required for spraying alone. A team of 10 sprayers could be trained to spray the treated zone in 9-10 weeks.

Mopping up of persistent Tsetse pockets

Assessment of fly patrol results will indicate these pockets which are estimated to be 300 ha. Ten spray operators with support staff could cover the area in five days. Insecticide requirements (Dieldrex 15T) are calculated to be 375 liters.

C. Water Supply Systems

1. Water resources in the region are of four distinct types:

(a) Mountain Springs:

There are numerous springs on the hill sides of the mesas in the project area. Differences in permeability between alternate layers of schist and quartzites cause the aquifers to surge out of the ground, thus forming springs.

Because of the high altitude, the sterility of the surrounding soils and the low population density of the area, there is a low risk of bacteriological contamination of these waters, providing there is adequate protection of the spring. According to physico-chemical analysis done on similar types of springs, the quality of the water is appropriate for human use without any peculiar treatment except chlorine treatment to sterilize the system before putting it in service. Regular inspection will determine if periodic sterilization is necessary.

Disadvantages

The disadvantages of these systems are of two kinds:

- The distance that generally separate the users from the water source requires a longer pipeline system.
- The soil in the surrounding area of the springs is subject to erosion due to steep slopes and lack of vegetation.

Advantages:

The advantages of spring systems are:

- The water quality: Analyses show that given proper installation, the water coming from the spring is of adequate quality for human consumption. No further treatment is necessary.
- The gravity flow system is also an appropriate and simple way of distributing the spring water without any pumping or sophisticated and expensive devices, thus lowering costs.
- The dispersion of the springs: The dispersion of the springs and the ability to tap the supply lines at any

point allows for provision of water to different areas of the camps for both animal and human consumption

(b) Surface Water:

Water is also available from surface water, mainly from the Akagera River and from the lakes located north of the project area. To be suitable for human consumption these waters need to be treated by means of filters, coagulants and sterilization. The distribution system would require pumping, power supplies, pressure pipes, high capacity reservoirs and a laboratory.

Disadvantages:

- Control and Maintenance: The operation and the control of this type of installation calls for well trained and qualified operators. Because their presence is required permanently, lodging and facilities would have to be provided for the personnel. The chemical reactives and spare parts would also have to be stocked so as to insure an adequate operation of the plant.
- Recurrent Costs: These systems imply high operating costs due to the high wages paid qualified personnel, high costs of reactive materials (alum costs about $400/ton) and energy.
- Distribution to the Users: The physical layout of the ranches and villages would require a large scale distribution system that would greatly increase costs.

Advantages:

- Security of Supplies: As the source of water would be the surrounding lakes, an assured supply of water in adequate quantities would be available to meet the needs of the project. The certainty of the supply would have to be questioned, however, if irrigation were to be carried

out under the hydro-electric project of the AKAGERA Basin Organization.

c) Ground Water - Deep Wells:

Information about the groundwater resources of Rwanda is limited, although supplies seem adequate: studies done by SODETEG in the Mutara area have shown the presence of an exploitable deep aquifer in river valleys. As the geological formation is similar, a similar aquifer may be present in the project area.

Disadvantages:

- Availability of drilling rigs: There is essentially no existing drilling capability within the country. The project would have first to implement an exploratory program that would add delays in the realisation of the project. Drilling is also very expensive and could easily amount to $400/foot.
- Recurrent costs: As the pumping system would require fuel and regular maintenance by a skilled mechanic, recurrent costs would be elevated relative to other systems.

Advantages:

- The Water Quality: Water coming from deep wells is of adequate quality and does not need any type of treatment.
- Availability: Once the installation is done, the availability of water is more than sufficient for future needs.
- Distribution: As is the case with spring and gravity flow systems, deep wells could be dispersed so as to

respond to pastoral uses without an extensive pipeline network.

(d) Ground Water - Shallow Wells:

In 1956-57, 54 hand-dug wells were constructed in the Eastern Zone of Rwanda and equipped with hand pumps. None of these is still in operation, showing that the superficial water table is subject to significant variations during the dry season. Because of the low permeability of the soil, the capacity of such wells during the dry season is very low and the quality of the water is questionable.

Conclusions

Of the four systems, the spring catchment with gravity distribution system is the most feasible means of water supply for the project area. A cost analysis undertaken by USAID mission to Rwanda by Herbert G. Blank shows the cost effectiveness of such installations (table 2). Gravity distribution systems have been extensively implemented in surrounding "paysannats" and ranches and have been well accepted by the users.

2. Project System Design

(a) Introduction:

The project covers four distinct springs and gravity fed water supply systems grouped in two major areas, Nasho West and Nasho ranch areas (see map, page 19a).

(i) Nasho Ranch

The Nasho ranch area is an L-shaped corridor of 7,500 hectares extending South to North along the Akagekra river and then South-west bordering lakes Rwampanga and Cyambwe. The topography is relatively gentle and is of a flood plain type standing at the foot of steep hillsides and plateaus where springs surge out from quartzites and schistes rock formations.

Table 2

COMPARISON OF RWANDAN RURAL WATER SYSTÉMS

	Petites Sources	Spring and Gravity Distribution	Surface Water Source, Treatment, Gravity Distribution	Spring Source, Pumping, Distribution	Surface Source, Treatment, Pumping, Distribution[2]	Hand dug Wells with Handpumps	Drilled Wells with Handpumps
Typical Daily Water Production (M^3)	8	8	8	8	1047	10	10
Typical number of families served	40	40	40	40	14,000	50	50
Typical cost of Construction (RFr)	40,000	1,310,000	2,500,000	2,500,000	1,280,000,000	800,000	600,000
Amortization period (years)	20	40	40	40	40	30	30
Recurrent costs	2,000	50,000	125,000	125,000	54,032,000	60,000	50,000
Investment per family (Rfr)	1,000	32,750	62,500	62,500	91,428	16,000	12,000
Annual maintenance costs per family (Rfr)	50	1,250	3,125	3,125	3,859	1,200	1,000
Annual depreciation allowance	4,698	133,960	255,648	255,648	N/A	84,864	63,660
Water cost, exclusive of capital costs per m^3 (Rfr)	0.70	17.12	42.80	42.80	64.48	16.44	13.76
Water cost, including capital and recurrent per M^3 (Rfr)	2.30	63.00	130.36	130.36	N/A	39.70	31.13

1. AIDR, "L'exploitation et l'entretien des ourrages hydrauliques gérés par l'AIDR, 2 ème partie" (Table No.5)

2. Icyanga - Bugesera East Project (Table No.1).

Six hundred and thirtynine refugee families are presently settled in the area along with a few Rwandan families living and fishing in the lakes area. Along the Akagera river water will be supplied by two systems, the AKAGERA "B" and AKAGERA "C" water delivery networks, the systems will cover an area of approximately 5,000 hectares and provide water for 2,800 persons and 4,000 animal units. The total demand for water for this area is evaluated at 357,000 l/day, while the capacity of both AKAGERA "B" and AKAGERA "C" water delivery systems has been established at 450,000 l/day (5.2 l/sec.), which is sufficient for the project purposes.

The rest of the Nasho Ranch area located along Lake Rwampanga and Lake Cyambwe, will be supplied by a single delivery system fed by the Nyamirembe spring. This area of 2,000 to 2,500 hectares will serve as a transient zone during project implementation and could eventually be used as an extension ranch. The primary beneficiaries of that water supply system will be the actual present Rwandan and refugee populations (250 to 300 families) but for design purposes we will assume that the area will be used as an extension ranch with 1,800 cattle units and a population of 1,260 persons. The demand for water would then be about 155,000 l/day (1.8 l/sec), equal to the capacity of the spring

The construction costs for the water supply systems for the entire Nasho Ranch area is estimated at 37,300,000 RFW (US$406,000).

(ii) Nasho West

The Nasho West project will complete the water supply systems in the Nasho area, and will provide potable water to the entire area adjacent to the refugee camps. Located to the west of Mulindi, this area extends north to Akagera Park and is intended to be used as a paysannat within the BGM project. The potential beneficiaries are between 800 and 1,300 families, 4,000-6,500 people.

The system would be supplied by two springs (Gikombe I,

Gikombe II and Kabahimba) having a total low-water flow of 4.0 l/sec. The preliminary cost estimates of that 30 kilometers gravity fed system amounts to 27,500,000 RFW ($300,000).

(b) Design Criteria:

(i) Demand

For the purposes of the project the following figures were retained:

- daily human consumption (varies from 10 to 40 l/d)	40 l/d*
- domestic uses (laundry, cooking, etc.)	10 l/d
- daily cattle consumption	50 l/d

*This figure takes into account a security factor, growth and waste.

(ii) Spring Capacity

The measurements of most springs was done by AIDR but they have not kept any detailed records. According to AIDR's engineer, two methods were used to determine the capacity of the springs, depending on the time of the year that the measures were taken. Preferably measures were made at the end of the dry season and the resulting figures were considered to be the low-rate flow of the spring. When the measures are taken during wet season the spring capacity was then established by assuming that the low-rate flow would lbe equivalent to 60% of the measured flow of the spring.

Due to the importance of a reliable supply of water, BGM's technical staff should keep a year round graphical record of the springs outflow so as to optimize water uses according to the fluctuation of the flowrate, and also to predict any unusual low-rate flows or

spills.

According to previous measurements the spring capacity for each network are the following:

Location	Distribution Network	Spring	Low Flow Rate (l/s)	Available for Project (l/s)
Nasho Ranch	Akagera "B"	Cyimparage	0.35	1.7
		Nyagahanga	1.75	1.7
	Akagera "C" Extension (Mpanga)	Gakiragugo	5.07	3.5
		Nyamirembe	1.8	1.8
Nasho Ouest	Nasho Ouest	Gikombe I	2.0	2.0
		Gikombe II	1.0	1.0
		Kabamimba	1.0	1.0

(iii) Hydraulic Capacity of pipes:

Pipes used on the project will be primarily PVC. These are manufactured by SONATUBES in Rwanda, and can be ordered to sustain minimal pressures of 6, 10 and 16 bars. All pipes exposed to daylight will be made of galvanized steel instead of PVC so as to prevent deterioration due to UV rays. Pipe diameter is determined according to their hydraulic capacities (hydraulic grade lines are plotted on detail drawings). Checks have been done on these figures according to Hazen Williams and Darcy Weisbach formulas and have been shown to be exact.

(iv) Distribution Networks:

Distribution systems will be of two types depending on their location and uses.

The Ranch Area:

The ranches will be organized in villages of approximately 20 families. A public tap and a 6 m3 reservoir will be provided for each village. Having a public tap in each village will ensure better maintenance. There will be a watering trough for every two villages. The exact location will depend on such local characteristics as pasture areas. These watering troughs could be supplied by the overflows from adjacent reservoirs and/or equilibrium chambers. In the extension ranch (Zone I) only two watering troughs will be installed for the project in the vicinity of BGM II. Dipping tanks and dispensaries will also be connected to the water supply systems.

The Paysannat Area (Nasho West)

On the Paysannat, reservoirs and public taps will be provided every kilometer along the main distribution lines. The capacity of the reservoirs will be 4 to 6 cu. m. depending on the specific water demand.

Public Taps:

Different types of public taps have been used in the BGM project. Massive works seem to deteriorate easily so it would be preferable to avoid them even if they look tougher and stronger. One aspect that is neglected is the erosion at the tip of the concrete apron. It would be advantageous to add a layer of crushed stone at the outlet of that concrete apron. Crushed stone, 150 mm thick and covering at least one square meter should rest on a layer of straw or other fibers that will act as anti-contaminant while allowing infiltration. The public taps should be located a minimum of 50 meters from latrines or watering

troughs. A valve should be installed between the reservoir and the tap to insure proper control and prevent spills and misuse.

Reservoirs:

The covered reservoirs should be circular in shape and be made of stone and reinforced concrete. To insure imperviousness a 2 cm. thick tar coating should be applied inside the reservoirs. A steel cover would allow access to the interior of the chamber. A valve should be added at the inlet of the reservoir insure control of the distribution network. Access to the interior of the reservoir should be restricted to authorized personnel only. Sterlization with a solution of calcium hypochloride (for 24 hours) is recommended before putting the system in service.

Watering troughs:

Watering troughs should have a 80 m x 80 cm. rectangular shape. The troughs should be between 80 cm and 1 meter high. The approaches to the watering trough should slope downward away from the trough so as to prevent the stronger animals from lingering around it after drinking. To prevent erosion a 200 mm thick crushed stone carpet extending 2 meters outside the watering trough will be needed. The crushed stone should be laid on straw to prevent mudding. The water points should consist of two or three rectangular watering troughs made of reinforced concrete or, better, of sheet metal, which make them movable. A valve should be provided to control water distribution and prevent spills.

Equilibrium chambers and collective chambers

These square-shaped stone works are of the same type as the reservoirs described before.

Spring catchments:

Each spring catchment should have its own specific design conforming

to the following general rules. Water is collected through perforated pipes that bring the spring water to a main collection chamber. To prevent contamination by people and animals a fence is erected at a distance of 300 meters from the springs to restrict access. The ground is covered with grammaceous plants and small bushes to to prevent erosion and insure slope stability. Special care must be taken in landscaping the surrounding area to prevent landslides, erosion or the growth of trees with developed root systems that would tend to clog the perforated pipes and drains.

Pipe installation:

Normally pipes will be buried at a depth of 40 to 80 cm. Under roads the depth will be 1.2 meters. Pipes should be seated on the bottom of the excavation and special care should be taken to insure that it is not lying directly on rocks or on any sharp-edged material. Backfilling should be made by using the finer material around the pipe and gradually filling the rest of the excavation with the remaining excavation materials. Special protection is also required when pipes are laid above ground. Galvanized steel pipes are then used as sleeves and are anchored to the ground by stonework.

(c) Systems Specifications:

1. Nasho Ranch Area

(i) AKAGERA "B"

o Project Area: (Part of Zone IV and Zone V)

Area = A(v) + 465 = 955 + 465

Area 1420 ha.

o Number of villages: (20 families per village)

One village includes

— 200 hectares for pasture (200 A.U.)

— 20 hectares for food crops (1 ha/family)

— 20 hectares for forage crops (1 ha/family)

— 5 hectares for housing (2500 m2/family)

245 hectares/village

Number of villages in AKAGERA "B" basin = N("B")

N(B) = 1420/245

N(B) = 5.79 = 6 villages = N(B)

Water Demand

Population = 6 villages X 20 families/village X 7 persons/family

= 840 persons

Cattle: 6 X 200 Au = 1200 Au

Water demand = (840 + 1200) X 50 1/day *

Thus, water demand = 102,000 1/day = 1.18 l/sec

*Includes cooking and laundry needs, security and growth factors.

System Capacity: (ref: AIDR Drwg RW/1659/80)

Total System Capacity = 2.1 l/sec.

Flow diverted to adjacent = 0.4 l/sec.

Paysannat System capacity for project = 1.7 l/sec

System capacity demand = exces

F.S. = 1.7/1.18 = 1.44 Q.E.D.

Construction Considerations:

— The spring catchments and the main pipelines including equilibrium chambers are already built along with two public taps.

— The project will have to implement the remaining public taps (one for each village) and three watering troughs (one for every two villages)

— Villages will be spaced at approximately 1.5 kilometers.

AKAGERA "C"

o Project Area: (Part of Zone IV, Zone III and part of II)

Area "C" = (1000-465) + 2158 + (1310 - 290)

Area "C" = 3713 ha.

---

o Villages Supplied

N("C") = 3713/245 (see 1.1)

N("C") = 15 Villages

---

o Water Demand (0.2 l/s/village)

- Population = 15 X 140

P("C") = 2100 persons

Cattle - 15 X 200

C("C") = 3000 Au

Water demand = (2100 + 3000) X 50 l/day

Q("C") = 255,000 l/day = 2.95 l/sec.

o System Capacity: (ref: AIDR drwg RW/1777/81)

- spring capacity : 3.6 l/sec.

flow to local population : .1 l/sec.

capacity for project : 3.5 l/sec.

System capacity demand — excess

F.S. = 3.5/2.95 = 1.19 F.S.

Construction Considerations:

— The spring catchments and 6 kilometers of pipelines are already built.

The project will have to implement the completion of the distribution network (19 km), 15 public taps, 8 watering troughs, dipping tanks and dispensary connections.

(iii) MPANGA Water Supply System (NYAMPIREMBE Spring)

General Considerations

- System will provide water to the remaining ranch area in Zone II (290 hectares) and to the rest of the refugee population. For design purposes, the area will be considered as an extension ranch.

Project Area (Zone I and part of Zone II)

Area = 1935 + 290

= 2225 ha.

Number of (future) villages :

N = 2225 ha. / 245 = 9 villages

Water demand

Interim : 240 families —— 0.97 l/sec.

Final : Q = Number of villages X 0.2 l/a

a = 1.8 l/sec. —— Retained.

Spring Capacity : (ref. Hydro Bat drwg H-83/20)

Q = 1.8 l/s.

Spring Capacity = Demand o.k.

Security Factor =1

(ii) Nasho West Area

Paysannat type system

— Water demand

Population: 1300 families (5 persons 1 family)

(800 to 1300 families) - Population : 1300 X 5 = 6500 persons

Animal: 5 AU/family (1 goat or sheep/family)

animal population : 650 A.U.

Water demand: (6500 X 40 l/day - 650 X 50 l/day

= 292500 l/day (3.4 l/sec)

— System Capacity: (Ref: hydrobat H. 38/36)

- Gikombe I : 2 l/sec
- Gikombe II : 1 l/sec
- Kabahimba : 1 l/sec

Total System Capacity: 4 l/sec. (345,000 l/day)

System capacity demand

S.F. = 40/3.4 = 1.18

— Construction Considerations

— The entire system has to be constructed. It will be built on a paysannat scheme instead of the ranch and village organization of the Nasho Ranch area.

— Public taps will be located approximately 1 km. apart

— System includes 3 spring catchments, 25 km. of water distribution pipes and 22 public taps and reservoirs.

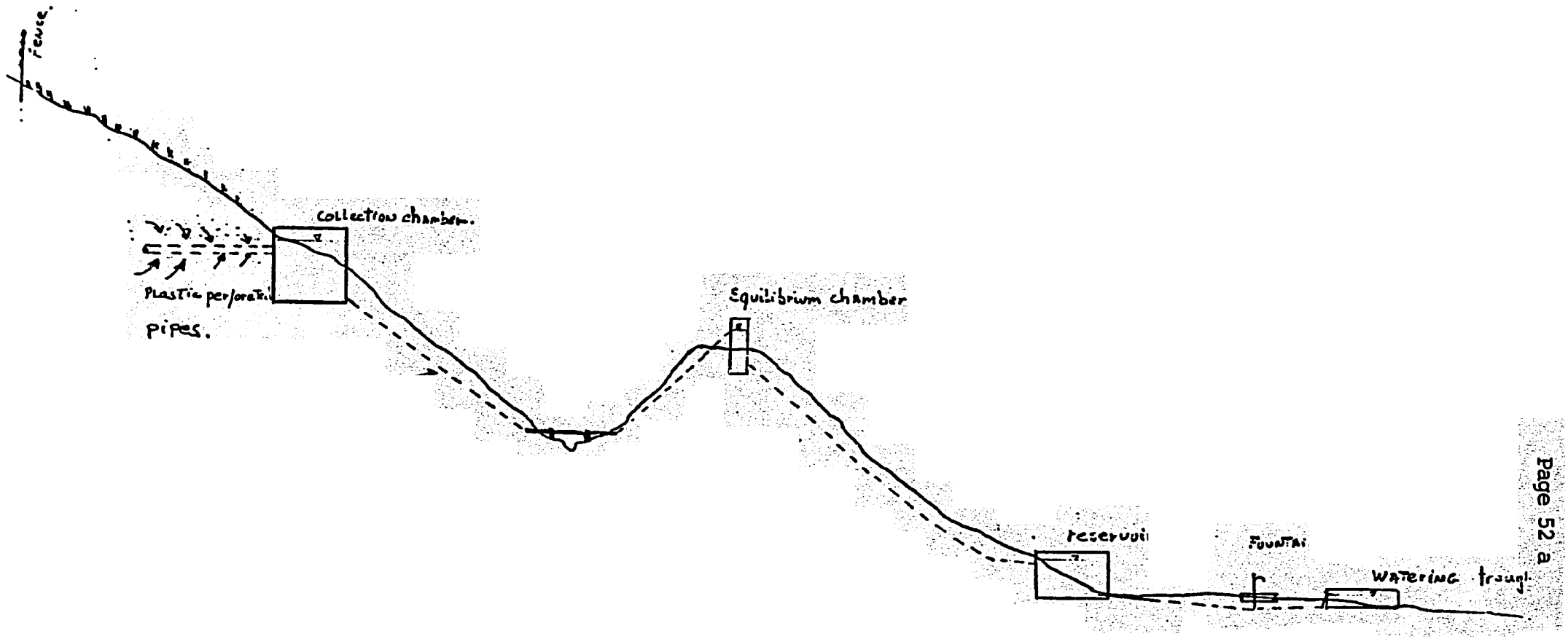
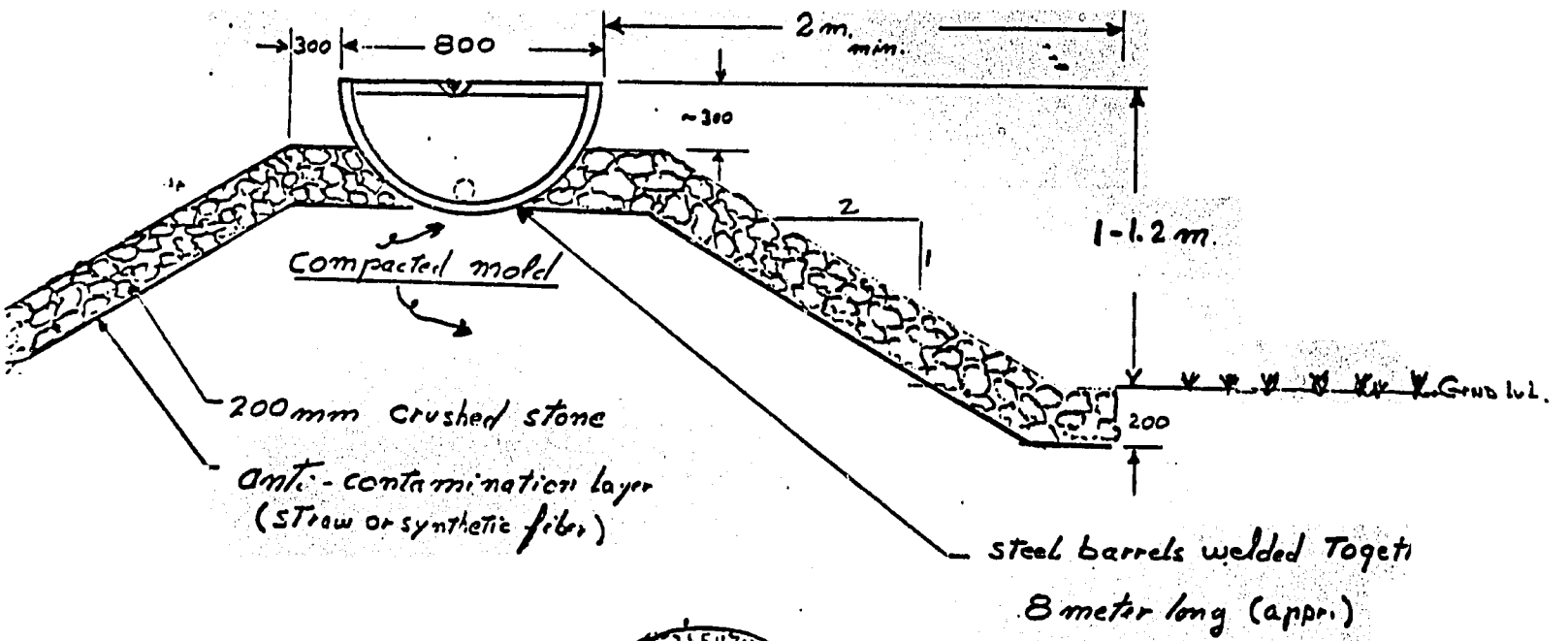
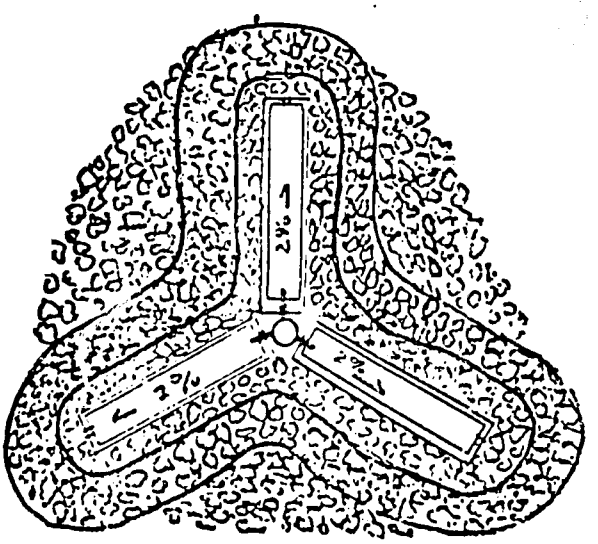


DIAGRAM OF GRAVITY FLOW WATER SUPPLY SYSTEM

SECTION



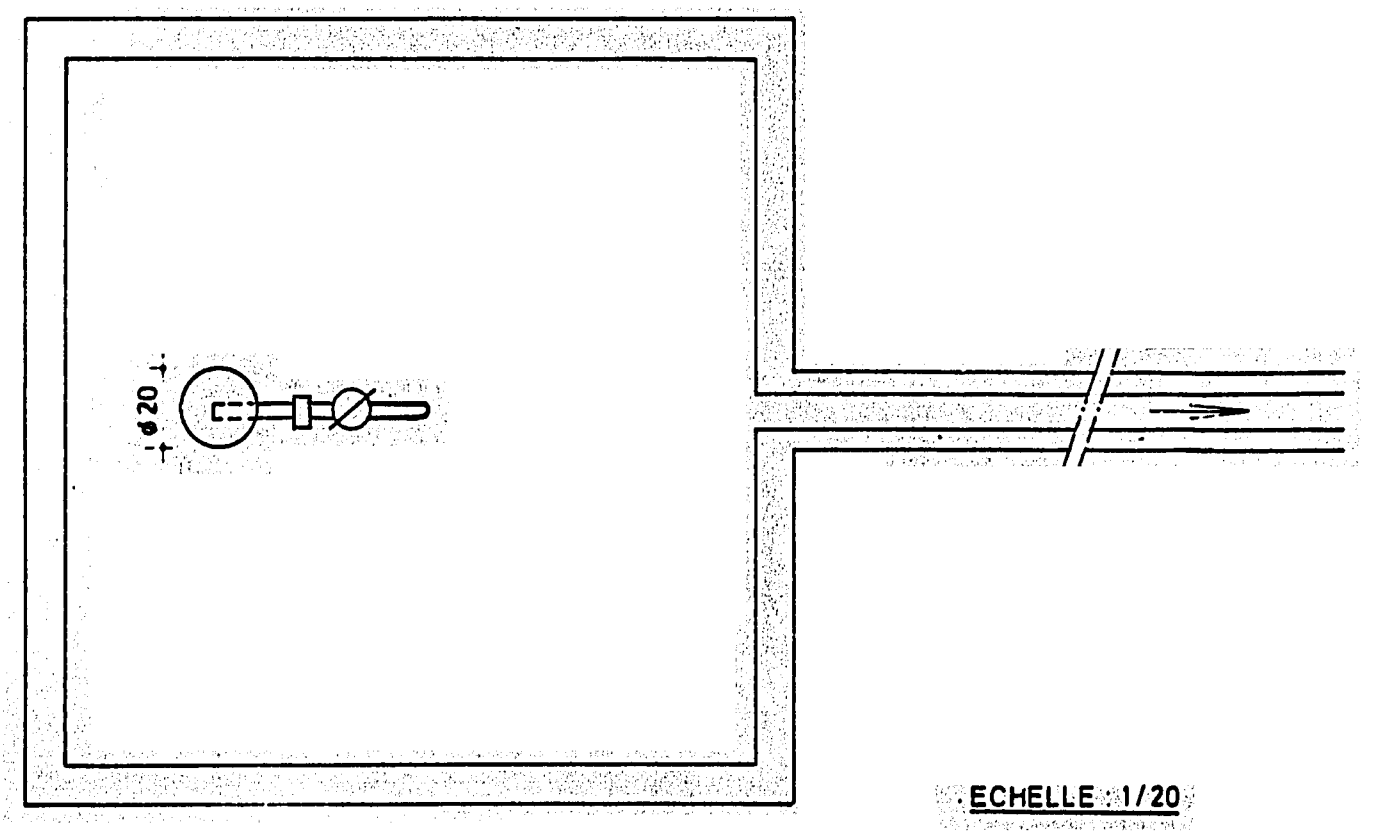


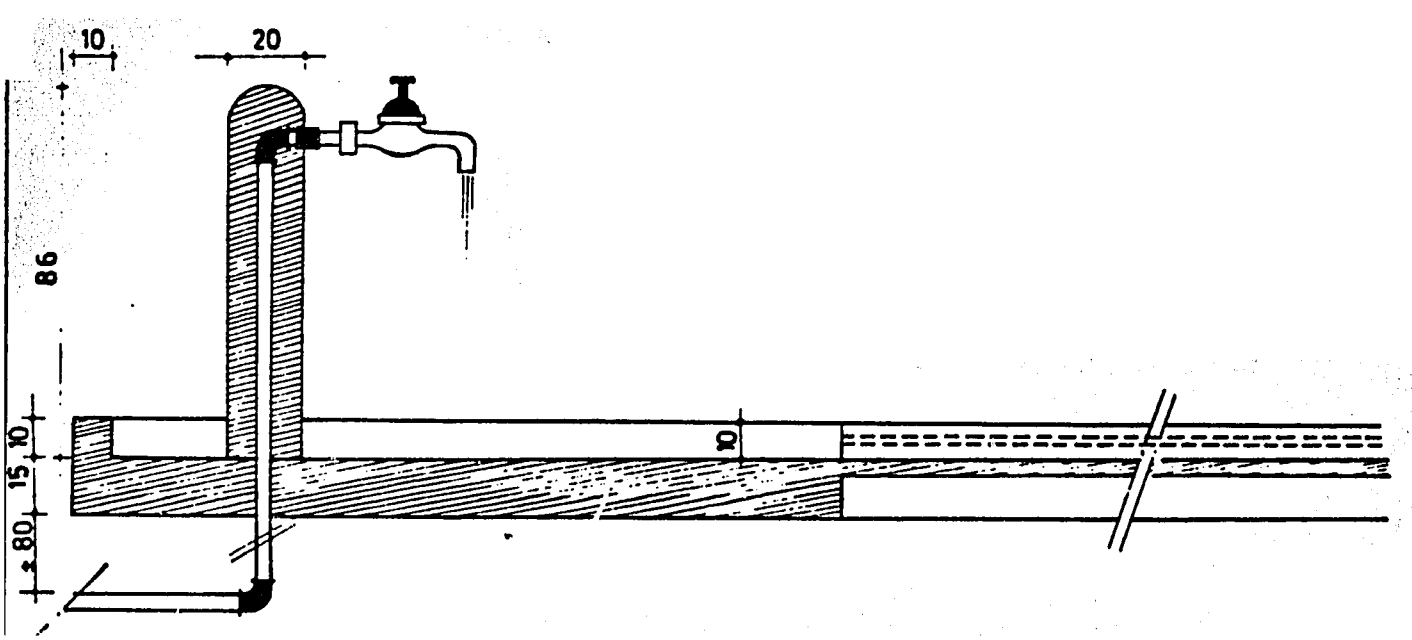
Top View
(general arrangement)

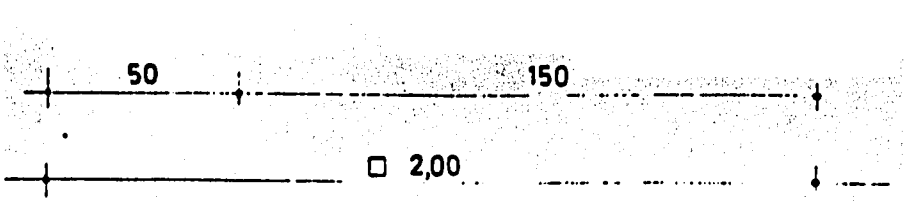
Moveable Watering trough
(steel tub)

BORNE FONTAINE TYPE

PUBLIC TAP (A.I.D.R.)





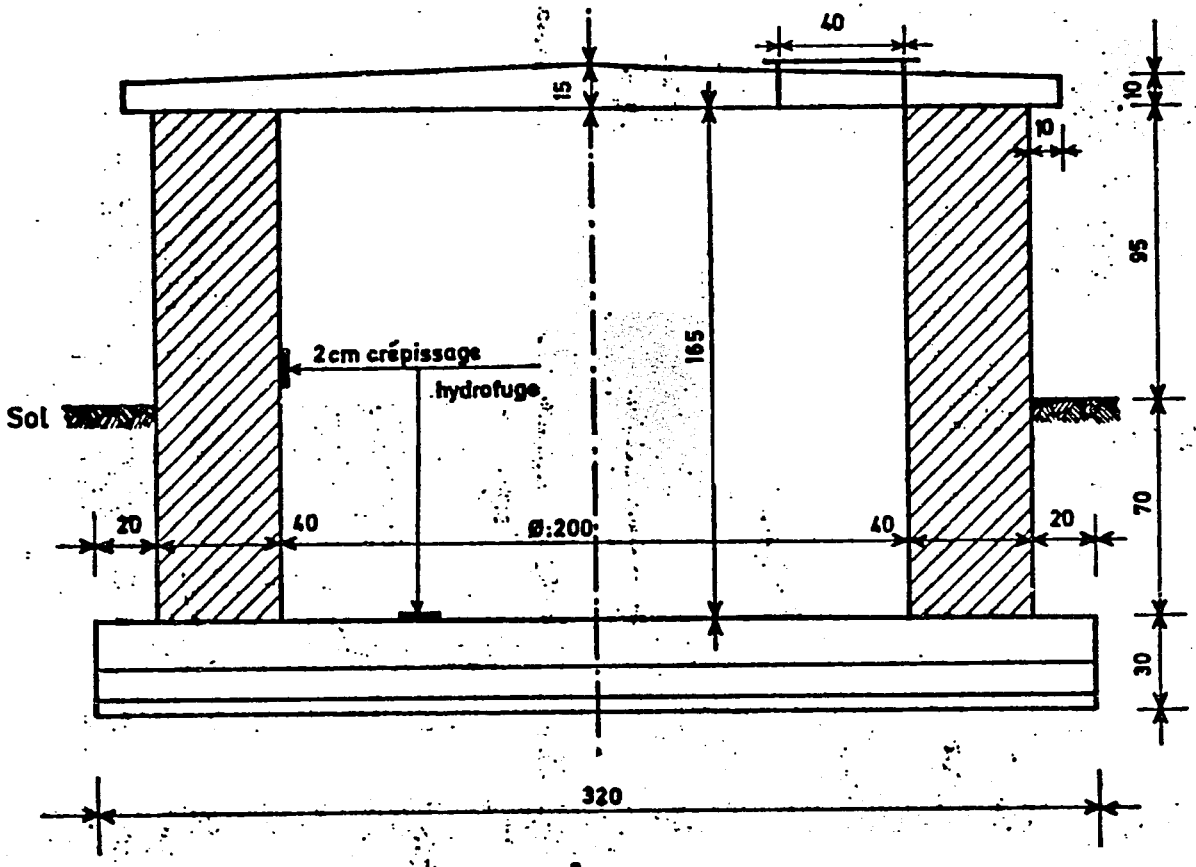


3 m de rigole.

66

ELLE : 1/25

RESERVOIR DE 4 m³



Surface crépissage hydrof. = 8,32 m²
Surface enduit hydrofuge = 16,64 m²
Jointoyage maçonnerie = 14,51 m²

15 cm Béton armé
10 cm Béton de fondation
5 cm Béton de propreté

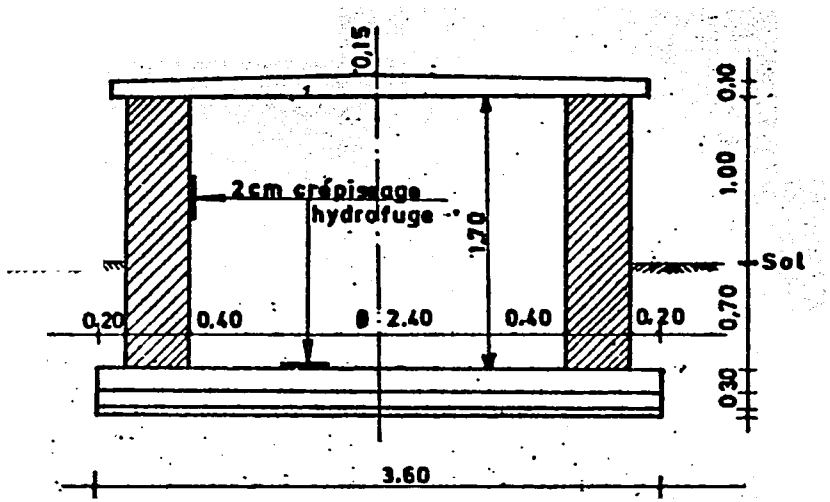
Surface nette D = 1,96 : S = 3,016 m²
hu = 4.000 : 3,016 = 1,33 m soit 1,35 m
10 cm pour la crépine
20 cm pour le trop-plein
Hauteur des murs = 1,65 m

Volume des fouilles	= 8,038 m³
Volume Béton de propreté	= 0,402 m³
Volume Béton de fondation	= 0,804 m³
Volume Béton armé du radier	= 1,206 m³
Volume des murs	= 4,967 m³
Volume Béton armé couverture	= 0,883 m³

G.A. / M.D B

RESERVOIR DE 6m³

'chelle : 1/50



Surface crépissage hydrofuge	=	17,342 m²
Surface enduit hydrofuge	=	34,684 m²
Surface maçonnerie	=	17,09 m²

15 cm B. A. radier
10 cm B. de fondation
5 cm B. de propreté

Surface nette- D = 2,36 S = 4,374 m²

h.u. = 6,000 4,374 = 1,37m

10 cm pour la crépine

20 cm pour le trop-plein

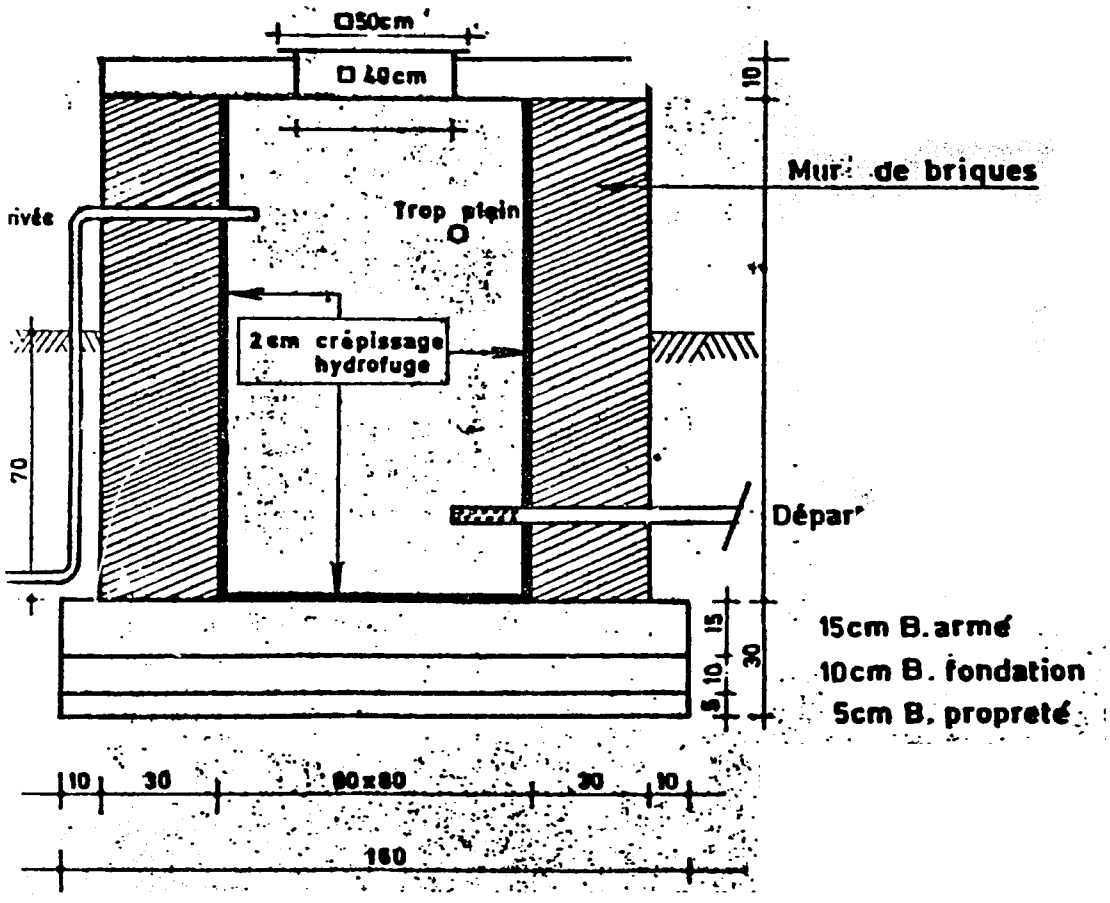
Hauteur des murs = 1,70 m

Volume des fouilles	=	10,179 m³
Volume B. de propreté	=	0,509 m³
Volume B. de fondation	=	1,018 m³
Volume B. A. du radier	=	1,527 m³
Volume des murs	=	5,982 m³
Volume B. de couverture	=	1,135 m³

G.A. /M. D.B

ECHELLE : 1/20

Chambre de départ - Chambre d'équilibre
Chambre collectrice



Surface crépissage hydrofuge	= 4,80m²
Surface enduit hydrofuge	= 9,60m²
Jointoyage maconnerie	= 7.28m²

Volume des fouilles	= 2,56m³
Volume B. de propreté	= 0,128m³
Volume B. de fondation	= 0,256m³
Volume B. armé	= 0,384m³
Volume des murs	= 1,848m³
Volume béton couverture	= 0,196m³

3. Cost Analysis

(a) Nasho Ranch

AKAGERA "B"

4 Units Public Tap, including Pipes and 6 m3 reservoir	at 302,000	1208,000 FRW
3 Units Watering Troughs, including pipes and 6 m3 reservoir	at 265,000	795,000 FRW

AKAGERA TOTAL 2003,000 FRW

AKAGERA "C"

Earthworks

(19000 meters including distribution lines and extension to Rwangango)

Assuming 25% hard rock

4750 m. hard rock	at 823.20 FRW/m	3910,200 FRW
14250 m. varied	at 260..00 FRW/m	3705,000 FRW

Pipes

900 m.	PVC 75 PN 6	at 385 RFW	346500
1160 m.	PVC 75 PN 10	at 455 RFW	527800
1600 m.	PVC 75 PN 16	at 691 RFW	105600
2900 m.	PVC 63 PN 10	at 322 RFW	933800
2600 m.	PVC 50 PN 10	at 208 RFW	540800
2700 m.	PVC 40 PN 16	at 145 RFW	391500
2500 m.	PVC 32 PN 16	at 128 RFW	320000
5000 m.	PVC 25 PN 16	at 78 RFW	390000

Transport and Manpower

38% of material costs			1731280
Accessories 10%			455600
Special Protections			500000
15 units	public taps and reservoir	at 302000	4530000
8 units	watering troughs	at 265000	2120000
AKAGERA "C" TOTAL			21508080

MPANGA Water Supply System (NYAMIREMBE Spring)

Spring Catchment			961962 FRW
Earthwork			
1600 m.	hard rock	at 832.20	1317320
12000 m.	varied	at 260.00	3120000
Pipe supply			
3300 m.	PVC 63 N 10	at 324	1069200
2500 m.	PVC 50 N 16	at 310	775000
2500 m.	PVC 50 N 10	at 209	522500
2000 m.	PVC 40 N 16	at 199	398000
2000 m.	PVC 32 N 16	at 129	258000
1500 m.	PVC 25 N 16	at 78	117000
Transport			
38%			1193086 FRW
Accessories 10%			313970
9 units public tap and reservoir		at 302000	2718000
2 units watering troughs		at 265000	530000
Special protection			500000

Nyamirembe Total 13793838

($150,000.00)

Resume Construction Costs Nasho Ranch:

— AKAGERA "B" 2003000

— AKAGERA "C" 21508080

— NYAMIREMBE 13793838

37304918 FRW

(b) Nasho West

Cost Estimates: (Ref: Hydro Bat pre-study No.H 83/36)

Spring Catchments

—	Kabahimba	969600 FRW
—	Gikombe I	951784 FRW
—	Gikombe II	997916 FRW

Spring Catchment subtotal 2919300 FRW

Earthworks

6084 cu. m.	soft material each 75	456305
5128.7 cu. m.	varied material each 101	518001
1236 cu. m.	soft rock each 323	399205
213.3 cu. m.	hard rock each 1104	235483

Earthworks subtotal 1608994 FRW

Pipes supply and installation

0	6654 m PVC 21/25 at 139	924906
1	2538 m PVC 26/32 at 209	530442
2	2496 m PVC 33/40 at 396	988416

12

3	1095 m PVC 35/40 at 290	317550
4	5502 m PVC 44/50 at 415	2283330
5	2376 m PVC 42/50 at 618	1468368
6	4392 m PVC 32/63 at 976	4286592
7	384 m PVC 56/63 at 644	247296
8	1272 m PVC 58/63 at 527	670344
	Galvanized accessories	302076

Pipes Supplies Subtotal			12019320 FRW
Backfilling			
2 units	collection chamber at	159319	2529171 FRW
9 units	valves at	69453	318638
22 units	reservoir at	292784	6441248
22 units	public taps at	38585	848870
	special protections lumpsum		249600 FRW
Nasho west total construction costs			27560218 FRW
			($299860.93)

Total costs of water supply systems

— Nasho Ranch	37304918 FRW
— Nasho West	27560218
Construction cost	64865136 FRW
— Local engineering and supervision (5%)	3234864 FRW
Total Project Cost	68100000 FRW

4. Implementation Considerations:

(a) Execution of Project:

The execution period for the water supply project will be 15 months, while the total estimated costs amount to 68,100,000 FRW ($741,000).

In Rwanda water supply systems are usually operated by one of

three private enterprises: AIDR, Hydrobat, and COFORWA.

AIDR is a Belgian organization that has been implementing water supply systems in Rwanda and Burundi for more than 20 years. They have a good knowledge of the country and of the project area. BGM had them implement the water supply systems in the Gisaka-Migongo project phase I.

Although a non-profit organization, AIDR's present approach is such that it is no longer considered as such by the local government representatives. AIDR has exercised a certain monopoly in that type of business for many years, sometimes to the detriment of the quality and costs of their works. The company is actually in the process of reorganization since the departure of some key personnel who left the organization to form a competing Rwandan company (Hydrobat).

If AIDR is selected for the project, certain aspects would have to be overseen carefully:

- Qualified personnel must be appointed to the project.
- The project must provide for on-site inspection of work during its execution.
- Credits for refugee manpower based upon the "food for work" method or for local manpower based on the "UMUGANDA" (communal work) should be organized by the project, since AIDR is not experienced in using this sort of labor.

Hydrobat is a Rwandan company created in 1982 and involved in water supply systems and building construction. As noted before, it was created in part by former engineers and technicians from AIDR, bringing to it the basic experience needed in this type of enterprise.

At present the job costs tend to be lower with "Hydrobat" than with AIDR, so the company is picking up more and more jobs. If this

company is chosen to do the work, special care should be taken with respect to:

- the logistics of the project
- verification of design and estimated costs
- on-site inspection
- credit for manpower (refugees and local population working on the UMUGANDA model).

COFORWA is a non-profit organization created by Father Bourguet to respond to communal needs for creating low cost water supply systemsthrough the use of communal work and local facilities. Usually, COFORWA provides the logistics, the design, the material component and the supervisory component. Manpower is supplied by communal labor. Once the system is in use, they train two local persons for each distribution line to be responsible for supervising the water system and assuring maintenance and repairs. The organization collects an annual fee from each family and this money is deposited in a special account to provide money for major system repairs. According to representatives from various Ministries, this type of management gives encouraging results.

Because of the large scale and urgent nature of the actual project, COFORWA would need logistical support. For instance, heavy equipment like dump trucks would have to be rented, transportation facilities provided, etc.

The nature of the project allows for its implementation in phases. It would be worthwhile to investigate the possibility of having COFORWA complete the AKAGERA "B" and "C" water supply systems in the refugee camps with the support of the BGM organization, while open bids could be asked for the construction of the balance of the project. The suggestion that COFORWA implement these two water supply systems is based on the fact that it is a non-profit organization oriented toward cooperation and

development through self-help on the part of the population. This aspect is significant when dealing with a refugee resettlement project.

The final design of the water supply system in the refugee camps could start as soon as the location of the villages is defined. The water distribution network will have to be specifically adapted to ranch uses. Africare and BGM will have to establish the necessary general specifications that they want to be included in the project such as the type of public taps and watering troughs required. These requirements will be specified in the bid or contract documents.

To prevent delays in pipe and material deliveries, the Rwandan pipe supplier (SONATUBES) should be given advance notice in order to maintain proper inventory.

Payments to contractors should be made monthly according to progress as specified in the contracts and only on items that have been properly executed and tested.

(b) Quality Control:

Quality control during construction can be assured by a well-organized team, specific contract provisions, staff trained for inspection and tests, and non-payment for deficient work.

Before being buried, all pipes should be inspected to verify proper bedding and depth. Control of concrete construction could be implemented, simply by controlling the quantities of cement used in the project. Water tests should be made on all pipes and reservoirs to insure water tightness before work is accepted and paid.

The Africare representatives will have to emphasize the importance of quality control and support the BGM staff on that aspect. The technicians appointed to inspection and supervisory positions will need some training to insure a good understanding of the requirements and responsibilities of the job.

(c) Maintenance and Operation:

The maintenance system followed by Father Bourguet and COFORWA should be implemented by BGM until a national policy on maintenance and operation of water supply systems is established.

Two local persons for each distribution line would be trained to operate and repair the system. A water fee would cover their salaries and major repair costs. The salaries, even if symbolic, will keep the maintenance personnel from losing interest in their jobs. If well maintained and operated, the spring and gravity water supply systems will prove to be reliable and low-cost.

Water Supply Systems:

Implementation Schedule (Details)

1st July - 30 Sept. (Pre-project)

— Measures of the low flow rate of the springs
(by BGM at the end of the dry season)

1st October - 30 December 1983

— Choose a technical staff within BGM hydraulic services.
(engineer, drafter, field technicans (3)).

— Establish an operational budget for BGM staff.

— Establish the local and refugee manpower availability.

— Determine the general design requirements for the entire project.

— Determine the bidding methods and contract procedures.

— Evaluate COFORWA involvement with the refugee population.

— Test water quality of springs.

— Ask bids for the Nyamirembe system (transition zone).
Studies and construction (3 weeks bidding period).

— Train the field staff on quality control.

— Ask bids for the Nasho West projelct (3 weeks bidding period).

— Sign contract for Nyamirembe system and start construction as soon as possible.

— Once villages are delimited in the ranch area, complete design of AKAGERA "B" and "C" and give contract.

1st Jan''ary - 30 September 1984

— Construction of the Nasho West system (4-5 months)

— Completion of Nyamirembe, AKAGERA "B" AND "C" system (5-6 months).

— In-field inspection and quality control.

— Monthly payment of contractors.

— Measure spring capacity and test water quality.

1st October - 30 December 1984

— Reception of the water supply systems (complete inspection and tests).

— Proceed to repairs (by contractor).

— Payment of contractors — less 10% of contract value that will be held as a one-year guarantee.

— Train local maintenance personnel, collect annual water fees.

1st October - 30 December 1985

— Final inspection.

— Repairs of deficiency by contractor.

— Payment of the amount retained on contractor's due.

— Adjust maintenance and fees according to specific needs.

— Measure spring capacity and test water quality at taps.

D. Natural Resource Conservation

The national shortage of wood, which is the primary source of

energy in Rwanda is acute. It has been estimated (Reintsma 1981:3) that the forested area is equal to only 40% of the area which would be required to fulfil the demand by natural regeneration. The problem in the eastern zone of Rwanda is particularly acute because of the high rate of migration into the area since 1970. Assuming a per capita consumption rate of 1m3, the permanent settlement of 5500 persons in the Nasho area would imply the need for 550 hectares of trees at the natural regeneration rate (Reintsma, ibid). The project will introduce the concept of village woodlots. Each village will maintain a woodlot of 2.5 hectares. In addition, individuals will be encouraged to plant trees around their own homes and agricultural plots.

Trees are needed not only for firewood, however, but to control erosion on the plateas and slopes, retain water for the surrounding plains, and to control erosion and nourish the soil in the pastures and crop fields. They should be selected, therefore, with all these needs in mind. When the acacia trees are killed for the tsetse campaign, for example, they would be replaced where necessary with other leguminous species, rather than the Euclyptus traditionally favored for firewood.

Considerable savings in wood consumption can be achieved by the use of improved cooking stoves as opposed to the traditional three-stone supports (50% according to AIDR estimates).

Potentially much greater savings can be achieved by the use of biogas plants. The conditions for their use are exceptionally favorable for Rwanda. The temperatures are sufficiently high and even, and the people will be grouped into villages instead of living in scattered homesteads, and will possess sufficient cattle for an ample supply of manure.

It is therefore recommended that four pilot digesters - one per zone - be constructed. They should vary in size to accommodate a range of from 1 to 4 families, up to the entire ranch. Each family would be served by a

single gas burner. The digesters would be fed with equal parts by volume of manure and water. Plant wastes would be mixed with the resulting sludge to produce an enriched fertilizer. Once these digesters have proved effective and acceptable, it would be well to consider units large enough to serve an entire village to achieve savings in construction costs.

Refugees themselves should be used as labor to construct these units so that the necessary skills will be present to build additional units once they have proved to be effective and their use acceptable. It will be most important that the long-term economic advantages of the use of such digesters, both in fuel savings and fertilizer, be thoroughly explained to the refugees and that long-term credit at low cost be made available.

(E) Social Analysis:

1. Social, Cultural and Economic Background of the Refugees

No systematic investigation into the background of the refugees has been made at Nasho. Random interviews with some of them confirm an impression that perhaps 90% are Tutsi herders and are without schooling, though other occupations are also represented - for example an electrician, a male nurse, a P.W.D. employee, and a district office clerk were all encountered. Although the refugees come from different regions in southewestern Uganda, they share a common cultural tradition.

Even though herding is their primary interest and principal source of income, all but the wealthiest among them, who used hired labor, are accustomed to growing cultivation of food crops. Women would make beer, whose distribution or sale would be determined by their husbands. The work of cultivation, it would seem, was normally shared by both men and women, with perhaps the larger share, as is the norm in Rwanda, for the women. Manure was used, but only for the poorest soils.

Cattle were not only the major source of wealth, but also of prestige,

and the common goal was to accumulate as many as possible, selling animals only to meet the need for money as it arose. They were also an important source of food in the form of milk, which often was almost the only food for children up to the age of ten.

Cattle were owned primarily by the head of the family and could be sold only with his consent. He would give some to his sons to enable them to marry (bride wealth was primarily in the form of cattle) and set up their own household, though sons could also buy cattle on their own from any money they might earn from paid employment. Women, except as widows, could not own cattle and did not herd them, milk them or sell the milk, though they were responsible for cleaning the milk pails. The cattle were milked in the morning, sent to the pastures during the day without their calves, and returned to the household (rugo) at night, where they were milked again.

Authority in the family is centered in the husband and father and is said to be thoroughly respected, since the son depends on his father for everything. Supposedly still important are the patrilineal descent groups (umulyango) to which the individual families belong. Traditionally these tended to be localized, with families linked through a common male ancestor forming relatively compact settlements of households. The extent to which the living head of such a lineage exercised authority over its members is not clear, though it undoubtedly varied according to circumstances.

In contrast to the traditional situation in Rwanda the Tutsis in Uganda never developed a caste-like dominance of the agricultural Hutus supported by a centralized monarchy, nor did the system of clientage (ubuhake) based on cattle exist.

2. Impact on the Traditions and Values of the Participants:

The limitations of space and ecology at Nasho impose an intensive form of animal husbandry greatly different from the traditional form of pastoralism

practiced by the refugees. Herd size will be severely limited and maintained, once the allowable maximum has been reached, at a fixed level with regular offtake; rotational grazing within limited pastures (which must be improved and maintained) will be required; calves will be allowed to accompany their mothers to pasture to promote their health and growth instead of being kept at home to increase the supply of milk for human consumption; they will be asked to grow fodder and make silage; they will have to learn new agronomic techniques including soil improvement and new plant varieties in the marginal semi-arid conditions of the Nasho region; they will have to engage in the joint management of village manure digesters for gas and fertilizer; they must adopt new forms of wood stoves; they must plant and manage wood lots; and they will be required to live in nucleated communities with joint responsibilities instead of dispersed homsteads with only family or lineage authority.

In other words they will have to change their whole orientation toward cattle, differences in wealth will be largely eliminated, and important aspects of their social and political relations will be altered. Not only will they have to elect and accept the authority, however limited, of village chiefs, but they will also have to learn to deal with the particular local and national political and social institutions of Rwanda.

Great though these changes may appear to be, it does not follow that they will be rejected by the refugees or that they will all be equally difficult to accept. For one thing it is not as if people living a traditional and satisfactory way of life were asked to change it radically in accord with outside goals they neither share nor understand, as seems to have been the case of forced villagization in Tanzania. The refugees are in a desperate situation, recognize quite well that the basis of their former way of life is gone, and seem quite willing to accept whatever their current circumstances demand, provided that they can take some responsibility for their own and

their children's future. The communal form of life, which constitutes a major change from the traditional pattern, seems to have been accepted without serious problems. They have already been living in camps in Rwanda for almost half a year, and have come to appreciate its advantages, particularly with respect to security in a not undangerous natural environment. Experience at the OVAPAM ranches in Mutara, incidentally, whose settlement and ranching pattern have served as a model for the Nasho project, shows that the settlers overcame their initial reluctance to village life and now appear to accept it fully. Leaders for each of the refugee camps were chosen by the residents at the start and this arrangement would seem to have given no trouble.

Discussions with refugees would seem to indicate that they could accept limitations on herd size and rotational grazing, simply because it is obvious to them that given the limited amount of land available, it would be impossible to do otherwise. This does not mean that it would be easy for them to do so. Not only would they lose the prestige associated with large herds, but they would have to learn new ways of managing their finances, including the use of banks, which for most are quite outside their experience.

Improving pastures, though unfamiliar and hard work, should be readily accepted because of its obvious necessity. Growing large quantities of forage for ensilage (in competition with food) and the process of ensilage itself may be more difficult. For one thing the people are not accustomed to working their animals and they have no carts. It is hard to imagine that they could adopt this practice at least until they have earned sufficient money to buy the carts.

Another recommendation of the project - that calves be allowed to follow their mothers to pasture - may also be hard to follow. Indeed it was the only feature that aroused opposition when the project was discussed with refugees. Milk is a basic constituent of the herders' diet, especially for the

children, and since their cattle normally produce little milk (1-2 liters a day on average) they save as much as possible for themselves. Once the condition of the herd is sufficiently improved and improved stock have been substituted, there should be enough milk for both calves and people, but that situation can only be graually reached. The problem will be to convince them of the relative advantage in improving the herd as fast as possible so that they will be willing to forego some of the milk.

It is hard to be certain of the reception that the biogas units will receive. In the abstract the advantages in terms of saving wood, ease of cooking, and having a ready supply of improved fertilizer are easily appreciated. Indeed, the young and educated people we talked to among the refugees were enthusiastic about the prospect. The fact that the people will be living in villages instead of scattered homesteads, will have adequate numbers of cattle, and will be living in a region of Rwanda with relatively high and even temperatures all make this an ideal situation for the introduction of manure digesters. Whether or not they would be accepted in practice, however, will probably depend on how well the pilot units are constructed and how effective they prove to be. It will, furthermore, be essential that the refugees be sufficiently trained to be able to construct them on their own; otherwise, the expense would probably prevent their extension to the rest of the villages in the project.

As for the use of manure in cultivation, although the refugees have had some experience with it, they have not been forced in the past to maximize their production, and they will need instruction in its optimal use and indeed in all aspects of cultivation in this semi-arid and soil-poor region. The experience of recent immigrants and even settlers on the BGM paysannats in the region has been discouraging in this regard. Not only have people

attempted to cultivate soils they should have avoided, but they have planted poorly adapted varieties at the wrong times (IAMSEA 1983 62ff). Close collaboration with ISAR will thus be necessary to ensure the best possible returns while avoiding further degradation of the soils.

While it seems reasonable to expect that the refugees as a whole will be able to adapt to the requirements of their situation, it also seems certain that it will be easier for some than others. Generally speaking, those who are young or have some education will find it easier to change because they have wider knowledge and less commitment to the traditional mode of subsistence. Because of the authority patterns of Tutsi society, however, it will be important to gain the active collaboration of the older and illiterate as well.

It is expected that this collaboration will involve labor as needed on the construction of the water systems and various structures essential to the veterinary services and land clearing and planting activities associated with tse tse fly eradication and pasture improvement. It was suggested by one Rwandan official that the refugees would not be willing to provide free labor on the Rwandan umuganda pattern (half a day per week) since they were not citizens and also because of their temporary status. Refugees interviewed, however, had no objection at all to working on the project for pay, either in cash or for food, and any wages that they could earn would help to alleviate their present depressed economic status.

While every effort should be made to elicit the voluntary cooperation of the refugees, it will be necessary that each family head be required to sign a contract with the managing authority stipulating the conditions of participation, such as limitations on the number of cattle, rotational grazing, and the improvement and maintenance of pastures.

3. Social Services:

A major factor in determining the outcome of the project in addition to

its technical feasibility will be the quality of the social services offered the population and the speed with which they are made available. Schools, health centers, and banks will be essential not only for the health and morale of the refugees, but will be crucial in fostering their adaptation to the demands of their new existence. The future of their children is foremost in the minds of the elder refugees and their attitude toward the project will be conditioned to a large extent by the degree to which they see that future as desirable.

The provision of these services will also be essential for the integration of the refugees into the life of the region. At present there would appear to be no problem with respect to the attitude of the Rwandans toward the refugees. This is probably due in part to a natural sympathy for their plight as well as to the fact that until now they have been kept isolated from the surrounding population. The Burundian refugees,who have been in the country since 1972, are predominantly agricultural Hutus, culturally almost indistinguishable from their Rwandan hosts, and their integration has offered few problems up to this point. These refugees, however, who are for the most part Tutsis, will be practicing a distinctive form of subsistence, and are occupying land which, no matter how poor, is in extremely short supply in Rwanda. The potential for conflict is thus amply present and the most likely ways to reduce it are, on the one hand, to attempt to break down the isolation of the refugees by allowing them to make use of such services as schools and health centers, and, on the other, to make new services and facilities, such as potable water, schools, and medical care, which they also lack, available to the local Rwandan population. As the region develops economically and the road network is improved, the establishment of local markets would also benefit both groups.

An important aspect of the medical services that should be offered is family planning, which is already projected for the region as well as the

country as a whole. The project plans to incorporate as many refugee families as possible, and thus there is no room for expansion. The number of cattle can be limited by contract, but the human population cannot. Any major increase in the population could easily threaten the success of the project and create a class of people permanently dependent on charitable support.

4. Beneficiaries:

The principal beneficiaries will be the herders and their families. This does not mean, of course, that they will be better off than they were before they became refugees, for some were relatively wealthy and that will no longer be possible. The preliminary conditions for the project also mean that those herders selected to join will be those who have the largest number of cattle, whereas those who have too few, for whatever reason, will be excluded. What will be significant for the participants is an ability to support their families and provide an opportunity for their children to prepare themselves for any future opportunities in Rwanda or elsewhere that may arise. Here, of course, the provision of schooling will be crucial.

Certain features of the project would appear to be of special benefit to the women. Reportedly it is the women who are suffering the most from the present conditions of life in the camps at Nasho because of their enforced idleness. The opportunity to cultivate food crops will relieve this situation. The provision of water, improved stoves, and biogas (to the extent to which it is generally available) biogas will greatly ease household labor. A survey on the condition of women in another region of Rwanda (Gregoretti 1983: 15) reports that what they wanted most was improved cooking facilities.

As was discussed in the previous section, some of the surrounding Rwandan population will benefit from the provision of potable water, improvements in roads (though these will not be financed by the project they are provided for in BGM's plans for the region), the establishment of schools

and medical facilities, and a stimulated economy. Everyone in the region, refugees and Rwandans alike, will benefit from the eradication of the tsetse fly and the threat of trypanosomiasis. This population is estimated at 40,000.

5. Potential Problems:

There are a number of problem areas apart from the technical aspects of the ranching and agronomic schemes that will be critical for the success of the project and which for the sake of convenience may be divided into two groups — those connected with starting it up and those affecting its operation.

It is essential that the present herd at Nasho be reduced drastically to a manageable number, but no clear policy to achieve that end seems to have been adopted. The design team has recommended that an initial reduction be made by testing the cattle for tuberculosis and brucellosis. Sample tests for the former on cattle entering the country from Uganda indicated an incidence of 30%. It is not known whether this recommendation will be followed. If it is, little opposition should be expected from the refugees, because they are aware of the necessity of destroying tubercular cattle and have not been compensated for it in the past. Those with brucellosis could, of course, be sold for meat.

Only when this has been done could one proceed on a reasonable basis to reduce the herd further and to select the families to participate. A certain degree of flexibility should be adopted. Some families should be allowed to enter with holdings somewhat above the standard ten animal units and some with fewer animals, provided that they reach the norm within a reasonable period of time. It should also be possible for sales among the refugees to serve the purpose of evening out the holdings. In any event the whole process of herd reduction will be crucial to the smooth implementation of the project and the full participation of the refugees in it should be encouraged.

Once the particular families have been chosen they will have to be

grouped into collectivities of approximately twenty families each, a process which should be governed largely by the wishes of the people themselves taking into consideration existing links of kinship and friendship. They will in turn have to be assigned to the individual ranches, which though roughly equal in area will inevitably vary in desirability. Here it would be wise to make the assignments by lot.

The selection of a site for the pilot biogas generator should most probably be made on the basis of expressed interest on the part of the village groups and the apparent skills of individuals who might be put in charge of it. If more than one village appears to be a likely candidate, the choice should be made by lottery. In any event, the villagers themselves should be involved in the construction of the unit so that they could acquire sufficient skills to duplicate it in the other villages.

The chief operational problems with which the project may be faced have to do with the effectiveness of BGM management and of the extension personnel for both livestock and agronomy. Unfortunately there have been serious problems with both in the past, and it will be necessary to monitor these operations carefully. Common weaknesses of extension agents are that their training is poorly adapted to the practical conditions faced by the people with whom they must deal and that they are seen as outsiders without any personal stake in the advice they give. For these reasons every effort should be made to find people among the refugees themselves for training.

Generally speaking it is likely that the first year or two of the project will be difficult. Because the project has been designed to include the maximum number of refugees, there is little margin for error. The carrying capacity of the land, for example, is calculated on the basis of improved pastures and this cannot be immediately accomplished. It will be necessary, therefore, to continue material support for the refugees during this period.

Whatever problems may arise, they will be most easily overcome by thorough consultation with the refugees. It is essential that they be made fully aware of the nature of the project and its constraints and that they come to regard it as their own. The temptation to regard the refugees as essentially a captive population who should do what they are told would be fatal. This implies thorough discussion with them before the project starts and regular consultation through the elected chiefs of the different villages subsequently. The latter should be used not merely as conduits for instructions from the project administration, but they should also serve as representatives of their villagers' concerns and needs.

F. Economic Analysis

The major thrust of the project is to increase the self-sufficiency of the refugees by increasing their capacity to feed themselves and by providing them with a means of generating a regular income. Additionally, the project will provide infrastructure that will improve the health of the refugee and surrounding Rwandan population (water supply systems, tsetse fly eradication, construction of health centers).

The most readily measurable benefits to the project are the increases in meat and milk production due to the investments in animal health care, pasture improvement, eradication of the tsetse fly, and adherence to the rotational grazing system. Specifically, it is assumed that live weight of cows and bulls will increase over the life of the project from 200 kg to 275 kg and from 250 kg to 325 kg, respectively. The reduction in the incidence of brucellosis and other diseases will increase the calving rate from 50% to 65% by year 4 of the project. Milk production will increase to 5 liters per day, whereas the number of days per year that the cows give milk will increase

from 100 to 150. The improved quality of the meat will bring a premium of 10 FRW per kilogram over the price of the present quality of meat. Tables 3 and 4 present the revenues with and without the project, respectively. The net benefits to the project are presented in Table 7. The major outlet for both live animals and milk will be the La Rwandaise operation. However, a certain number of animals will be slaughtered locally or walked to the Kigali slaughter house. As milk production increases a small dairy operation similar to that in the OVAPAM project (see Section I.2) should be considered.

All BGM personnel and training costs, the entire costs of the tsetse fly eradication program, construction of the vet center, dip tanks, cattle squeezes and staff housing, and vehicle purchase, operation and maintenance have been assigned to the benefits enumerated above. This figure may be considered conservative, as these investments are likely to result in improved animal health, and hence improved production for the entire region. Additionally, the tsetse fly eradication program will eliminate sleeping sickness that presently affects both refugees and Rwandans, and has been a major obstruction to the development of the region. Beyond the life of the project, costs include the cost of personnel, equipment and supplies for the veterinary centers and maintenance of infrastructure. Without the project, BGM's activities are assumed to be constant at a level substantially lower than that with the project. Costs with and without the project are presented in Table 4 and 6, respectively. Table 5 presents the incremental costs of the project.

The net benefit stream, the difference between the incremental benefits and the incremental costs, is presented in Table 7, and is used to calculate the internal rate of return to the investments in livestock production.

As the impact of the investments is expected to take effect in the short and medium term to achieve project purposes, a relatively short time frame of 12 years is assumed for IRR calculations. The rate of return for 12 years is 24.12%. To determine whether the project will yield adequate returns under various assumptions, a sensitivity analysis was performe d. Assuming that all project costs increase by 15%, holding without project costs constant, the rate of return is 18.2%. If all project-induced revenues decrease by 15%, holding without project revenues constant, the rate of return is 16.62%. In a worst case scenario, wherein revenues decrease by 15% and costs increase by 15%, the rate of return is reduced to 11.34%.

Each family in the project will be expected to stablize its herd at a level of 10 animal units. At this level, with improved animal care, the annual offtake will be raised to 18.2% by year 8, when the herd characteristics stabilize. In that year, an average of 2.7 animals will be sold by each family. By year 8, each family will be selling an average of 2,535 liters of milk. Income will be 108,200 RWF in that year. Assuming an annual average cost for veterinary services of 1,000 FRW per head the net returns to land and labor are 93,350 FRW, or $1,015. Without the project, a family with a herd of similar size could expect to earn 11,059 FRW, or $ 120.

Due to the difficulty of quantifying benefits to rural water supply and health infrasturcture, water supply systems must be cost effective when compared to alternative system designs. Table 2 compares various Rwandan rural water systems. Though water costs, including capital and recurrent costs, are lower for wells than for spring/gravity distribution systems, the water costs, exclusive of capital costs, are comparable, and much lower than other distribution systems involving springs, pumping or gravity flow. Furthermore, the technologies of gravity flow systems is such that the infrastructure can be

maintained by the beneficiaries with a minimum of training, whereas the costs of maintenance can be supported through user fees.

The major benefit is improved health of the beneficiaries due to the increased availability of potable water and the time saved, primarily by women and children, for not having to fetch water. At present, women and children of each family must spend several hours per day making trips of up to 3 kms. each way to fetch water. The labor saved could be made available for other productive activities.

Identifying the health impacts due to improved water quality and improved access to greater quantities of water, as well as access to health care facilities and related effects upon income is very difficult. Without extensive and costly baseline studies and followups, quantitative evaluation is not possible and it can only be assumed that improvements in quality and quantity of water and health care are beneficial.

One way of determining the perceived benefits of water to a population is to determine people's willingness to pay. Though this is difficult to determine empirically, due to cultural biases against paying for water and due to limited cash available to each family, the project anticipates introducing fees for water use. Though the final fee structure must await GOR policy decisions, it is anticipated that an annual fee will be assessed based upon projections of repair and maintenance costs of the system. For each system these costs will be divided among the families using the system.

TABLE 3
REVENUES WITH PROJECT

YEAR	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8-20]
1.TOTCOWS	2520	2420	2300	2260	2180	2080	2080	2080
2.#BULLSSLD	220	200	460	440	480	560	540	580
3.#COWSSLD	740	620	360	380	420	480	460	500
4.WT BULLS	250	275	300	325	325	325	325	325
5.WT COWS	200	225	250	275	275	275	275	275
6.CALVRAT	.50	.55	.60	.65	.65	.65	.65	.65
7.MLKDYS	100	120	140	150	150	150	150	150
8.MLK/DY	2	3	4	5	5	5	5	5
9.TOTMT	203000	194500	228000	247500	271500	314000	302000	326000
10.TOTMLK	252000	479160	772800	1101750	1062750	1014000	1014000	1014000
11.PRCMT	45	50	55	55	55	55	55	55
12.PRCMLK	25	25	25	25	25	25	25	25
13.VALMT	9135000	9725000	12540000	13612500	14932500	17270000	16610000	17930000
14.VALMLK	6300000	11979000	19320000	27543750	26568750	25350000	25350000	25350000
15.TOTVAL	15435000	21704000	31860000	41156250	41501250	42620000	41960000	43280000

TABLE 4
COSTS WITH PROJECT

1.PERSONNE	22282584	14557068	10090836	8081832	8280000	8280000	8280000	8280000
2.COMDTIES	32858444	2699096	2525032	1089832	4600000	2300000	2300000	2300000
3.CNSTRCTN	22275542	13172008	200008	200008	460000	460000	460000	460000
4.TRAINING	1840000	920000	0	0	0	0	0	0
5.TOTCOST	79256620	31348172	12815876	9371672	13340000	11040000	11040000	11040000

TABLE 5
REVENUES WITHOUT PROJECT

YEAR	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8-20]
1.TOTCOWS	766	766	766	766	766	766	766	766
2.#BLLSSLD	153	153	153	153	153	153	153	153
3.#COWSSLD	100	100	100	100	100	100	100	100
4.WTBULLS	250	250	250	250	250	250	250	250
5.WTCOWS	175	175	175	175	175	175	175	175
6.CALVRAT	.50	.50	.50	.50	.50	.50	.50	.50
7.MLKDYS	100	100	100	100	100	100	100	100
8.MLK/DY	2	2	2	2	2	2	2	2
9.TOTMT	55750	55750	55750	55750	55750	55750	557500	557500
10.TOTMLK	76600	76600	76600	76600	76600	76600	76600	76600
11.PRCMT	45	45	45	45	45	45	45	45
12.PRCMLK	25	25	25	25	25	25	25	25
13.VALMT	2508750	2508750	2508750	2508750	2508750	2508750	2508750	2508750
14.VALMLK	1915000	1915000	1915000	1915000	1915000	1915000	1915000	1915000
15.TOTVAL	4423750	4423750	4423750	4423750	4423750	4423750	4423750	4423750

TABLE 6
COSTS WITHOUT PROJECT

1.PERSONNE	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
2.COMMITIES	500000	500000	500000	500000	1604000	500000	500000	500000
3.CNSTRCTN	184000	184000	184000	184000	184000	184000	184000	184000
4.TOTCOST	1684000	1684000	1684000	1684000	2788000	1684000	1684000	1684000

TABLE 7
INCREMENTAL NET BENEFITS TO PROJECT

INCREBEN	11011250	17280250	27436250	36732500	37077500	38196250	37536250	38856250

INCREMENTAL COSTS WITH PROJECT

INCRCST	77572620	29664172	11131876	7687672	10552000	9356000	9356000	9356000

NET BENEFIT STREAM

BEN-CST	-66561370	-12383922	16304374	29044828	26525500	28840250	28180250	29500250

Notes on Tables 3,4,5 and 7

LINES

1 and 16 - TOTCOWS = total number of cows in herd.
2 and 17 - #BLLSSLD = number of bulls sold from herd.
3 and 18 - #COWSSLD = number of cows and heiffers sold from herd.
4 and 19 - WTBULLS = average weight of bulls sold (kg.)
5 and 20 - WTCOWS = average weight of cows and heiffers sold (kg.)
6 and 21 - CALVRAT = calving rate of cows in herd.
7 and 22 - MILKDYS = number of days/yr cows give milk.
8 and 23 - MILK/DY = liters of milk produced for sale per cow per day
9 and 24 - TOTMT = total weight of meat (on hoof) = (2X4)+(3X5)and(17X19)+(18X20)
10 and 25 - TOTMLK = milk produced by herd for sale = (1X6X7X8)and16X21X22X23)
11 and 26 - PRCMT = price per kilogram live weight.
12 and 27 - PREMLK = price per liter.
13 and 28 - VALMT = value in Rwandan francs of meat = (9X11)and(24X26)
14 and 29 - VALMLK = value in Rwandan francs of milk = (10X12)and (25X27)
15 and 30 - TOTVAL = value of meat and milk production = (13+14) and (28+29)
31 - INCREPEN = incremental net benefits = value of production with project minus value of production without project = (15-30)
32 and 38 - PERSONNEL COSTS
33 and 39 - EQUIPMENT AND SUPPLY COSTS
34 and 40 - CONSTRUCTION COSTS
35 - TRAINING
37 and 46 - TOTAL COSTS = (32+33+34+35) and (38+39+40)
43 - INCREMENTAL COSTS = 37-42
44 - NET BENEFIT STREAM = 31-43

200 AU HERD : 200 HECTARES

YEAR	0*	1	2	3	4	5	6	7	8-20
TOTAL ANIMAL UNITS	200	209	198	200	200	200	200	201	202
TOTAL NO. ANIMALS	271	289	272	282	284	288	291	293	297
Breeding bulls	3	3	3	3	3	3	3	3	3
Breeding Cows: opening stock		126	121	115	113	109	104	104	104
- deaths		13	10	8	7	4	4	4	4
- culls		30	30	15	17	18	16	16	16
SUBTOTAL		83	81	95	89	87	84	84	84
+ heiffer transfers		38	34	20	20	18	20	20	20
Closing stock	126	121	115	115	109	149	104	104	104
Female calves: births		32	30	32	34	33	34	34	34
- deaths		5	5	5	4	4	3	3	3
Closing stock	26	27	25	27	30	29	31	31	31
Heiffers 1-2 years		26	27	25	27	30	29	31	31
- deaths		3	2	2	2	1	1	1	1
Closing stock	46	23	25	23	25	29	28	30	30
Heiffers 2-3 years		46	23	25	23	25	29	28	30
- deaths		5	2	2	1	1	1	1	1
- culls		3	1	1	1	1	1	1	1
SUBTOTAL		38	20	22	21	23	27	26	28
- sales		4	0	2	1	2	7	6	8
transfer to cows	38	34	20	20	20	21	20	20	20
Male calves: births		32	30	32	34	33	34	34	34
- deaths		5	5	5	4	4	3	3	3
Closing stock	12	27	25	27	30	29	31	31	31
Young males 1-2 yrs: opening stock		12	27	25	27	30	29	31	31
- deaths		1	2	2	2	1	1	1	1
Closing stock	12	11	25	23	25	29	28	30	30
Males 2-3 yrs. opening stock		12	11	25	23	25	29	28	30
- deaths		1	1	2	1	1	1	1	1
Closing stock	8	11	10	23	22	24	28	27	29
Sales cows		30	30	15	17	18	16	16	16
- heiffer culls		3	1	1	1	1	1	1	1
- heiffers		4	0	2	1	2	7	6	8
- males		11	10	23	22	24	28	27	29
Total sales		48	41	41	41	45	52	50	54
Sales per family		2.4	2	2	2	2.3	2.6	2.5	2.7
Technical Indices									
Birthrate	50	50	50	55	60	60	65	65	65
Mortality rate (general)	10	10	8	7	6	4	4	4	4
Mortality rate (calves)	16	16	15	14	13	12	10	10	10
Heiffer culls	5	5	5	5	5	5	5	5	5
Offtake as percentage if total no animals		(16.6%	15%	14.5%	14.4%	15.6%	17.9%	17.1%	18.2

* Present herd structure

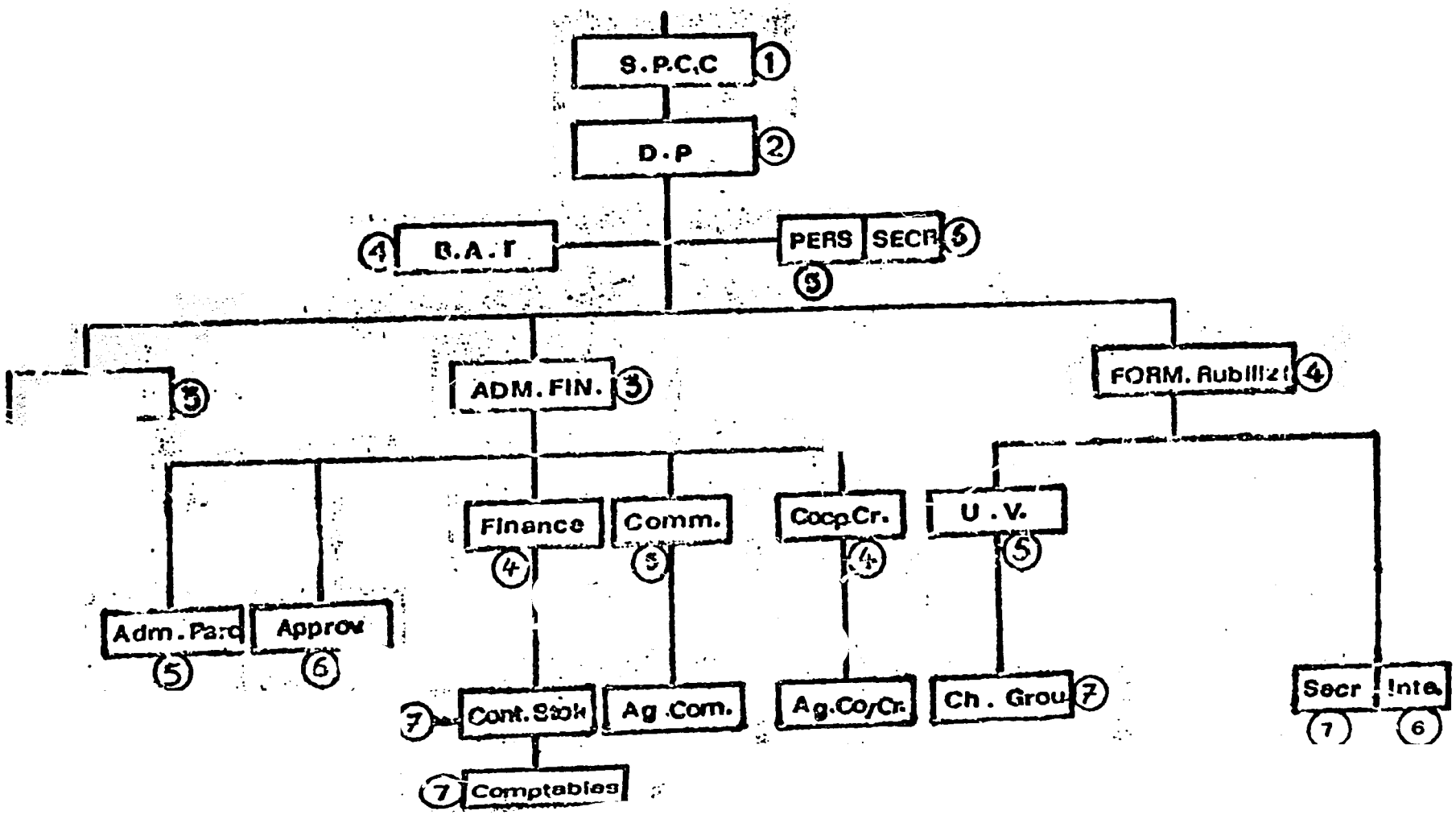
(G) Administrative Considerations

At present the Ministry of Social Affairs and Community Development is in charge of the refugee settlement at Nasho, with food, clothing, and medical support provided by the United Nations High Commission for Refugees (UNHCR) and the Rwandan and International Red Cross. Veterinary care is supplied by the Bugesera, Gisaka, Migonogo (BGM) Regional Development Project, which is headed by a Project Coordinating Committee, whose members are the Ministries of Agriculture and Livestock Development, Health, Social Affairs and Cooperative Development, Public Works, and Interior.

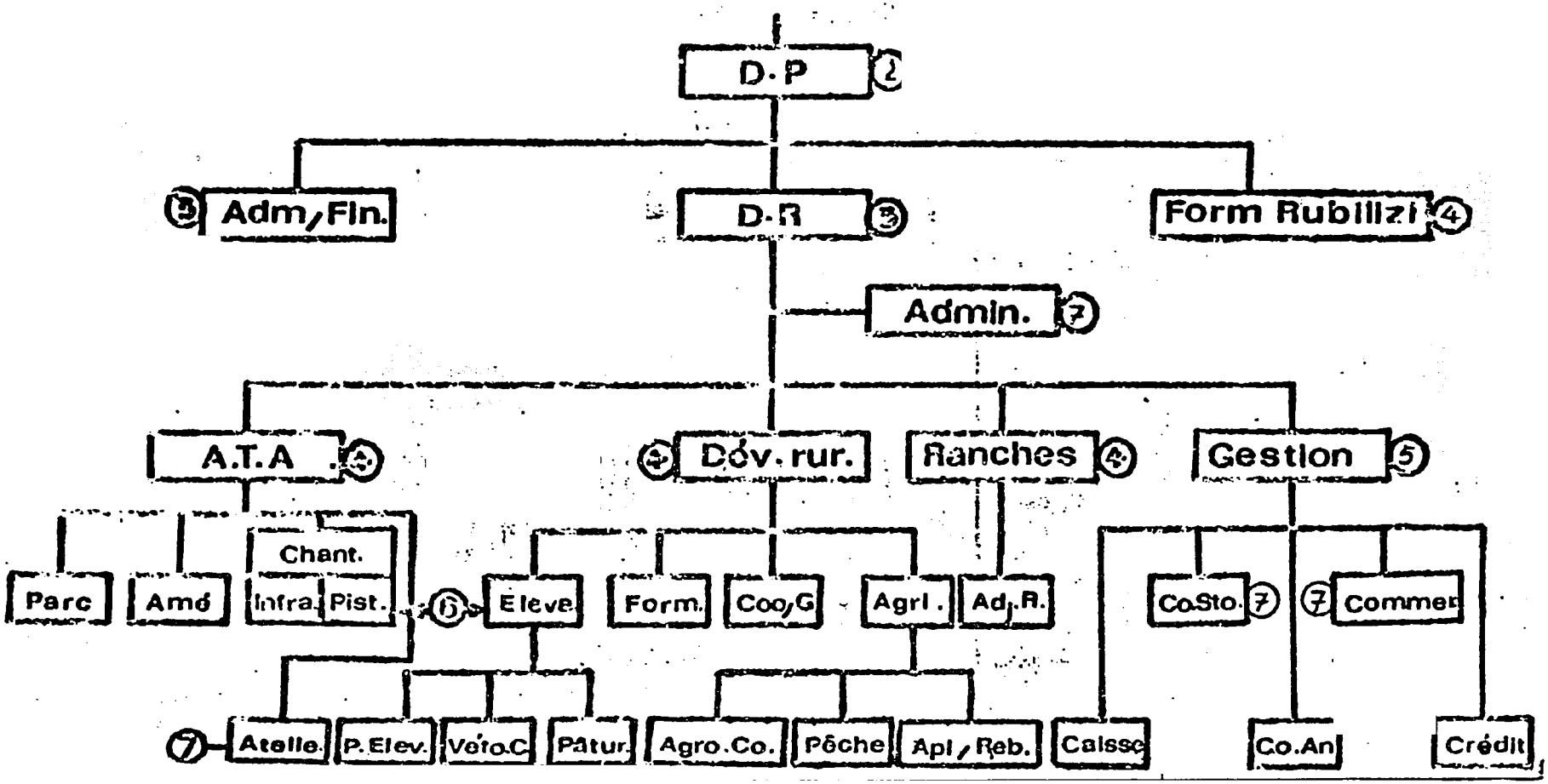
UNHCR sees its role as providing support on a gradually reducing basis until the refugees are able to support themselves and are more or less integrated into the region as a whole. It also sees itself responsible for supplying schools, but funds for their construction have not been included in its budget for 1984. It wants to put in schools at the same time as medical facilities, but the GOR has not yet been willing to commit itself to schools for the refugees since their construction would imply an acceptance of their long-term presence in Rwanda. Although the GOR now appears to be leaning toward such a decision, they would want any schools constructed to be located where they could be used both by Rwandan citizens and the refugees and medical facilities to be incorporated into general development centers (CCDFP), which would also serve the same two groups. Not knowing the location or size of these facilities makes it difficult to budget for their construction or to ensure their early establishment. The national program for schools and development centers is furthermore beset with serious problems of finance and staffing.

The implementing agency, BGM, is an organization with development experience since 1976. It is engaged in all phases of livestock development, the improvement of rural services, research in crops designed for hot dry areas

ORGANIGRAMME DE LA DIRECTION



ORGANIGRAMME REGIONAL



as well as the training of veterinary staff. BGM is already functioning in the project area monitoring the refugees, supplying veterinarian support, water and road development, and trained personnel in tsetse eradication.

Although BGM is presently lacking sufficient trained veterinarian personnel, they are rapidly closing the gap by acquiring graduates of the school at Rubili. The first class of 56 students graduated in January 1982 were placed in the BGM and other development projects. The continuation of the school, certified by the Ministry of Primary and Secondary Education, has been assured through financial support by the World Bank through 1984. The GOR has given assurance that it would take all administrative and financial measures necessary to continue the functioning of Rubili after 1984.

The BGM organization has had previous experience in spring-fed and gravity-flow water supply systems in this area and will function as the coordinating agency of this aspect of the project. BGM's hydraulic services, in concert with the Africare representative, should prepare the general outlines of the project, ask for bids, prepare contracts, supervise and inspect the works and be responsible for the reception of the water supply systems.

The project will be operated by BGM under a separate financial account. Ultimately the region will presumably come under the jurisdiction of the burgermaster of Rusumo, within whose territory Nasho lies, though a timetable for this process has not yet been fixed. Obviously, a major concern for Africare will be to see to it that its funds are expended expeditiously for the project itself and not lost among the multiple activities and interests of BGM and its controlling ministries.

The Chef du Ranch will report on a monthly basis all financial and programmatic activities of the previous month. Reports will be due by the fifth working day following the end of the month. These reports will be attached to the program manager's monthly report, which will include the

following: details on travel and meetings, activities under the project, perceived constraints.

A formal project report will be written by the project manager on a quarterly basis for submission to Africare/W and, subsequently, to USAID. The report will follow the Project Reporting Guidelines of the Africare Organization and Goals Manual.

Staffing

The project manager will be an Africare technician stationed in Kigali. The Project Manager will be responsible for receiving fund transfers from Africare/W and will disburse funds to the implementing agencies based upon established work plan receipts for previously advanced funds and site inspections by the project manager and the other technical advisors.

BGM will appoint a Chef du Ranch and assistant, both educated to the A2 level. They will be posted at the Nasho Ranch Center between zones 1 and 2. There will be 11 veterinary agents, trained at an A3 level, assigned to the project. This is based on BGM's estimate of needing one agent for each 500 head of cattle. Thus there will be approximately one agent for each two ranches. They will be assigned to the three centers between zones 1 and 2, 2 and 3, and 3 and 4. Two agricultural extension agents will be assigned to the project and posted at the center between zones 2 and 3 and between zones 3 and 4. Chauffeurs and other auxiliary personnel and other workers in the tsetse fly eradication program and the pasture improvement program will be provided by BGM.

H. Environmental Considerations

A. Effects of Project Activities on the Environment

1. Improvement of Pastures

To improve the pastures, tree and shrub removal will be necessary.

However, denuding of the land will not occur due to extension, planting of legumes and the establishment of permanent living fence. The legumes will add nitrogen to the soils, thus aiding the growth of the grass and increasing the protein intake of the cattle.

The establishment of permanent living fences will help prevent soil erosion by interrupting the flow of wind across the pasture. The rotational grazing will also assist in this because the ground will always have some grass or stubble cover on it.

The concentration of cattle could be quite a detriment to the area because the number of cattle far exceeds the present carrying capacity of the pastures. This is to be corrected by reducing the cattle numbers, improving the pastures, providing extra feed during the dry season and controlled grazing of the pastures.

The manure provided by the cattle when applied to pastures, crop and forage land will improve the permeability of the soil and its fertility.

The tsetse eradication program will not be harmful to the environment. This has been assured by tests made at the center of Research of Phytopharmacology of Gembloux in the Laboratories of Toxicology at the University de Ghent, which state that the methods and materials used are not harmful to the environment.

The eradication of the tsetse fly will improve the health of the people and the cattle in the area by eliminating trypanosomiasis.

The installation of water supply systems will also improve the health of the people and the cattle. At present many of the refugees and settlers are drinking polluted water out of the lakes and the river. The introduction of potable pipe-borne water will eliminate the possibility of the people and cattle of infesting pathogenic organisms and reduce their exposure to disease vector breeding sites.

The reforestation program will control water/soil erosion by preventing run-off and wind erosion.

The biogas program will reduce the amount of wood consumed. Manure will be used to produce the gas that will be used for cooking and heating water. The remaining waste can be used as fertilizer.

The cultivation practices used to produce the crops and the forages for the cattle will be similar to the practices now being used by the Rwandan farmers. The major implement of cultivation is the hoe. This eliminates the possibility of large tracts of land being exposed to rain and sunshine over long periods of time without some cover on them.

B. Conclusions

1. Clearing and improvement of pastures

Impact rating — negative. The planting of legumes and the establishment of permanent living fence will overcome any detrimental effect the removal of shrubs might have

2. Concentration of cattle

Impact rating — negative. The reduction of cattle numbers bringing into line the number of cattle with the hectares available will reduce the possibility of overgrazing the area. The manure produced by the cattle, applied to the fields and producing biogas will overcome any negative effect presented by the cattle. The controlled grazing of the cattle will be a plus to the environments imact.

3. Tsetse eradication

npact rating — negative. The health improvement of both the opulation and the cattle as a result of the elimination of the etse fly will be an improvement in work done and gains in meat and milk production.

4. Installation of potable water supply systems

Impact rating — negative. This has to be a plus because so many people and cattle are now drinking polluted water and are going to disease vector breeding sites to get the water.

5. Reforestation and biogas program

Impact rating — negative. The reforestation program will restore the natural resources and the biogas will reduce the consumption.

6. Cultivation Practices

Impact rating — negative. The practices used in combination with the other practices being used will be an improvement to the environment.

Overall, the environmental impact rating will be negative. Continued evaluations will contain an environmental statement to strengthen this statement.

I. Related Activities

1. Relevance to Third Plan

The Third Five Year Plan for Economic, Social and Cultural Development, 1982-86, issued in September of 1982, discusses the role of both the livekstock sector and the development of water resources as they contribute to Rwanda's development.

(a) Livestock

The decrease in area and quality of pasture has been a serious constraint to meat and milk production and the national cattle herd has been decreasing at a rate of about 1.5% per year since 1971. The Third Plan calls for decreasing this rate to 1% and to maintain production through an increase in individual performance. Livestock raising must make use of more stable

116

systems, and improved feed and health care for the animals. Attention must be given to the organization of production, conservation and transport facilities to allow for better access by consumers in both rural and urban sectors to protein in the diet. This project places great emphasis on increased efficiency in livestock production and will result in compensating for land lost to livestock production in other areas due to population pressures.

(b) Water

At present only 37% of the total population benefit from a source of potable water — 41% of the urban population and 36.8% of the rural population. An estimated 2.7 million people still lack a potable water source in the rural sector. Kibongo Region is cited as one of the priority areas particularly poor in surface water.

Existing systems are gradually falling into disrepair due to a lack of maintenance especially systems requiring pumping. Principal problems for rural water supply development include:

- a lack of financial resources in the communes, which are thus totally dependent upon exterior aid;
- a lack of qualified technicians that would allow the communes to put together dossiers to present to donors for funding;
- a lack of technicians properly trained in maintenance.

To remedy this situation, the Plan proposes that:

- adequate funds be budgeted through competent organizations to maintain water works;
- the population be made aware that they are responsible for the works put into their sector. Beneficiaries should contribute the bulk of the labor for new works and should maintain the systems under Umugnada.

The project will emphasize the involvement of the beneficiaries in both construction phase and the maintenance aspects of the water supply system, both through the contribution of labor and by assessing an annual user's fee.

2. OVAPAM

OVAPAM, the Agro-Pastoral Project in the Mutara Region, has been financed by the World Bank since 1974, and contains both an agricultural division and a livestock division. (See Organigramme, page 85a). The Pastoral Program has served as a model for the livestock component of the Refugee Resettlement Project at Nasho, and contains the following components:

(a) Veterinary Support

- Personnel
- Material
- Equipment
- Tick Control

(b) Range Management

- Rotation of pastures
- Pasture improvement

(c) Tsetse Eradication

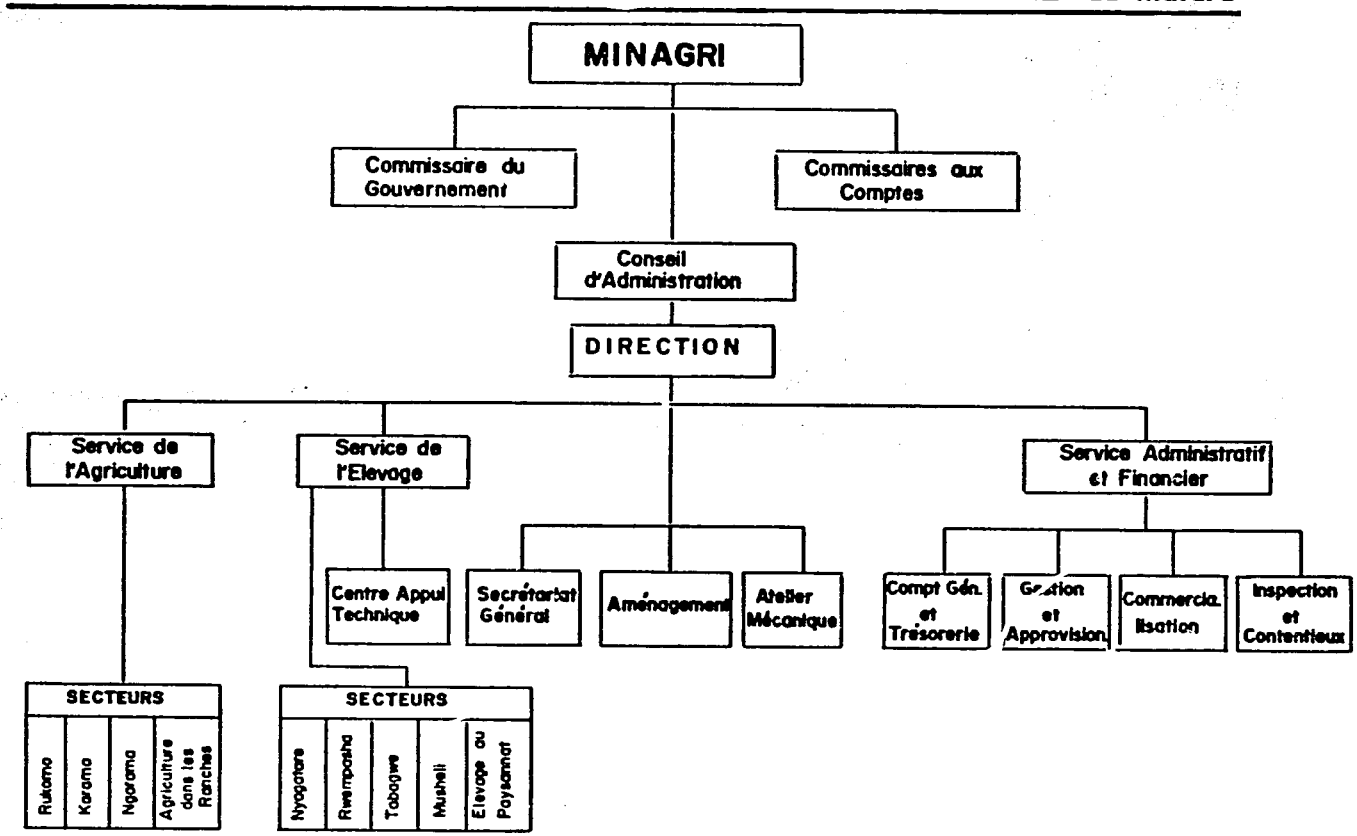
- Chemical spraying
- Elimination of the fly's habitat
- Trypanosomiasis treatment and prophylaxis

(d) Supply of water to the cattle and ranchers

The whole area of 35,800 ha. has been divided into 4 sectors and these sectors divided into two sub-sectors, making 8 divisions in all. There are 74 ranches, each ranch comprising an average of 20 families, with an average of 400 head of cattle on about 480 ha.

Each of the 8 sub-sections has a veterinary center with a dipping tank, squeeze chute, equipment and materials. Each center has 8 regular day

ORGANIGRAMME DU PROJET AGRO-PASTORAL du Mutara



workers and when more labor is needed as many as 9 contract laborers may be employed. Each center is operated by a senior veterinary officer and 2 assistants.

On the ranches, the cattle are taken out each day to graze, returning each night to the owner's compound. The calves remain in the villages all day and are the responsibility of the women and young boys. The cows are milked morning and night, with the calves allowed to suck to start the flow of milk, forced away and later allowed to suck the remaining milk.

Each of the 20 families elects a chief to represent them at project meetings, and to be responsible for pasture rotation, fencing, pasture improvement, etc. A schedule has been established for meetings between the chiefs and the veterinarians.

A complete health program has been established that includes regular tick control, internal parasite control, vaccination against black leg and Anthrax and trypanosomiasis treatment and prophylaxis. Specific fees are charged each herder for treatments given (see schedule, page 86a). Both the herder and the veterinarian have records of each treatment given to each numbered animal. All cattle are tested against TB and brucellosis. Those that are positive to TB are immediately destroyed and those with brucellosis are sold to the butcher. A calfhood vaccination program has not been implemented, because it is claimed to be too expensive. Rinderpest vaccinations were given all cattle as they came across the border. This vaccination will be given the unvaccinated calves once in their lifetime.

Cattle from both the ranchers and the settled farmers are bought at Nyagatare by butchers and walked to the slaughter-house in Kigali. There is a a slaughter house at Nyagatare which is not being used because:

1. the electricity there is not sufficient to operate a cold room;
2. there is not a reliable demand for meat locally;

COUTS DES INTERVENTIONS VETERINAIRES A PARTIR DU 1er FEVRIER 1983.

1. Inspection des viandes :	- grands animaux	200 FRW
	- petits animaux	100 "
2. Détiquage :	- adultes - - - - Spray - Ticks - -	120 "
	- jeunes (6 - 12 mois) - - - - - -	60 FRW/an
3. Vermifugation:	- adultes - - Worms - - - - -	120 FRW
	- jeunes - - - - - - - - - - - -	60 "
4. Traitement trypanocide	- - - - - - - - - - -	100 "
5. Traitement aux antibiotiques et aux sulfamidés		120 "
6. Intervention chirurgicale	- - Surgery - - - -	300 "
7. Vaccination anticharbonneuse	Blackleg - Anthrax	20 "
8. Vaccination antiaphteuse	- - Foot + Mouth disease	100 "
9. Divers :	- - - - - - - - - - - - - - - - - - -	50 "

10. Autres interventions : au prix coûtant en considération des coûts des produits utilisés.

11. Saillie	- - - - - - - - - - - - Covering service - - -	100 FR

Fait à Nyagatare, le 24 janvier 1983

Le Directeur des Renches

Dr NSENGIYAREMYE Dismas

Pg - 160

111

3. they do not have a refrigerated truck with which to transfer the carcasses to Kigali (8,000,000 FRW).

Milk is collected daily from both the settled farmers and the ranchers, delivered to a central station at Rukumo where it is filtered, pasteurized and cooled. When butter is to be made the cream is separated by a hand separator and the butter is made in a hand churn. The butter, whole milk, skimmed milk are sold locally. A generator supplies power for refrigeration.

The project is now looking for a refrigerated truck to transfer the milk and milk products to Kigali. There is already a dairy outlet in Kigali supplied by another project and a detaileld marketing study has not been done. Given this, and their reluctance to support a parastatal's commercial activities, the World Bank has already refused to fund this purchase.

The pastures are being improved by killing the acacia trees, uprooting shrubs and hoeing out the cymbopogo. Euphorbia is planted as fences to further divide the pastures into four paddocks per ranch. Work for all of this is organized by the village chiefs; however, the project will supply extra labor when needed.

It appears that full pasture rotation and improvement is not being practiced. Pastures were found in various stages. In some only the trees were killed or the shrubs removed; in others legumes were interplanted. It is planned to improve pastures by planting strips of stylosanthes and centrocema.

We observed pure stands of chloris gayana, brachiaria and centrosema planted by the technical support division. These had been cut and fed green to stall feed animals by the settled farmers. Seeds will be collected to be used in improved pastures.

The technical department was engaged in producing Sahiwal-Ankole bulls to be supplied to the ranchers and the settled farmers. Records are kept of the growth rates of the crosses. This cross has proven capable of increasing

both milk production and growth rates.

A study of the tsetse fly was made, followed by an eradication program. The proximity of the Akagera Park to the project site allows for reinfestation, so the eradication program will continue using chemical sprays, tree killing, chemical traps and extraction of the small bush. A buffer zone must eventually be established between the park and the site to protect against reinfestation. Crop cultivation and pasture improvement such as extracting Acacia trees and brush will contribute to maintaining such a zone.

Nothing has been done about delivering water to the ranchers and their cattle. They depend upon the river which is somteimes five km. away.

Each family on the ranches is given 2 ha. on which to grow food crops and will be given 1.5 ha. on which to grow fodder. It is not known how the fodder crops will be harvested, i.e. made into silage, grazed, or cut and fed.

3. BGM

The Bugesera Gislaka Migongo Project - Phase I was funded by the World Bank from 1977-1982, and was designed to develop essential infrastructure and improve rural services in the communes of the project area.

The first phase did not accomplish its goals in production, but did establish infrastructure and train a cadre of technical and management staff. The second phase, 1983-1987, will build on the first phase to dlevelop services for the rural population in the area, initiate farming systems research, improve roads, and strengthen the extension services. The major elements impacting upon the Refugee Resettlement Project are:

(a) Support of Rubilizi Training Center - the center will continue to provide assistant-level (A3) zoo technicians, of which the Refugee Resettlement Project will employ 11. Rubilzi is the only school of its kind in Rwanda. The first class of 56 students graduated in January of 1982 and have already been

placed in BGM and other development projects, replacing underqualified veterinary assistants.

(b) BGM plans to construct 14 kilometers of new road, and improve 124 kilometers of existing road in the Gisaka Region. The road passing through the Refugee Resettlement Project site is to be improved along its entire length from Rusumo to Mulindi.

c. The Rusumo Ranch is to be set up as a self-sustaining operation and is to produce quality heiffers for distribution to farmers and the production of quality bulls for the stud services at the veterinary centers.

d. The BGM extension service plans to distribute to the farmers fuelwood and leguminous treecrop planting material for planting. The Refugee Resettlement Project will provide funds to expand the capacity of the nurseries to provide seedlings.

V. EVALUATION

An evaluation will be done four times during the life of the project. The first is planned for January 1985, about one year after the project gets started. At this time the project should have overcome the starting up problems and any necessary changes in implementation can be identified.

This evaluation should be a full scale evaluation with a team from Africare and representatives from BGM, MINASODECO, AID and UNHCR. All of these are necessary to make a proper evaluation and approve any changes that might be necessary.

The evaluations in January 1986 and in January 1987 should be Africare in-house evaluations. The Rwandan organizations involved in the first evaluation should again be involved. The purpose of these evaluations would be to see how close to accomplishing the goals the project has come. Again changes necessary should be executed with the idea of overcoming problems and constraints.

The last evaluation should be with a full-team, as the first. This evaluation should be able to recommend either to the GOR as to what should be done to maintain the progress accomplished under the project.

VI. IMPLEMENTATION SCHEDULE

Pre-Implementation Activities

July 1 - September 30

1. Reduction of herd to 5000 head — resp. BGM, MINASODECO and HCR.
2. Socio-economic survey by MINASODECO should be completed.
3. Criteria for selection of participants should be established BGM, MINASODECO, HCR.
4. Africare-GOR agreement.
5. Africare recruits Project Coordinator and Administrative Assistant.
6. BGM must identify and recruit or assign project personnel.
7. BGM should survey area to delimit zones exactly.
8. BGM survey water sources to establish low-rate flows.

Project Implementation (1 October 83 - 30 September, 1987)

October 1 - December 31

1. Surveying of sites and demarcation of ranches and soil map verification
2. Selection of participant families: 1st 3 months.
3. Construction: vet, health, housing: 1st year.
4. Training of extension agents: 1st 3 months.
5. Firebreaks: throughout May-June.
6. Consultation and familiarization of refugees with project: first 3 months.
7. Construction of villages and ranch improvement:

116

Jan. 84-June 85.

8. Settlement of families on ranches and training: Jan. 84-June 85.

9. Animal identification: Dec. 83-June 84.

10. Implementation of veterinary program: Jan. 84 onwards

11. Procurement of vehicles and supplies: October 83-December 84.

12. Studies and final design of water supply systems.

13. Bids and contracts for construction of water supply systems.

14. Anthropological/social study: entire first year, one-month visits by senior researcher during first month, once after approximately one year and once at end of project

15. Economic study: 4 weeks between January and June 84, and between January and June 86.

16. Tsetse eradication: first 2 years.

    a. October 83—June 84 : clearing

    b. May 84—Sept. 84 : spraying

    c. Oct. 84—June 85 : clearing

    d. May 85—Sept. 85 : final spraying

17. Pasture improvement

    a. Clearing land : Oct. 83—Sept. 86

    b. Planting legumes : Oct. 83—Jan. 84
       Oct. 84—Jan. 85
       Oct. 85—Jan. 86
       Oct. 86—Jan. 87

18. Cropping : Sept. 84—Jan. 85

: March 85—May 85

: Sept. 85—Jan. 86

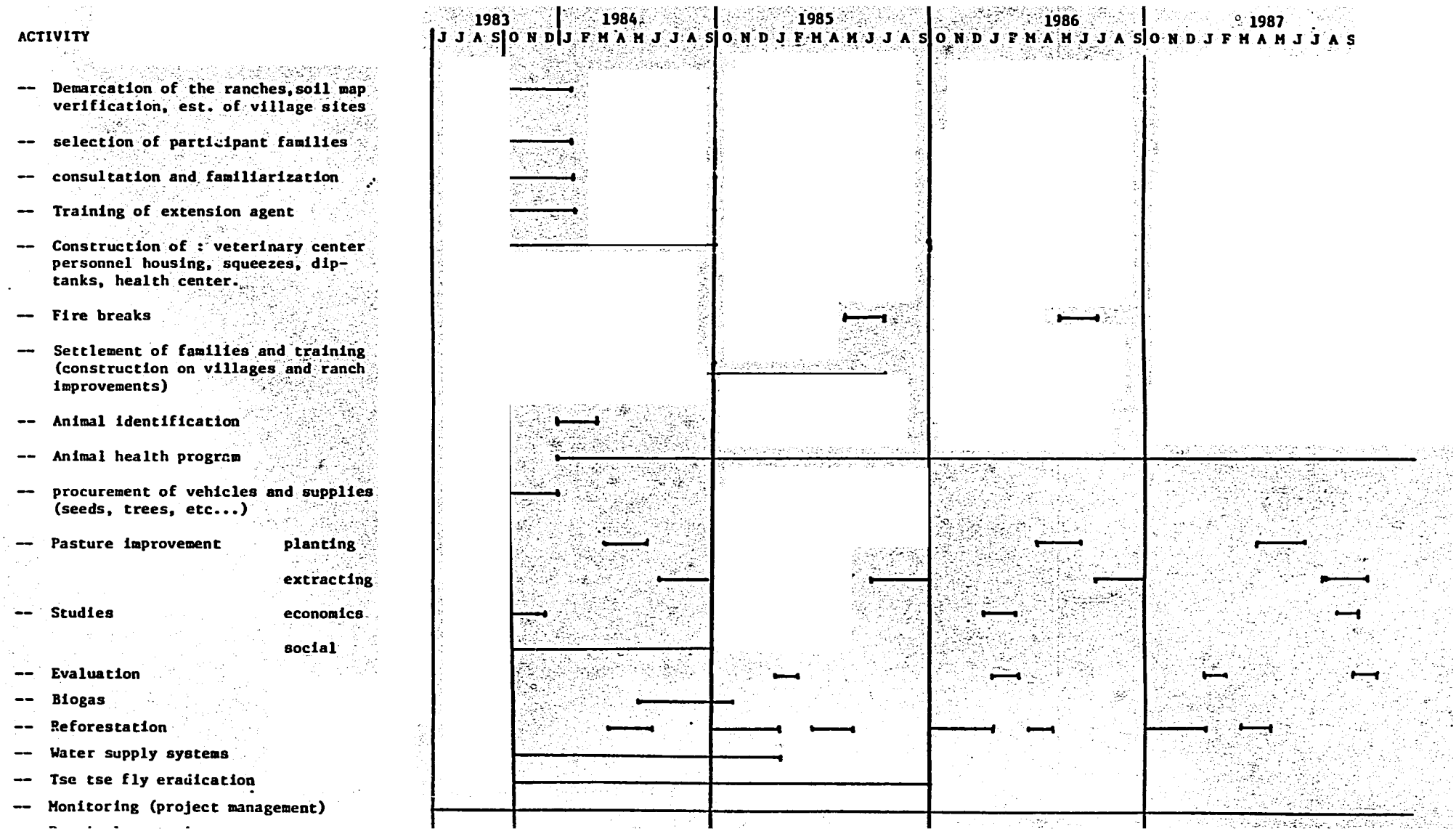
: March 86—May 86

19. Biogas:

Installation : May 84—Oct. 84

20. Reforestation:

: Oct.-Dec. and March-April each year.


ACTIVITY
1983
1984
1985
1986
1987
J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S
-- Demarcation of the ranches, soil map verification, est. of village sites
-- selection of participant families
-- consultation and familiarization
-- Training of extension agent
-- Construction of : veterinary center personnel housing, squeezes, dip-tanks, health center.
-- Fire breaks
-- Settlement of families and training (construction on villages and ranch improvements)
-- Animal identification
-- Animal health program
-- procurement of vehicles and supplies (seeds, trees, etc...)
-- Pasture improvement
planting
extracting
-- Studies
economics
social
-- Evaluation
-- Biogas
-- Reforestation
-- Water supply systems
-- Tse tse fly eradication
-- Monitoring (project management)

REFUGEE RESETTLEMENT/NASHO, RWANDA
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
	AFRICARE STAFF SALARIES					
1	PROJECT MANAGER	35000	37450	40072	42877	155399
1	ADMINISTRATIVE ASSISTANT	20000	21400	22898	24501	88799
2	SECRETARY	2100	2247	2404	2572	9323
2	MESSENGER	1200	1284	1374	1470	5328
2	GUARDIAN	1200	1284	1374	1470	5328
3	PROGRAM OFFICER/W 1/2 TIME	15000	16050	17174	18376	66600
3	SECRETARY/W 1/2 TIME	7000	7490	8014	8575	31079
						0
	SHORT TERM SALARIES					0
5	ECONOMIST					0
	@ 180/DAY	3960	0	3960	0	7920
5	SOCIAL SCIENTIST					0
	@ 180/DAY	3960	3960	0	3960	11880
5	ENGINEER					0
	@ 180/DAY	1980	1980	1980	0	5940
5	RANGE MANAGEMENT SPECIALIST					0
	@ 180/DAY	3960	3960	3960	0	11880
5	EVALUATOR	0	1980	0	1980	3960
	GRANTEE SALARIES					0
8	RANCH CHIEF A2					0
	24,500 RF/MO.	3196	3580	4010	4491	15277
8	ASST. RANCH CHIEF A2					0
	15,000 RF/MO.	1957	2192	2455	2750	9354
8	SOCIOLOGIST					0
	15000 RF/MO.	1957	2192	2455	2750	9354
8	VETERINARY EXTENSION AGTS.A3					0
	11 X 13,500 RF/MO.	19370	21695	24298	27214	92577
8	AGRICULTURE TRAINERS A3					0
	2 X 13,500 RF/MO.	3521	3944	4417	4947	16829
8	ACCOUNTANT					0
	24,500 RF/MO	3196	3580	4010	4491	15277
8	FOREMEN					0
	2 X 6000 RF/MO.	1565	1753	1963	2199	7480
8	ZONE CENTER GUARDS					0
	9 X 5,250 RF/MO.	2054	2300	2576	2885	9815
8	SPRAYING TEAMS (ANIMALS)					0
	27 X 3750 RF/MO.	13207	14791	16567	18556	63121
9	TSETSE (LAND CLEARING)					0
	SUPERVISORS:					0
	4X200 RF/DA.X25 MD/MO.X12MO.	2609	870	0	0	3479
	TSETSE LABORERS					0
	60X100 RF/DA.X25MD/MO.X12MO.	78261	26087	0	0	104348
	TSETSE (SPRAYING) SUPERVISORS					0
	2X200 RF/DA.X25 MD/MO.X 4 MO.	435	0	0	0	435
	TSETSE LABORERS					0

REFUGEE RESETTLEMENT/NASHO, RWANDA
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
	80X150 RF/DA.X25 MD/MO.X4MO.	13043	0	0	0	13043
	TSETSE STUDY TEAM LEADER					0
	15,000 RF/MO. X 9 MO.	1467	0	0	0	1467
	TSETSE STUDY ASSISTANTS					0
	6 X 7,500 RF/MO. X 9 MOS.	4402	0	0	0	4402
	INSECTICIDE SUPERVISORS					0
	2 X 200 RF/DA. X 75 DA.	326	0	0	0	326
	INSECTICIDE SPRAYERS					0
	20 X 150 RF/DA. X 75 DA.	2446	0	0	0	2446
	INSECTICIDE LABORERS					0
	12 X 100 RF/DA. X 75 DA.	978	0	0	0	978
	PASTURE IMPROVEMENT LABORERS					0
	120 X 100 RF/DA. X 300 DA.	39772	43603	25000	0	108375
	FORESTRY LABORERS	0	2319	2319	2319	6957
						0
	SUB TOTAL ALL SALARIES	289122	227991	189320	178383	884816
						0
11 TO 20	FRINGE BENEFITS 25%	72281	56998	47330	44596	221205
						0
						0
						0
22	RECRUITING					0
	ADS: 3 X 275	825	0	0	0	825
	TRAVEL: 6 X 300 RT	1800	0	0	0	1800
	PD: 3 X 75 X 2 = 450	450	0	0	0	450
	3 X 76 X 2 = 228	228	0	0	0	228
						0
	SUBTOTAL ALL FRINGE&RECRUITING	75584	56998	47330	44596	224508
						0
						0
	RELOCATION & INCIDENTAL					0
23	ORIENTATION/PER DIEM					0
	2 X 75/DA. X 14 DA. = 2100	2100	0	0	0	2100
	2 X 38/DA. X 14 DA. = 1064	1064	0	0	0	1064
24	TRAVEL INCIDENTALS					0
	PASSPORTS, PHOTOS, PHYSICALS	1200	0	0	0	1200
25	RELOCATION, PERSONAL EFFECTS					0
	2 FAMILIES X 3110 X 3.75	23325	0	0	24880	48205
26	RELOCATION: TRAVEL					0
	4 ONE WAY X 1,350	5400	0	0	5700	11100
27	RELOCATION: PER DIEM					0
	2 X 84 X 21 DA. = 3528	3528	0	0	336	3864
	2 X 42 X 21 DA. = 1764	1764	0	0	168	1932
28	SETTLING-IN ALLOWANCES	1000	0	0	0	1000
						0
	HOUSING COSTS					0
29	HOUSEHOLD FURNISHINGS					0
	2 X 7,500	15000	0	0	4000	19000
30	HOUSING REPAIR/MAINTENANCE					0
	2 X 2,000	4000	2000	2000	2000	10000
31	HOUSING RENTALS					0
	2 X 6000	12000	13440	15054	16860	57354
						0

REFUGEE RESETTLEMENT/NASHO, RWANDA
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
	GENERAL TRAVEL					0
32	AFRICARE OFFICE TRANS./GAS	4000	5000	5500	6000	20500
33	PER DIEM PROJECT MANAGER					0
	5 DA./MO. X 56 X 12 MOS.	3360	3600	3900	4200	15060
34	AFRICARE STAFF VEHICLE	3000	5000	5000	5000	18000
	REPAIR/MAINTENANCE					0
						0
	INTERNATIONAL TRAVEL					0
36	HOME LEAVE TRAVEL	0	0	11200	0	11200
37	CONSULTANTS					0
	2700/RT	10800	11000	8300	5700	35800
37	PROGRAM OFFICER/W	2700	2750	2800	2850	11100
38	ECONOMIST @ 85/DAY	2550	0	2550	0	5100
38	SOCIAL SCIENTIST @ 85/DAY	2550	2700	0	3000	8250
38	ENGINEER @ 85/DAY	1190	1260	1330	0	3780
38	RANGE MGT. @ 85/DAY	2550	2700	1330	0	6580
	EVALUATOR	0	1260	0	1400	2660
	PROGRAM OFFICER @ 85/DAY	1190	1260	1330	1400	5180
	SUB TOTAL ALL TRAVEL & RELOC	104271	51970	55044	83494	294779
	BASIC PROJECT EQUIPMENT					0
40	PASTURE IMPROVEMENT					0
	TOOLS	5600	1000	1000	0	7600
41	TSETSE FLY					0
	TOOLS, SPRAYERS, CLOTHING	14296	1000	1000	0	16296
42	VETERINARY CENTER					0
	LABORATORY	5108	0	0	0	5108
43	REFORESTATION TOOLS	0	1268	1268	1268	3804
						0
	VEHICLE PURCHASES					0
49	4-WH.DR.1/41 TRUCK(AFRICARE)	15000	0	0	0	15000
49	4-WH. DR. PICKUP (BGM)	15000	0	0	0	15000
49	4-WH. DR. PICKUP (BGM)	15000	0	0	0	15000
51	10 MOTOR CYCLES (VETERINARY)	16300	0	0	0	16300
						0
	AFR.OFFICE EQUIP.& FURNITURE					0
52	PHOTO, TYPEWRITER, COMPUTER	20000	0	0	0	20000
53	FURNITURE	5000	0	0	0	5000
						0
	EQUIP. REPAIR/MAINT./OPER.					0
54	2 PICKUPS	5217	5843	6545	7330	24935
	10 MOTOR CYCLES	1957	2191	2780	2662	9590
	TRUCK (RENTED)	2717	5435	2717	0	10869
55	TRUCK RENTAL	1630	3260	1630	0	6520
	SUB TOTAL ALL EQUIPMENT	122825	19997	16940	11260	171022
	BASIC PROJECT SUPPLIES					0
56	REFORESTATION (NURSERY)	0	11649	11649	11649	34947
57	PASTURE IMPROVEMENT					0
	SEEDS, HERBICIDES	134189	8948	10022	0	153159
58	TSETSE FLY					0
	HERBICIDES, INSECTICIDES	133809	0	0	0	133809
59	VETERINARY CENTER					0
	LABORATORY	5434	761	852	954	8001
	GENERAL SUPPLIES					0

REFUGEE RESETTLEMENT/NASHO, RWANDA
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
63	AFRICARE OFFICE	6000	2000	2000	2000	12000
63	BGM OFFICE	1000	900	900	900	3700
	SUBTOTAL ALL SUPPLIES	280432	24258	25423	15503	345616
						0
	CONSTRUCTION CONTRACTOR FEES					0
68	A WATER SYSTEMS (4)	600000	141000	0	0	741000
69	B HEALTH CENTERS (2)	125000	125000	0	0	250000
70	C VETERINARY CENTER	21739	0	0	0	21739
						0
	CONSTRUCTION MATERIALS					0
73	A PASTURE IMPROVEMENT					0
	8 TROUGHS, HOUSE, FIREBREAKS	45652	2174	2174	2174	52174
74	B VETERINARY CENTER					0
	DIP TANKS, SQUEEZES, HOUSES	174735	0	0	0	174735
75	APPROPRIATE TECHNOLOGY					0
	BIOGAS APPARATUS	20000	20000	0	0	40000
						0
	SUB TOTAL ALL CONSTRUCTION	987126	288174	2174	2174	1279648
						0
	TRAINING					0
						0
80	TRAINING MATERIALS	10000	5000	0	0	15000
82W.	SHOP.TRVL.&ALLNCS.(EX).AGTS)	10000	5000	0	0	15000
82	COMPUTER TRAINING(AFR.STAFF)	2500	0	0	0	2500
	SUB TOTAL ALL TRAINING	22500	10000	0	0	32500
	GENERAL BUSINESS COSTS					0
84	FREIGHT, HSD. OFF. EQUIP.	30000	2000	2000	2000	36000
85	VEHICLE INSURANCE	675	675	675	675	2700
						0
	OFFICE OCCUPANCY COSTS					0
93	OFFICE RENTAL	6000	6720	7527	8430	28677
94	OFFICE OPER./MAINTENANCE	7000	7200	7400	7600	29200
						0
	SUB TOTAL ALL OTHER DIRECT	43675	16595	17602	18705	96577
						0
	TOTAL DIRECT	1925535	695933	363043	354115	3338676
						0
INDIRECT I	SALARIES, FRINGE, TRAVEL					0
	TRAINING,OTHER DIRECT @ 21.45%	114790	77982	68320	69751	330843
						0
						0
						0
INDIRECT II	EQ.SUPPLIES, CONSTRUCTION					0
	@ 10.70%	148771	35570	4765	3096	192202
						0
	SUB TOTAL INDIRECT	263561	113552	73085	72847	523045
						0
						0
	G R A N D T O T A L	2189096	809535	436128	426962	3861721

ANNEX 1

LOG FRAME

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWORK

Life of Project:
From FY_____ to FY_____
Total U.S. Funding_____
Date Prepared:_____

Project Title & Number: REFUGEE RESETTLEMENT PROJECT

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Goal To settle and to provide assistance to refugees			Government of Rwanda remains committed to assisting refugee resettlement
Purpose 1. Assist host country government and International Donor Community with support and maintenance for refugees.	2800 refugees resettled in Nasho area	BGM Reports UNHCR Reports Ministry of Social Affairs	Rwanda's ability to maintain the refugees even on marginal conditions is tenuous. Its ability to meet refugees' needs from its own resources is limited.
2. Assist refugees to become more productive and self-sufficient	20 families on each of 20 ranches 20 families each with 15 head of cattle 2-3 head of cattle sold/family/year 1 hectare per family in food production		Both the short and long term needs require major undertakings that will necessitate participation and collaboration among many groups including GOR agencies, PVOs and Int'l. agencie
3. Strengthen the infrastructure needed to support the refugees	4 camps equipped with potable water supply systems 250 km^2 cleared for tse tse fly control 50 hectares of trees planted for erosion control and for firewood Veterinary Center constructed 2 health centers constructed		The lack of an adequate infrastructure constitutes a major obstacle to development.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs			
1. Establish an improved pasture management program	1. 4000 has. pasture lands improved by end of project 2. 20 ranches of 250 has. established by end of project	BGM Reports Africare Reports	1. When the GOR had to permit the refugees to graze their cattle in the Domaine de Chasse, a hunting reserve on which the GOR had long denied access to its own people, resentments were fueled by seeing others taking up use to the forbidden land. GOR will give full support to a pasture improvement program.
2. Establish a tse tse fly control program.	125 km^2 cleared for tse tse fly control by end of year 1 125 km^2 cleared for tse tse fly control by end of year 2.		
3. Introduce the use of biogas as an alternative energy source for domestic purposes.	4 biogas plants in use		3. That this be a technology considered appropriate by the participants.
4. Provide accessible improved water supply for human and animal consumption	2 camps supplying 357,000 liters/day Nasho camp supplying 85,000 liters/day Nasho West camp supplying 295,000 liters/day	BGM Reports Contractor reports Africare Reports	4. Water should be provided to serve not only the needs of the refugees, but that of the settlers who live in the surrounding areas.
5. Establish reforestation program for erosion control and for fire wood.	50 hectares of trees planted		

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs			
Technical Assistance			
U.S. Hire			
Project Manager	155399 48 mm.		
Admin Assistant	88799 48 mm.		
Consultants	40620 10 mm.		
Host Country Hire	453744		
Africare Management/Sec 'y.	66598		
Equipment and Supplies			
3 4 WD vehicles	45000		
10 motorcycles	16300		
Other	414487		
Construction			
Dip tank zone 3	27174		
4 squeezers	6261		
8 troughs	21739		
10 houses for A 3s	141300		
1 house for A2	21739		
Vet Center zone 2/3	21739		
Water systems	741000		
2 health centers	250000		
firebreaks	8696		
biogas digesters	40000		
Total Construction	1279648		
Training	30000		

ANNEX 2

WAIVER REQUEST

ACTION MEMORANDUM FOR THE ASSISTSANT ADMINISTRATOR FOR AFRICA

From :

Subject: Rwanda Refugee Resettlement Project, Nasho, Rwanda. Source/Origin Waiver for Procurement of Geographic Code 935 Vehicles, Motorbikes and Veterinary Supplies

A.	Cooperating Country	:	Rwanda
B.	Authorized Document	:	OPG/Project Paper
C.	Project	:	Refugee Resettlement Project Nasho
D.	Nature of Funding	:	Grant
E.	Description of Goods	:	Vehicles and Motorbikes Veterinary Supplies
F.	Approximate Value	:	Vehicles and Motorbikes - $61,300 Veterinary Supplies -$271,630
G.	Probable Source	:	Kenya, Japan, Western Europe
H.	Probable Origin	:	Western Europe, Japan

The principal reason for which non-US manaufactured vehicles and motorbikes are expected to be purchased under the project is the lack of servicing and spare parts. These vehicles and motorbikes will be procured for

technicians and extension workers. The extension workers will be responsible for the maintenance and upkeep of the motorbikes. It will be therefore necessary to rely upon commercial facilities to service the vehicles and motorbikes.

The veterinary service and the tsetse fly control program will be using a variety of chemicals which technicians and workers have learned to use. These too are non-US manufactured products. Since quantities required are larger than shelf items, a waiver is required for their importation.

ANNEX 3

TSE TSE FLY CONTROL STUDY

RAPPORT DE MISSION

Fonctionnaire : J.G. Le Roux, spécialiste en santé (contrôle de la Tsetse), FAO

Date du rapport : 30 octobre 1981

Pays visité : Rwanda

Dates de la mission : 18 - 28 octobre 1981

Objet de la mission : Evaluation des actions prises jusqu'à present contre la tsetse dans la vallée de la rivière Kagera, au sud du parc national de l'Akagera; élaborer une strategie pour le futur de l'opération avec les coûts correspondants.

Travail effectué

Best Available Document

La mission a été provoquée à l'instigation du Gouvernement de Rwanda. Le but de la mission était de (i) porter un diagnostique sur les possibilités de réinfestation des zones traitées contre les glossines dans le sud de Bugesera et du Gisaka; (ii) établir un procédure du contrôle; (iii) éventuellement définir une procédure de lutte à mettre en oeuvre; et (iv) établir le coût de l'opération sur une période de 10 ans.

Best Available Document

G. morsitans et G. pallidipes sont toujours present dans les zones visitées par la mission. Ceci malgré les efforts déployés par l'Institute des Science Agronomique de Rwanda (ISAR) en 1977 (campagne partielle), 1978 et 1980 (pulvérisation legère et limitée) et de la mise en place d'une zone tampon de 10 km sur 1,5 km au sud du Rusumo afin d'empêcher la tsétsé de revenir par la frontière tanzanienne. Le bétail des deux ranches (Rusumo - 4.000 ha et Nasho 6.000 ha) subissent toujours un traitement prophylactique contre la trypanosomiase, du fait de l'inéfficacité de contrôle de la tsétsé sur le ranch de Nasho, et la réapparition importante de la tsétse dans certaines parties de Rusumo.

La zone du projet fut visitée à deux reprises, faisant suite à des discussions avec le chef du projet (Mr. G. Lescanne), et le Secrétaire du Comité de Coordination du projet BGM (Mr. Sabasajya), Mr. J. Hannotier de l'Agence Générale de Coopération et Développement (Belgique), le Secrétaire Général du Ministère de l'Agriculture, le Secrétaire exécutif de l'Organisation du Bassin de la Kagera et Mr. Cassien de l'ISAR.

A l'occasion d'une rencontre avec Mr. R. Devers, qui fut en 1980 le chef du projet PNUD d'une équipe multidisciplinaire pour le développement du bassin de la Kagera, et qui termine son rapport de mission, il a été noté qu'un projet régional pour l'éradication de la tsetse (Rwanda, Burundi, Tanzanie) bénéficierait d'un soutien important, comme l'a souligné le rapport publié à l'issue de la mission PNUD.

Lors de ma mission un document de projet fut préparé comprenant entre le coût du projet, des opérations de nettoyage de la brousse,

Best Available Document

d'entretien de la zone tampon, d'utilisation des insecticides, ainsi qu'un programme prophylactique de la trypanosomiase. Les objectifs actuels du gouvernement furent pris en compte. Mille hectares d'implantation sont prévus aussi bien que la mise en valeur de quelques 4.000 ha sous la forme d'un ranch-coopérative. L'échec de l'éradication efficace de la tsetse est due en partie, voire totalement, à l'absence d'un manque de données entomologiques et à un dosage unitaire trop faible d'insecticide. Le projet de document prévoit l'utilisation d'un consultant entomologiste pour étude et pour formation, et d'un spécialiste en insecticide afin d'obtenir les dosages requis et de déterminer les endroits à pulveriser, lorsque les opérations de pulvérisation seront reprises à nouveau.

La mission s'acheva par une réunion finale avec les représentant du projet et du gouvernement, ainsi que des représentants de la Banque mondiale.

La stratégie proposée et les coûts pour l'éradication à la fois de la tsetse et de la trypanosomiase ont été discutés. Il a été proposé que l'auteur de ce rapport participe à une revue des progrès effectués par le projet, au cours de la seconde moitié de 1982, étant donné que l'expertise nécessaire pour l'exécution du projet fait défaut.

Il n'existe pas d'unité en tant que telle d'Eradication de la tsetse et de la trypanosomiase au Rwanda, unité qui est nécessaire pour une exécution efficace du programme d'éradication, et qui devrait trouver sa place au sein du service vétérinaire. L'auteur de ce rapport a accepté de définir les grandes lignes pour la mise en place d'une telle unité, en termes de personnel, appui logistique et coûts.

Il est agréable de noter que le vétérinaire responsable des trois ranchs est le Dr. J. Bagiramenshi qui a participé à la réunion de Lusaka en 1978. Le gérant du Ranch de Rusumo est le Dr. F. ~~Ilubirumayo~~ Nkurikiye qui a recémment participé au stage FAO/France sur l'éradication de la tsetse et de la trypanosomiase.

<u>Ampliations</u>: tous les fonctionnaires AGA

ADG, AG

Directeur, AGA

fonctionnaire administrateur, AGA

AGOA

Représentant Resident PNUD, Kigali

RAFR (2).

DDFA

DDCB

AGE Vienne

AGA Rep (3)

ERADICATION DE LA TSETSE ET DE LA TRYPANOSOMIASE

VALLEE DE LA KAGERA, KABUNGO

1. Historique

1.1 La mise en valeur de la vallée de la Kagera entre les chutes de Rusumo et le parc national de l'Akagera, pour le ranching et la sedentarisation, necessitait, comme préalable, l'eradication de la tsetse, afin d'éviter à la fois la trypanosomiase humaine et animale. Les différentes espèces de Glossina concernées sont:

- G. morsitans, répartie dans la vallée faisant une ceinture entre la frontière Ougandaise en les chutes de Rusumo, y compris le parc national, contigue à la ceinture tanzanienne de l'autre côté de la rivière Kagera. La limite ouest de l'infestation semble être la côte 1.500 m des contours de la vallée. Ce type de mouche se trouve dans la vegétation de zones non drainées, des reseaux de drainage, d'affleurement rocheux, dans des fourrés de zones boisées, et au pied d'escarpements.

- G. pallidipes, est connue pour être concentrée de façon intermittente sur la végétation en bordure des lacs Rwampanga, Rwehikama et Nasho, est supposée se répandre dans le parc national. L'invasion est probablement plus importante que ce qui ressort de la méthode d'étude employée jusqu'à présent. ~~En règle générale G. pallidipes n'est pas une espèce du bord de l'eau, n'est pas reperable facilement, et peut s'accommoder d'une variété de type d'habitat allant des endroits humides et secs, est supposée se répandre dans le parc national. L'invasion est probablement plus importante que ce qui ressort de la méthode d'étude employée jusqu'à présent.~~ En règle générale G. pallidipes qui n'est pas une espèce du bord de l'eau, n est pas reperable facilement, et peut s'accommoder d'une variété de type d'habitat allant des endroits humides aux fourrés très secs.

1.2 G. brevipalpis se trouve dans la partie méridionale du parc national. Elle n'apparait pas dans la carte de la repartition de la tsetse de Ford et Katondo. Son importance dans la transmission de trypanosomes pathogènes au bétail n'est pas connue.

1.3 La strategie initiale des l'éradication du vecteur comprenait l'application d'un insecticide tenace aux endroits de repos de la tsetse dans la zone du projet qui était protégée par des zones d'éclaircies afin d'empêcher la re-invasion. La technique d'éradication employée consistait en une simple application d'une solution à 3% de Dieldrex 18%, a l'aide de pulvérisateurs sur des types de végétation selectionnées, est situés entre le sol et une hauteur de 2,5 m. En général l'insecticide était appliqué pendant la saison sèche après un feu de brousse.

Best Available Document

Best Available Document

1.4 La zone de Rusumo

1.4.1 La zone tampon du ranch de Rusumo s'étend de Rusozi aux Chutes de Rusumo, donc en parallèle aval à la rivière jusqu'à Kamondo, localité dans laquelle la zone tampon comprend toute la surface située entre la rivière et l'escarpement. La longueur totale est de 10 km, et elle fut achevée au cours de 1969/70. Par la suite, le nettoyage fut étendu de façon à comprendre la zone en amont des chutes jusqu'au marais de papyrus. L'entretien de la zone entre Rusozi et les chutes de Rusumo ne fut pas continu du fait que les hauteurs du terrain dans la partie meridionale de la zone étaient considerée comme suffisante à elles seules pour empêcher la ré-invasion, et aussi du fait de l'extension de la zone tampon en amont des chutes. La reprise de la végétation necessita l'entretien manuel de la zone en 1975, 1978, et de nouveau au cours de 1980.

1.4.2 Les zones choisies, de présence tsetse furent passées au pulvérisateur au cours des saisons sèches de 1973/75, et celles "resistantes" furent retraitées en 1978. Des études menées au cours de 1980 révéla un nombre important de cas de G. morsitans sur le ranch, le long de la zone tampon parallèle à la rivière. Un autre foyer fut localisé dans une vallée située immédiatement au nord du guesthouse (Centre AIDR). Des pulvérisations très limitées et palliatives eurent lieu dans ces localités où des specimen de tsetse furent pris. Le Bloc E fut traité de façon similaire.

1.5 Zone située entre Rusumo et le parc national de l'Akagera

1.5.1 Zones tampons. Du fait que la Kagera coule entre des marais du papyrus, les aménagistes ont supposé que la largeur entre Kamonbo et le lac Rwanpanga constituerait une barrière adequate, et que seul le bout d'un promontoire situé à Nogoro necessitait le nettoyage de quelques 60 ha, en 1976 (Zone tampon N.O.). Au cours de la même année une zone de 3 km de large fut également nettoyé entre le lac Nasho et l'escarpement à l'intérieur et le long de la frontière méridionale du parc national. Un re-nettoyage fut nécessaire en 1978 et de nouveau au cours de 1980/81.

1.5.2 Un essai d'éradication de la tsetse entre Rusumo et la zone tampon du parc national fut entrepris en 1971, mais fut arrêté du fait de l'impact négatif possible de la Dieldrin sur l'environnement. Depuis ces craintes ont disparu, et toute la zone fut passée au pulvérisateur en 1978, comme ceci est décrit dans le paragraphe 1.3 ci-dessus. Des études ultérieures menées en 1979/80 indique une invasion de G. morsitans dans la vallée entre Kamombo et la partie meridionale du ranch de Nasho, tandis qu'on constate la présence de G. pallidipes dans la végétation lacustre du ranch. Des pulvérisations furent entreprises à titre palliatif dans la plus grande partie de la zone infestée par la morsitans, d'une façon semblable à celle décrite dans la paragraphe 1.4.2 ci-dessus.

Best Available Document

1.6 La consommation d'insecticide s'eleva à 4.320 tonnes pour l'opération de 1978, au taux de 0,514 tonnes/ha. 80 tonnes supplémentaires furent utilisées lors de la pulvérisation de 1980. L'équipe de pulvérisation était composée de 25 pulvérisateurs, 25 marqueurs d'arbres, qui faisaient également fonction de pulvérisateurs, et de 15 à 20 ouvriers.

1.7 La trypanosomiase du bétail sur les ranches de Rusumo et de Nasho fait l'objet de traitements bi-annuels de Trypamidium à la dose de 1 mg/kg. Les cas individuels de trypanosomiase entre les traitements prophylactiques sont traités avec du Berenil à 3,5 mg/kg. Des analyses de routine sont pratiqués par examen microscopique de frottis épais de sang.

2. Situation actuelle de l'éradication

2.1 Tsetse

Faisant suite à l'essai final d'éradication entrepris au cours de septembre/octobre 1980, une période brève de suivi des effets fut interrompue à cause du manque de transport. Il n'y a pas de doute cependant que la campagne de pulverisation de 1980 n'eu qu'un effet passager sur l'invasion de tsetse, particulièrement dans la zone située entre Kamombo et le ranch de Nasho. Au cours du mois d'octobre 1981 un véhicule se deplaçant lentement attira de nombreuses G. morsitans, tout au long du trajet. Un seul specimen fut pris au bord du ranch de la zone tampon, près de la limite des chutes de Rusumo.

2.2 Trypanosomiase

Les données disponibles sur les traitements en 1981 sont les suivantes:

Ranch	nombre de têtes	nombre de têtes traités au Trypamidium	J	F	M	A	M	J	J	A	S
Rusumo	2.500	(1.672) 477)	4	15	-	-	-	2	9	4	-
Nasho	1.568	1.670	-	3	9	12	12	13	25	-	43

138

Best Available Document

3. Evaluation de la situation de l'éradication

3.1 Zones tampon

Le problème de l'utilisation de zones tampons afin de freiner l'avance de la tsetse ou pour empêcher son retour dans les zones nettoyées a fait l'objet de l'une des plus importantes controverses dans toute l'histoire de l'éradication de la tsetse. Ces zones sont non seulement coûteuses à établir, mais également à entretenir à cause des contrôles périodiques que les différentes sortes de brousse nécessitent. De surcroit, leur efficacité est douteuse puisque des véhicules variés peuvent permettre à la tsetse de traverser ces zones, n'importe quel véhicule animal ou humain peut constituer un moyen de traversée, et plus récemment certains ont émis l'hypothèse que la tsetse, portée par le vent, peut couvrir de longues distances.

Les zones de Rusumo et du parc de l'Akagera constituent un compromis, et peuvent au mieux servir à réduire, bien que de façon substantielle, le risque de re-invasion. De surcroit, à certains endroits, la zone tampon de Rusumo n'est pas plus large qu'un kilomètre, et il est plausible d'admettre que la tsetse peut traverser cette zone d'une façon ou d'une autre.

La diminution de l'entretien de la zone tampon entre Rusozi et les chutes de Rusumo est expliquée par le risque faible qu'un véhicule ou un piéton puisse aider la tsetse à passer. La mise en place d'un poste de desinfection près de la frontière tanzanienne n'apparait pas non plus justifié à cause du volume de traffic peu elevé, le retard occasionné au passage de la frontière, les coûts et l'inefficacité de la desinfection en arrêtant tous les véhicules porteurs de tsetse. La re-invasion de la vallée par la route près du guesthouse est une pure hypothèse, et aurait pu être provoquée par le traffic routier de la route principale. Cependant, les véhicules du ranch au retour de la zone tampon ou les déplacements du bétail (puisqu'il est amené de temps en temps à la rivière pour abreuvement) pourraient également être incriminés.

L'efficacité du marais de papyrus entre Kamombo et le lac Nasho, comme zone tampon est à douter parce que ce marais abrite sa propre faune, qui pourrait être un moyen de diffusion de la tsetse.

Avec l'établissement de sedentaires entre le ranch de Nasho et le parc national une barrière de 3 km de largueur semble superflue et pourrait être réduite en largeur. Des traversées occasionnelles de la réserve et le braconnage pourraient constituer un facteur de passage de la tsetse, mais ceci est d'une importance mineure dans une zone de colonisation où l'habitat de la tsetse est progressivement détruit par la mise en culture. Les va-et-vient des véhicules au parc peuvent cependant, constituer indirectement un risque pour le bétail du ranch de Nasho.

En resumé, quelque soient les méthodes d'éradication employées dans la vallée de la Kagera, leur efficacité sera toujours sujette, à des degrés divers, au risque de re-invasion à partir de la Tanzanie ou du parc national de l'Akagera.

Les coûts de l'elimination de la regénération de la tsetse au cours de 1980/1981 ont été les suivants:

• Rusumo	1.700 ha	FR	680.000
• Nogoro (zone N.O)	60 ha	FR	90.000
• Parc national	1.800 ha	FR	5.580.000
• Divers	-	FR	632.000

Le coût moyen de 21.4 FR par ha peut être consideré comme étant représentatif du coût de l'élimination de la régéneration dans cette zone, du fait que cette élimination été effectuée jusqu'à présent à des stades variés de la regénération.

3.2 L'éradication de la tsetse

Malgré des applications repetées d'insecticide, un degré satisfaisant d'élimination n'a pas encore été atteint à l'exception, peut-être, du ranch de Rusumo. Les raisons en soit réduites aux hypothèses, mais il y a peu de doute que le manque de donnés écologiques de base sur Glossina en est particulièrement, voire complètement la cause. De surcoit les données obtenues par la méthode d'observation employée ne peut donner qu'une indication sur la repartition de la tsetse. L'importance du facteur re-invasion/recrudescence sur l'invasion de tsetse posterieure à 1977, reste non determinée. Des mouvements saisonniers de la tsetse dans la zone entre le marais de papyrus et l'escarpement, ainsi que ceux provoqués par le traffic routier au nord et au sud, à l'extérieur de la zone devraient être étudiés. Afin de contrôler l'efficacité de la pulvérisation d'insecticide il est essentiel de déterminer la pyramide des âges de la population tsetse avant et après pulvérisation.

Il n'existe pas d'information concernant les porteurs de parasite preferés, et la prédominance d'animaux sauvages, plus particulièrement entre Kamombo et le lac Kwampanga. Au cours d'une courte visite à la fin de la saison sèche, la presence évidente de phacochères, antilopes et de (Duiker) fut observée, ces animaux étant des porteurs appréciés des parasites. Un troupeau important de buffles fut également repéré près du nord-ouest de la zone tampon, à Nogoro.

La raison du traitement insecticide effectué en 1980 sur les petits foyers d'infection, localisé à partir d'enquetes, n'est pas évidente, puisque son application généralisée n'aurait pas pu avoir d'effet global appréciable.

3.3 Eradication de la trypanosomiase

A l'heure actuelle il est difficile d'évaluer l'état de l'éradication de la trypanosomiase sur les deux ranches de Rusumo et de Nasho. Non seulement la véritable distribution de la tsetse n'est pas connue mais la méthode utilisée pour le diagnostic est inefficace. Le risque réel de trypanosomiase est inconnu et le traitement trypanosomiase semble être appliqué irrégulièrement sans tenir compte de tendances des trypanosomes à la resistance aux médicaments.

On peut supposer un risque relativement uniforme sur toute la zone du ranche de Nasho, lié à la topographie des lieux, avec des fluctuations saisonnières liées à la reprise de la saison humide, et peut être à la répartition des tsetse. A Rusumo, par comparaison, il devrait y avoir un risque faible, avec toutefois une possibilité du fluctuation saisonnière si le risque de trypanosomiase est seulement lié à la ré-invasion de la tsetse. Si il en est ainsi, l'impact de la maladie sera plus importante sur les troupeaux qui patûrent en bloc au bord de la zone tampon. L'impact de la maladie sur les troupeaux est également lié à la rotation des pâturages, combiné avec l'abrûuvement périodique du bétail à la Kagera.

4. Développement proposé

1000 ha de terre supplémentaires dans la zones de Kamombo seront mis en valeur, attenants, et au nord de l'aménagement de Rusumo. Les 3000 ha restant et situés au Nord de Kamombo, de même que 1000 ha supplémentaires du Ranch Nasho contigu, seront mis en valeur sous la forme d'un ranche-coopérative (éventuellement en incorporant tout le ranche Nasho). La mise en valeur de la zone de Kamombo va servir à l'éradication de la tsetse, mais du fait que l'installation des personnes pourrait être retardée, et du fait que le nettoyage du terrain pour la mise en culture prendra du temps avant de libérer la zone de la tsetse, il est conseillé d'envisager des mesures d'éradication de la tsetse également dans cette zone afin d'éviter la re-invasion de la zone de ranching.

5. Recommandations

5.1 La répartition de la tsetse

Une étude detaillée de toute la vallée de la Kagera entre Rusumo et la limite du parc national de l'Akagera est un préalable essentiel avant que d'autres mesures d'éradication de la tsetse ne soient entreprises. L'étude devrait determiner la répartition de la tsetse ainsi que l'importance de la saison sèche sur les sortes de végétation que hébergent la tsetse. De plus, l'étendue de la ré-invasion à travers les zones tampon et la présence ou l'absence de foyers persistants de tsetse sur le ranche de Rusumo devraient être déterminées. Des études sur les habitudes de repos, les porteurs de parasites préferés et les deplacement des animaux du parc sont facultatifs, et si le temps le permet.

A cet effet, les services d'un entomologiste experimenté seront requis pour une période de 2 mois, de préférence au cours de la saison sèche du début 1982. Il devrait être aidé par une petite équipe (6 personnes) provenent du personnel de l'Institut des Sciences Agronomiques du Rwanda (ISAR), et qui recevra une formation sur l'utilisation des pièges de type biconique, et sur l'aspect de l'entomologie Glossina, ainsi que sur l'interpretation des données de l'étude.

5.2 Eradication de la trypanosomiase

Mise en application immédiate d'un medicament trypanocide plus efficace, sur les ranches de Rusumo et de Nasho, par:

- l'amélioration du diagnostic par la technique de centrifugation hématrocrite (TCH).

- La détermination de la période de protection assurée par le trypamidium sur les deux ranches. Il est proposé que le dosage utilisé soit de 0,5 mg/kg au lieu de 1 mg/kg tel qu'il est effectué à présent, puisqu'une protection aussi efficace peut être obtenue à partir d'un dosage plus faible. Il est fort possible que le risque de trypanosomiase sur le ranch de Rusumo provienne en grande partie de la répartition saisonnière de la tsetse. Si il en est ainsi, des traitements prophylactiques, deux fois par an, et immédiatement avant le commencement des pluies, devraient être suffisants pour contrôler la situation. Il est improbable que le traitement prophylactique, au regime de deux fois par an, appliquée sur le ranch de Nasho, soit adéquat pour un contrôle adéquat de la trypanosomiase. Non seulement ce ranch abrite une population residente de tsetse, probablement plus importante que ce qu'indique les données actuelles, mais de surcroit il reçoit les tsetse véhiculées par les automobiles.

- Le traitement en bloc de tout le bétail des deux ranches avec des doses de Berenil à 7,0 mg/kg au moins deux semaines precédant le traitement au trypamidium, afin d'éliminer les effets de resistance de trypanosomes aux médicaments. Une fois que les périodes de protection efficaces du Trypamidium sur les deux ranchs auront été déterminées et que le traitement revisé aura été appliqué, il est proposé que Berénil à 3,5 mg/kg soit appliqué une fois par an si le trypamidium l'est à deux fois par an. Pour un traitement de 3 à 4 applications par an, Bérénil devrait l'être 2 fois par an. L'innoculation de Bérénil doit être faite au moins deux semaines avant le Trypamidium.
Du fait que l'innoculation de la trypanosomiase peut être facilitée par le regime alimentaire et par le traitement d'autres maladies, les aspects de gestion ne doivent pas être negligés, pour un contrôle efficace de cette maladie.

5.3 Trypanosomiase humaine

Elle n'est pas très repandue; toutefois, il est recommandé d'obtenir l'aide de Mr. J. Hanotier de l'Agence Générale Belge de Coopération et de Développement pour une étude de cas parmi les habitants de la zone entre le ranch de Nasho et le Parc ainsi que sur la main d'oeuvre qui travaille actuellement sur la zone tampon.

5.4 Entretien des zones tampon

L'éradication de la régénération dans les zones nettoyées, fut initialement prévue par l'utilisation de l'herbicide 2-4-5T. La raison du nettoyage à la machette n'est pas nette mais il est proposé d'envisager l'application d'un herbicide tel que Torodon qui contient du picloram et qui est un herbicide systématique puissant et très actif contre la plupart des plantes à large feuilles mais qui est peu ou pas actif sur la plupart des herbes en place, plus particulièrement les espèces perennes. Les fabricants recommandent l'utilisationde Torodon 225E, applicable en solution, comme pulvérisateur défoliant, pour une grande gamme de problèmes de brousse et d'espèces d'arbres, et qui convient tout à fait à l'entretien des zones contre la tsetse. L'herbicide doit être utilisé lorsque la végétation est dans un stade de croissance active.

Il est suggéré de mener un essai pilote de terrain dès que le matériel pourra être disponible, afin de déterminer l'impact de ce produit sur les espèces principales de végétation des zones tampon. Cet essai devra être effectué en liaison avec les représentants du fabricant, afin d'obtenir leur conseil sur la dillution, le dosage, le calendrier et la façon d'appliquer le produit, ainsi que sur les espèces de plantes qui ont des chances d'être touchées. Le fabricant pretend que la plupart des plantes à "feuille large" sont sensibles au produit, et en conséquence de bons résultats sont à attendre puisque Combretum spp sont les plantes problématiques prédominantes dans la vallée de la Kagera. Cependant, d'après des données en provenance d'Afrique du Sud, quelques espèces de Combretum (c. fragrans) ont été resistantes à l'application aerienne de Torodon. Par contre, en Tanzanie les résultats furent bons, grâce à un traitement des souches avec du Torodon, dans la région de la Kagera près de Bukoba. En fait, il semble qu'un essai pilote d'un herbicide, appliqué comme défoliant par pulvérisation avec des pompes, serait justifié. Comparé au coût actuel relativement elevé de l'entretien des zones tampon, l'application d'herbicide à intervalle de 2 à 3 ans parrait s'avérer être plus économique, dans le long terme.

5.5 L'éradition de la tsetse

5.5.1 Quelques soient les avantages au point de vue du coût et de la rapidité de l'application d'insecticide dans la vallée de la Kagera, la

pulvérisation seule est contre-indiquée. L'application d'insecticide ne va pas modifier la présence de tsetse et en conséquence la ré-invasion continuera à être un problème. Il est recommandé qu'un ensemble de mesures d'éradication comprenant le nettoyage manuel du terrain, la coupe des repousses (par application d'herbicide ou par machette, et l'application d'un insecticide tenace lorsque nécessaire.

Cette stratégie est particulièrement utile pour l'éradication sur les terrains impropres à la culture et, puisque seules certaines espèces végétales peuvent être éliminés afin de rendre aux tsetse leur présence insupportable, et sans avoir à éliminer toute végétation. Lorsque le maintien de la vegétation est nécessaire, afin d'empêcher l'érosion du sol (fortes pentes, goulets), seul l'insecticide sera utilisé.

5.5.2 Du fait que l'utilisation d'insecticide est envisagée dans la stratégie proposée, il est recommandé de proposer au responsable de l'éradication de la tsetse en Ouganda d'aider pour une période de 2 semaines, à la formation et à la supervision du personnel qui effectuera la pulvérisation, parce que cette méthode a été ~~tsetse~~ testée et perfectionnée en Ouganda.

5.5.3 <u>Effets des mesures d'éradcation de la tsetse sur l'environnement</u>

De telles études prennent du temps et elles sont coûteuses. Des récherches menées dans de nombreux pays africains ont amplement démontré que le Dieldrin appliqué tel que proposé, a un effet négatif négligeable sur les organismes non visés. En conséquence il n'est pas proposé de mener des études similaires dans la vallée de la Kagera.

5.5.4 <u>Mesures contre la traversée de la zone tampon par la tsetse</u>
Du fait que les opérations de contrôle deviennent de plus en plus coûteuses et que les actions de développement incluent fréquemment des actions d'éradication de la tsetse, et qui nécessitent en conséquence des zones tampons, une attention plus grande a été portée sur les méthodes peu coûteuses, simple a exécuter, et pour rendre les zones tampon plus efficaces. De telles méthodes qui sont actuellement testées, comprennent des moyens tels que écrans en tissu et des pièges biconiques impregnés d'insecticide. pour Palpalis et non pour Morsitans.

Au Rwanda une nouvelle approche a été essayée mais les preuves de son efficacoté font encore défaut. En gros, elle consiste en morceaux de pneus usagés, la partie concave enduite d'un insecticide résistant, suspendu aux bouquets d'arbres situés dans la zone de tsetse. La partie concave du pneu permet un refuge à la lumière du soleil et le caoutchouc est un excitant olfactif pour la tsetse. Les mouches ainsi attirés s'installent et ingurgitent une dose mortelle d'insecticide. Les premiers

résultats semblent encourageants et une expérience suivie est justifiée. En conséquence, il est recommandé qu'un essai soit mené par le projet agro-pastoral BGM, en collaboration avec Mr. J. Hanotier, dans la zone tampon du parc national de l'Akagera afin d'essayer de prévenir la traversée de cette zone par la tsetse. (le gérant du Ranch de Rusumo est revenu recemment d'une session de formation organisée conjointement par la France et la FAO sur l'éradication de la tsetse et de la trypanosomiase; il sera d'un grand secours pour le suivi de cette opération).

Une rangée de pièges biconiques (Challier-Laveissière) sera installée initialement tous les 200 mètre à un kilomètre de la bordure nord de la zone tampon. Les prises hebdomadaires seront enregistrées sur une période d'un mois afin de suivre l'importance des passages de tsetse à travers la zone. Postérieurement, deux rangées de pneus-pièges passés à l'insecticide seront placées à 200 et 300 m respectivement de la bordure de la zone tampon. Ces pièges seront placés à 200 m, ceux de la seconde rangée étant decalés par rapport à ceux de la première rangée. Les pièges biconiques resteront en place pour une période non-déterminées et les prises seront enregistrées chaque semaine. Si les pièges constitués à l'aide de pneus sont efficaces, aucune prise ne sera enregistrée avant que l'effet toxique du Dieldrin n'ait disparu. Le retraitement des pneus piège permettra de les rendre efficaces à nouveau.

La hauteur à laquelle les pneus-pièges sont suspendus peut constituer un facteur clé. En conséquence il est suggéré que les pièges soient visibles au dessus de l'herbe, et qu'ils soient placés dans des éclaircies de 4 m2 environ.

6. Programme de travail proposé

6.1 Novembre/Décembre 1981

- fin de l'éradication de la regénération dans la zone tampon du parc national;

- déterminer les périodes de protection des ranches de Rusumo et de Nasho par le trypanidium;

- commander l'équipement pour le diagnostic trypanosomiase;

- commander l'insecticide pour l'éradication de la tsetse et pour les essais (empêchement de la ré-invasion à travers des zones tampons), et les pièges biconiques;

- étude sur les cas de trypanosomiase humaine;

Décembre 1981 - Juin 1982;

- recrutement du consultant entomologiste et participation du personnel ISAR.

6.2 Janvier - Juin 1982

- fin de la détermination de la période de protection par le trypamidium, traitement en bloc de tout le bétail avec des doses de Berenil, suivi deux semaines plus tard par le trypamidium, puis continuer en fonction de la période de protection procurée par ce dernier;

- débuter les expériences d'arrêt de la re-invasion à travers les zones tampon;

- début de l'étude de la tsetse par le consultant entomologiste et achèvement par l'équipe ISAR;

- achat d'équipement pour le nettoyage du terrain;

- commander d'herbicide pour un essai limité du contrôle de la regénération et application expérimentale sur 50 ha.

- début du nettoyage (selectionné) du terrain où la tsetse est abritée sur Nasho et sur les ranches-coopérative comme indiqué dans l'étude sur la tsetse.

6.3 Juillet - Décembre 1982

- continuer le traitement prophylactique trypanocide

- continuer le contrôle du passage par la tsetse de la zone tampon;

- continuer le programme de nettoyage du terrain;

- évaluer l'impact de la pulvérisation de l'herbicide;

- procéder à l'application de l'insecticide en Août-Septembre;

- suivre l'impact de l'application de l'insecticide d'octobre à Décembre;

6.4 Janvier - Juin 1983

- re-traitement des foyers résistants si nécessaire;

- application d'herbicides sur les zones tampon et sur les zones nettoyées aau cours de Mai - Juin.

- empêcher le passage de la zone tampon par la tsetse grâce à des pneus-pièges si ils s'avèrent efficaces, et continuer à utiliser cette méthode.

6.5 Mai - Juin 1984

- application d'herbicide sur le reste des zones tampon et des zones nettoyées.

7. Coût de l'opération

7.1 Consultations

	US$
Entomologiste 60 hommme/jours	12.500
Specialiste en application d'herbicide 14 homme/jours	2.500
Sous-total	15.000

7.2 Nettoyage du terrain

Nettoyage manuel de 1600 ha en utilisant des haches et des machettes; (ranch de Nasho: 400 ha de rives lacustre et de fourrés habités par G. pallidipes; terrain cooperative: 1.200 ha habités par G.mortisans).

La superficie à être nettoyée est arbitraire puisque l'étendu de l'invasion de la tsetse est inconnue et en conséquence l'estimation faite constitue peut-être un maximum. Le besoin de 60 hommes jour par ha semble être une estimation raisonnable est il correspond à ce qui est nécessaire dans d'autres pays ayant une végétation similaire. Le nettoyage ne veut pas dire l'élimination de toute végétaton dans la zone; Il est recommandé de conserver de 30 à 40 troncs nettoyés d'arbres par hectare.

	SE.U.
Personnel - 4 Superviseurs pour 4 équipes de 60 travailleurs chacune pour une période de 16 mois (4xFR130x35 hommes jours/mois x 16)	2.610,00
Main d'oeuvre - 1.600ha x $65 (FR100/homme jour)	104.000,00
Matériel/Remplacement (machetes, haches)	6.000,00
Divers (medicine)	2.800,00
Sous-total	115.510,00

7.3 Eradication de la regénération

Il est proposé de traiter une surface de 50 ha avec du Tordon, à titre expérimental, dans l'une des zones tampon en Mai au Juin 1982 lorsque les plantes sont en fleur. Une pulvérisation de defoliant avec des ponpes pressurisées consommera environ ~~11,5~~ lt/ha, et nécessitera 2 homme-jours; on peut estimer de façon arbitraire que 50% seulement de la surface nécessitera un traitement. 1,5 l/Ha

	$E.U.
Main d'oeuvre 100 homme-jours à FR100	110,00
Herbicides à 15,6$/lt.	1.170,00
Matériel (2 pompes à pulvériser, entonnoirs, seaux, boîtes à mesurer)	200,00
Sous-total	1.480,00

Les coûts de l'expérience seront en conséquence de 30 US$/ha. Le nettoyage de la zone tampon et des zones de brousses couvrent 5.160 ha. Si la largeur de la zone tampon du parc national devrait être reduite, comme suggéré, la superficie totale serait 3.940 ha.

Si l' application d'herbicide pour l'éradication s'avère concluante, le coût estimé de l'éradication devra probablement être modifié à la lumière de l'expérience tentée, l'efficacité de laquelle devant être connue au cours de novembre/décembre 1982. La totalité de la zone pourrait être traitée sans inconvénient au cours de deux saisons des pluies, soit un total de 4 mois - mai/juin et novembre/décembre 1983.

	$ E.U.
Main d'oeuvre	
2 superviseurs (4 mois à 25 jours/mois à FR150/jour)	330,00
80 pulvérisateurs/porteurs à FR100	8.500.00
Herbicides	92.664,00 - 120.74
40 pulvérisateurs	2.500,00
Matériel divers/pièces détachées	500,00
Frais de fonctionnement, 1 camion	5.000,00
Sous-total	109.494,00

Les opérateurs des pompes à pulvériser alterneront leur tâche avec celle de porteur, afin d'acheminer la solution d'insecticide jusqu'à l'endroit où la pulvérisation aura à être effectuée. Les pompes à sac préssurisé utilisées pour pulvérisation seront également pour l'application de l'insecticide (le compresseur de pulvérisation MARUT est bien adapté au niveau de pression et à la profondeur de la cavité de l'injecteur).

Etant donné que l'achat d'un camion lourd n'est pas justifié pour un programme de travail de 4 mois, aucune prévision du coût n'a été faite à ce sujet. Le transport sera fourni par une autre section du projet.

7.4 Etude de la tsetse

Une équipe de l'ISAR, ayant des connaissances sur l'écologie de Glossina, et composée d'un responsable de terrain avec 6 assistants sera nécessaire pour une période de 9 mois.

Mars - Juillet 1982	: Etude de pré-pulvérisation
Octobre - Novembre 1982	: Etude de post-pulvérisation
Mars - Avril 1983	: Contrôle de post pulvérisation

		$ E.U.
Salaires:	- responsable de terrain 150 SEU par mois	1.350,00
	- 6 Assistants à 75 $E.U par mois	4.050,00
	Indemnité journalière, 50% des salaires	2.200,00
	Frais de fonctionnement des véhicule (1 véhicule léger, 4 roues motrice	8.000,00

Au cours de la période Mars - Avril 1982 le personnel de l'ISAR recevra ses instructions du consultant entomologiste. Le calendrier pourra être modifié au début de l'étude en février, pour s'assurer de la localisation des habitats en saison sèche; des contraintes de recrutement et de non disponibilté de matériel essentiel pourraient être les causes de retard de l'étude.

7.5 Matériel pour les études sur la tsetse

L'étude technique sera largement basée sur les pièges biconiques mais ceci n'exclut pas l'utilisation d'autres méthodes.. Quoique les pièges biconiques peuvent être commandés à ICIPE, Nairobi, ou à l'Université de Salford en Grande Bretagne, il est suggéré que ces pièges soient préparés localement à cause des délais possible de livraison. Le mode de construction figure en annexe. Un petit nombre de pièges peut être immédiatement disponible à l'Université de Salford, et il serait intéressant d'obtenir des précisions à ce sujet, car si ils sont disponibles, les essais sur le passage de la zone tampon pourraient commencer plus tôt.

	Dollars US
pièges biconiques - 150 à $50	7.500,00
- 100 pour l'étude	
- 50 pour les essais de passage de la zone tampon	
Matériel entomologique (écrans de tissus, gaze, pour les filets de prise, matériel du bureau, reproduction de cartes, etc...)	1.500,00
Sous-total	9.000,00

7.6 Eradication de la tsetse: insecticide

La qualité de Dieldrex 15 (T) nécessaire est estimée à 7.000 litres pour une zone de 4600 ha comprenant Nasho, le ranch coopérative et la zone d'aménagement de Kamomdo. 750 litres supplémentaires seront peut-être nécessaires pour traiter les foyer résistants, les endroits réinfestés sur le ranch de Rusumo et pour enduire les pneus-pièges.

Le matériel pour l'application d'insecticide et d'herbicide est similaire, et comme ces applications seront décalées dans le temps, le même matériel pourra être ré-utilisé. Les véhicules de transports seront fournis par le Centre d'éradication de la tsetse.

Du personnel temporaire sera employé parce que les opérations de pulvérisation, y compris le retraitement des foyers résistants, devraient s'étendre sur une période de 3 mois, soit 75 jours ouvrables.

- 6 jours de formation par le spécialiste en insecticide
- 6 jours de formation sur le terrain
- 63 jours pour les différentes pulvérisations, et en tenant compte des conditions atmosphérique (pluie 0, des pannes, des retards, et de l'entretien de l'équipement.

Les préparateurs devront toujours avoir un stock de Dieldrex 3% prêt à être acheminé par les porteurs aux agents chargés de la pulvérisation.

Les preparateurs, les porteurs et les pulvérisateurs, devront être équippés avec des vêtements de protection consistant en bleu de travail, bottes et un chapeau afin de réduire le contact de la peau avec l'insecticide; ces équipements devront être lavés régulièrement.

Dieldrex 15 (T) est fournie par bidons de 20 et 200 litres; ceux du 20 litres sont pratiqués pour transporter la solution d'insecticide. Des précautions devront être prises lors du nettoyage des vêtements imprégnés d'insecticide, ou des équipements contenant de l'insecticide (pompes d'aspersion, matériel de mélange, bidons), et les eaux utilisées pour ces nettoyage devront être collectées dans un puisard, qui est généralement une fosse de 1,5 m de profondeur.

Cinq ouvriers assisteront les agents pulvérisateurs, en ouvrant des bandes à travers les fourrés denses, lorsque cela sera nécessaire.

Le spécialiste en insecticide sera chargé d'expliquer et de montrer l'organisation des activités de pulvérisation, les techniques de pulvérisation, les façons d'économiser le temps de travail.

- 20 agents pulvérisateurs à FR150/jour	1.400,00	
2 superviseurs à FR200/jour	350,00	
- 12 ouvriers à FR100/jour (10 porteurs, 2 préparateurs)	2.500,00	
		4.250.00
Insecticide à $9/ litre		70.000.00
Matériel (pris en compte sous le para. 7.3)		--
Vêtements de protection		2.000.00
Frais de fonctionnement des véhicules (1 camion, 1 véhicule leger)		5.000.00
Imprévus - retraitement des foyers résistants		6.000.00
- endroits ré-infestés		-
- fournitures médicales		
Sous-total		87.250,00

7.7 Eradication de la trypanosomiase

Le coût de l'éradication de la trypanosomiase ne peut pas être estimé à ce stade parce que les intervalles entre les traitements à effectuer et le nombre de têtes de bétail ne sont pas connus.

Le facteur le plus important est la fréquence avec laquelle le traitement doit être appliqué.

Quelques chiffres sur les coûts de différents régimes trypanocide sont donnés en Annexe 4. Ces coûts proviennent d'une étude économique effectuée dans un ranch situé dans l'arrière pays de la Côte Kenyanne, et portant sur la chemiothérapie pour l'éradication de la trypanosomiase du bétail. Ces chiffres doivent être pris uniquement comme indicatifs, du fait que le coût du matériel et des médicaments varie de pays à pays. De surcroit les coûts de main d'oeuvre, de transport et de contrôle peuvent être partagés lorsque plusieurs maladies sont traitées en même temps.

Etant donné les conditions de la zone étudiée, les pertes estimées dues à la trypanosomiase, si aucun trypanocide est utilisé, sont de $EU 989,93 par km2 avec une densité de 14,2 Unité Bétail Tropical (UBT = 500 kg) par km2.

8. Récapitulation des coûts

	$ U.E.
Consultants	15.000
Nettoyage du terrain	115.500
Eradication de la regénération (essai)	1.500
Eradication de la régénération	109.500
Etudes de la tsetse	15.600
Eradication de la tsetse (pulvérisation)	87.250
Matériel pour les études de la tsetse	9.000
Total général	353.350

Notes: (i) Aucun coût n'est inscrit pour l'achat de véhicules de transport, magasin pour le matériel, le secrétariat et la supervision générale.

(ii) Si l'éradication de la régénération par herbicide n'est pas satisfaisante, le coût total sera réduit de $E.U. 109.500. Dans ce cas, il faudrait prévoir de couvrir les coûts correspondants à une éradication manuelle, tous les 3 ans.

ANNEX 4

REQUESTS FROM GOVERNMENT OF RWANDA

REPUBLIQUE RWANDAISE

2è CIARA - GENEVE 21-23 Mai 1984

Le 26 Mai 1983

AVANT PROJET
DE FICHE RESUMEE DE PROJET

A. INFORMATIONS GENERALES

N° Ref. .../AGF.

1. Intitulé du Projet : VALORISATION DU CHEPTEL ET AMENAGEMENT DU RANCH de NASHO
2. Lieu d'Information : Autour du Lac NASHO; au Nord-Est de la Préfecture de KIBUNGO
3. Secteur et Branche d'activité : Secteur productif -Agriculture - Mise en valeur des terres et des parcours pastoraux.
4. Ministère de tutelle : Ministère des Affaires Sociales et du Développement Communautaire
5. Organisme de Suivi d'exécution: Ministère de l'Agriculture et de l'Elevage/Projet Bugesera-Gisaka-Migongo
6. Organisme de gestion : Ministère de l'Agriculture et de l'Elevage/Projet Bugesera-Gisaka-Migongo
7. Durée d'étude et de réalisation: 4 ans
8. Date souhaitable de démarrage : Septembre 1984
9. Coût global approximatif : estimation FRW et US dollars constants : 430.250.000 FRW ; 4.626.000 US dollars.

B. OBJECTIFS DU PROJET:

10. Motivations:

- L'Aménagement du Ranch de NASHO permettra d'Installer les Eleveurs Réfugiés avec leurs troupeaux estimés actuellement à 12.000 têtes de Bétail à ramener à 7.400 têtes pour tenir compte de la capacité d'accueil des terres de pâturages;
- Combiné avec la varolisation du cheptel, cet aménagement entraîne un mieux être des Réfugiés eux-mêmes et des populations rwandaises environnantes par la mise en vente de leurs productions (lait-viandes);
- La production escomptée des animaux des réfugiés et de ceux des populations locales manque de façon criante des moyens de transformation pour en faciliter l'écoulement;
- La situation économique tant des Eleveurs réfugiés que des populations locales plaide pour une intensification de l'Elevage dans cette zone aux conditions bioclimatiques marginales sur le plan agronomique;
- Enfin, dans le cadre de la protection de l'Environnement, un reboisement sur des crêtes dénudées s'avère impérieux.

C. DESCRIPTION SOMMAIRE DU PROJET ET MOYENS A METTRE EN OEUVRE

11. Etudes préalables à l'Exécution : Le Gouvernement rwandais dispose d'études en relations avec le Projet, Mais des Etudes Complémentaires sont nécessaires (Etudes architecturales - Relevés topographiques.....

12. Consistances du Projet :

Le Projet consiste à :

- Construire un Deeping-Tank, 9 logements pour vétérinaires, des abris-couloirs de traitement, Dix abreuvoirs en dur, un Parc de tri du Bétail, un Quai de chargement, un Abattoir, une laiterie, un centre de traitement des peaux;
- Installer une Bascule pèse-bétail;
- Installer des cultures fourragères d'appoint, Elaguer des arbres sur 1200 Ha, Débroussailler les fourrés sur 5.600 Ha, Appliquer un Herbicide et un insecticide, Enrichir les pâturages avec du Centrosema et du Brachiaria, reboiser 2.000 Ha de crêtes dénudées

13. Moyens à mettre en oeuvre

- Sur base des Etudes disponibles au MINAGRI, La Direction du Projet BGM sera responsable de la mise en oeuvre des différentes phases du Projet. Certaines actions seront confiées à des Entreprises spécialisées, d'autres seront exécutées en régie avec les moyens du Projet.

Le Projet BGM détachera un médecin vétérinaire à temps partiel, un Zootechnicien, Trois techniciens vétérinaires, un technicien Agronome, un technicien du génie civil, Onze Infirmiers zootechniciens-vétérinaires, un comptable et 60 agents d'appui.

Il sera nécessaire également de fournir des marques d'oreilles, du matériel vétérinaire, des graines de Centrosema et de Brachiaria du matériel d'abattoirs, des pots à lait, de la tuyauterie, du ciment, du mobilier, des produits vétérinaires (Antibiotiques, Acaricides, Trypanocides, Vermifuges, Sulfamides, antiseptiques, colorants divers.....), un groupe électrogène (20-30 KVA), un Pasteurisateur, une Ecrémeuse, une Barratte, des cuves d'arrivée et de refroidissement du lait, un congélateur, Deux frigidaires, un camion frigorifique, Trois véhicules tout-terrains, Onze motocyclettes, une Bascule pèse-Bétail et des produits phytosanitaires anti-termites.

D. RESULTATS ATTENDUS :

14. Effets directs et indirects du Projet sur les Réfugiés et sur les populations rwandaises environnantes :

Le Projet ainsi conçu permettra de traiter 3.000 litres de lait par jour;

- d'abriter un cheptel de 7.400 têtes de bétail;
- de commercialiser 10 T de viande par an;
- de Reboiser 2.000 Ha et d'éradiquer la mouche tsé-tsé sur 20.000 Ha.

E. CONDITIONS DE FINANCEMENT :

15. Estimation du coût en 1983 : 346.000.000 FRW; 3.720.000 US dollars.

16. Echéancier de réalisation :

	1984	1985	RESTE	TOTAL
En FRW courants 1983	69.200.000	173.000.000	103.800.000	346.000.00
En FRW courants 1984	76.120.000	209.330.000	144.801.000	430.250.00
En Dollars US courants 1983	744.000	1.860.000	1.116.000	3.720.00
En Dollars US courants 1984	818.400	2.250.000	1.556.820	4.626.00

17. Répartition des dépenses par nature d'activité et selon l'origine des biens et services nécessaires à la réalisation du Projet :

Etudes, expertise, formation	: 5%	soit	231.300	US dollars
Constructions, équipement	: 70%	soit	3.238.200	US dollars
Assistance, mise en route	: 25%	soit	1.156.500	US dollars
TOTAL	100%	soit	4.626.000	US dollars

dont achats de biens et de services Rwandais : 50%
achats de biens et services importés : 50%

F. GESTION ET ORGANISATION DU PROJET :

18. Fonctionnement du Projet :

Après réalisation, la direction du Projet BGM assurera le fonctionnement du Présent Projet pour le compte du Gouvernement Rwandais

19. Evaluation des contributions locales et charges récurrentes :

Le Gouvernement Rwandais mettra à la disposition du Projet des terrains nécessaires à sa réalisation. Il exonérera des droits de douanes des importations des biens d'Equipement.

En attendant que le Projet réalise autofinancement de son fonctionnement, le Gouvernement Rwandais apportera son appui au fonctionnement du Projet. Les charges récurrentes sont de l'ordre de 23 millions de Francs Rwandais par an soit 247.312 US dollars par an.

PROJET D'AMENAGEMENT DU RANCH DE NASHO

PARTIE A : RENSEIGNEMENTS DE BASE

1. Pays : RWANDA
2. Lieu du Projet : Autour du Lac NASHO; au Nord-Est de la Préfecture de KIBUNGO.
3. Titre du Projet : Installation des Eleveurs (Aménagement d'un Ranch).
4. Date du début du Projet : FEV. 1983.
5. Date d'achèvement proposée : MARS 1988.
6. Service gouvernemental responsable des questions relatives aux réfugiés : MINASODECO.
7. Organisations chargées de la mise en oeuvre : MINASODECO/HCR/MINAGRI
8. Besoins financiers globaux : 1.414.982,3 US DOLLARS.
9. Catégorie de personnes à assister : Réfugiés Eleveurs.
10. Catégorie d'assistance à fournir : Aménagement d'un Ranch pour 7.428 têtes de bétail.

PARTIE B : DESCRIPTIF ET JUSTIFICATIFS

1. Historique des localités

Le Ranch de NASHO fut conçu au départ pour abriter un Ranch administratif géré par le Projet Agro-pastoral BUGESERA - GISAKA/MIGONGO.
Par la suite, les orientations de ce ranch furent modifiées au profit d'un ranch collectif pour les éleveurs locaux.
Le ranch comprenait alors un centre technique, un deeping tank et un certain nombre de couloirs de traitement contre les tiques ainsi qu'un réseau de pare-feux sur une partie de la zone du Projet.

Avec l'arrivée des Eleveurs réfugiés ougandais, cette zone fut gelée pour sauver leurs animaux qui commençaient à mourir au MUTARA. Le bétail existant dans la zone fut donc évacué vers RUSUMO (Station d'Elevage) pour céder la place aux nouveaux arrivés.

A l'heure actuelle, la zone a une superficie de 8000 Ha pâturables et ne peut abriter que 7.428 têtes de bétail si toutefois les aménagements proposés sont réalisés.
Le souci majeur du projet consiste à sauver le maximum possible des animaux réfugiés. Ceci implique l'amélioration des pâturages, la création d'un certain nombre d'investissement pour permettre la gestion du cheptel et des pâturages etc....
Les charges réccurentes devraient être supportées par les éleveurs eux-

mêmes après un fonctionnement de cinq ans du Projet.

2. Besoins pour ce Projet

Il s'agit de financer les rubriques suivantes :

2.1. Investissements

Les investissements à réaliser tiennent compte du grand nombre d'animaux présents dans la zone. Il s'agit donc de construire un deeping-tank, des couloirs de traitements et leurs abris, des abreuvoirs ainsi que la finition du réseau de pare-feux.

De même, pour permettre au troupeau de 7.428 têtes de vivre et de produire dans de bonnes conditions, il faut enrichir les pâturages, éliminer les buissons et cultiver de nouvelles cultures fourragères d'appoint.

2.2. Fonctionnement

Le fonctionnement comprend les charges de personnel, des entretiens divers (Pare-feux, pistes, cultures fourragères, ...) ainsi que les produits et le matériel vétérinaires.

Le Gouvernement ne pouvant pas supporter toutes ces charges et la situation financière des réfugiés ne pouvant pas en supporter le coût, il est proposé que le projet soit supporté par une source de financement extérieure pour une durée de cinq ans.

3. Projets antérieurs

Le Ranch de NASHO initial était un Ranch géré par le Projet B.G.M. sur financement conjoint BADEA-IDA. Il avait pour objectif principal l'engraissement de jeunes Taurillons-Bouvillons jusqu'à l'âge d'abattage. Par la suite, l'engraissement de taurillons-bouvillons fut jugé non rentable et s'en suivit un désengagement progressif du Ranch administratif pour en faire après complément d'infrastructures un Ranch collectif pour Eleveurs locaux. L'arrivée des Réfugiés ougandais devait bouleverser les perspectives alors arrêtées.

En 1967, fut créé par l'A.I.D.R. à Rusumo un ranch naisseur avec comme objectifs la fourniture de génisses améliorées aux paysans locaux ainsi que la production de mâles pour la boucherie. Le Ranch de RUSUMO est appelé à subvenir à ses besoins en réalisant dès 1985 des recettes de l'ordre de 18.000.000 F.RW couvrant ainsi ses dépenses tout en renouvelant son matériel et en réalisant des bénéfices.

4. Agence d'exécution

Le MINAGRI (Ministère de l'Agriculture et de l'Elevage) par l'intermédiaire du Projet agro-pastoral BUGESERA - GISAKA/MIGONGO est tout indiqué pour exécuter ce nouveau Projet. L'expérience acquise dans la gestion du Ranch de Rusumo est un gage pour le succès du Ranch de NASHO.

PARTIE C : DESCRIPTION DU PROJET

1. Objectifs du Projet

Le projet a pour objectif l'installation des Réfugiés-Eleveurs dans la zone de NASHO.
Pour ce faire, il est nécessaire de compléter les infrastructures existantes afin de permettre l'exploitation rationnelle d'un troupeau de 7.428 têtes de Bétail.
Pour atteindre cet objectif, les infrastructures complémentaires à réaliser sont :

- Les constructions (Deeping-tank, logements du personnel, abreuvoirs abris des couloirs de traitement).
- La finition du complexe pare-feux.
- L'installation des cultures fourragères d'appoint.
- La fourniture d'un matériel vétérinaire pour les soins du bétail.

Enfin, le présent projet prévoit des frais de fonctionnement consistant en frais de personnel, frais de bureau, produits vétérinaires etc...

2. Description de l'Assistance à fournir par secteur et composants

2.1. Constructions

2.1.1.	Deeping-Tank	:	2 500 000.- FRW
2.1.2.	Neuf logements pour vétérinaires	:	13 500 000.- FRW
2.1.3.	Abris couloirs	:	720 000.- FRW
2.1.4.	Dix abreuvoirs en dur	:	4 000 000.- FRW
2.1.5.	Finition complexe pare-feux	:	200 000.- FRW
	TOTAL 21		20.900.000.- FRW

2.2. Amélioration, Enrichissement des pâturages et Santé animale

2.2.1	Cultures fourragères d'appoint	:	3.600.000.- FRW
2.2.2.	Elagage sur 1.200 Hectares	:	12.000.000.- FRW
2.2.3.	Enrichissement avec centrosema sur 1.000 Hectares	:	200.000.- FRW
2.2.4.	Travaux culturaux	:	400.000.- FRW
2.2.5.	Santé animale (MATERIEL D'EQUIPEMENT VETERINAIRE) :		
2.2.5.1.	Microscopes = 4 x 80.000	:	320.000.- FRW
2.2.5.2.	Petit matériel divers	:	250.000.- FRW
2.2.5.3.	Frigo Electrolux	:	150.000.- FRW
	Machaura		4000000
	TOTAL 22		16.720.000.- FRW

2.3. Fonctionnement général annuel

2.3.1.	Personnel d'encadrement technique (Salaires) :		
2.3.1.1.	Chef de Ranch A2 = 24 500 x 12	:	294.000.- FRW
2.3.1.2.	Chef de Ranch adjoint A2 = 15 000 x 12	:	180.000.- FRW
2.3.1.3.	Vétérinaires A3 = 12.000 x 11 x 12	:	1.584.000.- FRW
2.3.1.4.	Capitas tous travaux: 6 000 x 2 x 12	:	144.000.- FRW
2.3.1.5.	Indemnités diverses (Pharmacie, Prime)	:	610.200.- FRW
2.3.2.	Main-d'oeuvre permanente (salaires) :		
2.3.2.1.	Gardiens de centres de zone (175 x 30 x 5 x 12)	:	315.000.- FRW
2.3.2.2.	Main-d'oeuvre Aspersion (125 x 30 x 45 x 12)	:	2.025.000.- FRW

... / ...

2.3.3.	Frais de bureau	: 80.000.-FRW
2.3.4.	Entretien Pistes	: 200.000.-FRW
2.3.5.	Entretien cultures fourragères	: 400.000.-FRW
2.3.6.	Produits vétérinaires	: 10.000.000.-FRW
2.3.7.	Entretien des Pare-feux	: 200.000.-FRW
2.3.8.	Fonctionnement véhicules (2P.U. + 5 Motos)	: 2.450.000.-FRW
	TOTAL 23	18.482.200.-FRW
TOTAL GENERAL (21 + 22 + 23)		= 56.122.200.-FRW

PARTIE D : BESOINS FINANCIERS

1. Totaux des besoins financiers : 1.414.982,3 US Dollars

2. Besoins et Sources possibles de financement par année civile

ANNEE	GOUVERNEMENT U.S. Dollars	COMMUNAUTE INTERN. U.S. Dollars	TOTAUX (US Dollars)
1983	p.m.	p.m.	p.m.
1984	22.391,5	266.872	289.263,5
1985	22.391,5	259.038,2	281.429,7
1986	22.391,5	259.038,2	281.429,7
1987	22.391,5	259.038,2	281.429,7
1988	22.391,5	259.038,2	281.429,7
TOTAL	111.957,5	1.303.024,8	1.414.982,3

3. Détail des différents volets et Budget alloué

Les dépenses du Gouvernement concernent les salaires du Personnel d'encadrement ..... 111.957,5 US Dollars

Les autres dépenses concernent les investissements réalisables en cinq tranches (sauf matériel vétérinaire acheté dès le début) et le fonctionnement non supporté par le Gouvernement;
d'où Dépenses supportées par la communauté internationale
Internationale de ..... 1.303.024,8 US Dollars

N° de Réf. 07/A.E.P

FICHE DE PROJET

A. INFORMATIONS GENERALES :

1. Intitulé du projet: Alimentation en eau potable (en deux phases);
2. Lieu d'implantation : Nasho; au nord-est de la Préfecture Kibungo;
3. Secteur et branche d'activité :
   - secteur relatif aux conditions d'accueil, de séjour et de vie des populations réfugiées
   - sous-secteur d'accueil, d'aménagement de bases de vie et de satisfaction de besoins essentiels
4. Ministère de tutelle: Ministère des Affaires Sociales et du Développement Communautaire.
5. Organisme d'exécution : Ministère des Ressources Naturelles
6. Organisme de gestion : Projet BUGESERA-GISAKA-MIGONGO.
7. Durée d'étude et de réalisation: six mois
8. Date souhaitable de démarrage : septembre 1984
9. Coût global approximatif : estimation en FRW et $ US constants 1984 :
   705 millions FRW; 0,77 millions $

dont : phase I (dans l'immédiat)	: 35 millions FRW;	0,38 millions $ US
phase II	: 35 millions FRW;	0,39 millions $ US
T o t a l	: 70,5 millions FRW;	0,77 millions $ US

B. OBJECTIFS ET CONTEXTE DU PROJET :

10. Motivations du projet :

La région de Nasho, et plus spécialement les localités d'implantation des réfugiés, souffre d'une très grave pénurie en moyens d'alimentation en eau potable des populations et des troupeaux. Ces localités concernent une population de quelques 40.000 personnes, dont 5.000 réfugiés ugandais possesseurs d'un troupeau de 12.000 bovins.

Dans l'état actuel des choses, il est nécessaire de faire des déplacements de plus de 10 km en moyenne, pour trouver des points d'eau qui risquent de tarir lors de la saison sèche.

C. DESCRIPTION SOMMAIRE DU PROJET ET MOYENS A METTRE EN OEUVRE :

11. Etudes préalables:disponible au niveau du Ministère des Ressources Naturelles

161

12. Consistance du projet :

Le projet est réparti en deux phases selon les urgences :

Phase I : - Achèvement des adductions B et C dans le cadre du projet agro-pastoral du Bugesera-Gisaka-Migongo
- Construction de 20 réservoirs de 4 m3 chacun, en dur;
- Construction de 8 abreuvoirs de 4 m3 chacun, en dur
- Pose de 8 bornes-fontaines;
- Réalisation d'une nouvelle adduction en complément des adductions B et C. du projet Bugesera-Gisaka-Migongo.

Phase II: - Captage de deux sources distinctes ayant respectivement des débits de 2 litres/seconde et d'1 litre/seconde, adduction à partir de ces deux sources à l'aide d'une conduite de 30 Km;
- construction de 15 réservoirs de 4 m3 chacun, en dur;
- construction d'un réservoir central de 200 m3, en dur.

13. Moyens à mettre en oeuvre :

La réalisation du projet sera confiée à un entrepreneur spécialisé dans ce secteur d'activité.

D. RESULTATS ATTENDUS :

14. Effets directs et indirects du projet sur les réfugiés et sur les populations rwandaises environnantes :

Phase I : alimentation en eau potable des réfugiés et de leurs troupeaux.

Phase II: alimentation en eau potable des populations et du bétail des réfugiés et des populations rwandaise avoisinantes.

E. CONDITIONS DE FINANCEMENT :

15. Estimation du coût en 1983 : 63,5 millions de FRW; 0,7 million $ U.S.

16. Echéancier de réalisation :

Unités: millions FRW et de $ US

	1984	1985	Reste	Total
en FRW constants 1984	70,5	-	-	70,5
en FRW courants	70,5	-	-	70,5
en $ US constants 1984	0,77	-	-	0,77
en $ US courants	0,77	-	-	0,77

../...

160

17. Répartition des dépenses par nature d'activité et selon l'origine des biens et services nécessaires à la réalisation du projet :

en millions $ US constants 1984

Etudes, expertise, formation	:	- %	-
Construction, équipements	:	100%	0,77
Assistance, mise en route	:	- %	-
Total	:		0,77
dont achats biens et services rwandais	:	100%	
achats biens et services importés	:	-	

F. GESTION ET ORGANISATION DU PROJET :

18. Fonctionnement du projet :

Ce projet s'intègre dans celui agro-pastoral régional du B.G.M.

19. Evaluation des contributions locales et charges récurrentes :

Le projet B.G.M. pourvoiera aux frais d'entretien.

G. ETUDES EXISTANTES :

20. - étude adduction d'eau B et C
- étude adduction complémentaire d'eau - nouvelle

disponibles au Ministère des Ressources Naturelles

PROJET " ERADICATION DE LA MOUCHE TSÉ-TSE

PARTIE A : RENSEIGNEMENTS DE BASE

1. Pays : RWANDA
2. Lieu du Projet : Autour du Lac NASHO; au Nord-Est de la Préfecture de KIBUNGO.
3. Titre du Projet : Eradication de la mouche tsé-tsé.
4. Date de début du Projet : MARS 1984.
5. Date d'achèvement du Projet : JUIN 1986.
6. Service Gouvernemental responsable des questions relatives aux Réfugiés : MINASODECO
7. Organisations chargées de la mise en oeuvre : MINASODECO/HCR/MINAGRI
8. Besoins financiers globaux : 438.853 US DOLLARS
9. Catégorie de Personnes à assister : Réfugiés-Eleveurs.
10. Catégorie d'Assistance à fournir : Eradication de la mouche tsé-tsé.

PARTIE B : DESCRIPTIF ET JUSTIFICATIFS

1. Historique des Localités

C'est en 1977 que débutèrent les premiers travaux d'éradication de la mouche tsé-tsé. Ces travaux comprenaient le Fly-Belt de RUSUMO ainsi que le Corridor dit "AKAGERA" allant de Rusumo au Sud du Parc National de l'Akagera au niveau du Lac NASHO.

Il y eut alors interruption sous les protestations des écologistes mal informés et ce n'est qu'en 1978 que reprirent les travaux après assurances données par les analyses effectuées par le Centre de Recherche de Phytopharmacie de GEMBLOUX d'une part et par le Laboratoire de Toxicologie de l'UNIVERSITE DE GAND d'autre part quant à l'innocuité de la méthode utilisée.

Les travaux de 1978 ne furent pas suivis par un traitement indispensable des gîtes résiduaires.

En 1979, une équipe de l'ISAR devait constater la présence de quelques gîtes résiduaires de Gl. pallidipes (Fly-Belt de MPANGA) mais aussi de vastes zones infestées de Gl. morsitans Westw dans le Corridor AKAGERA et quelques gîtes dans la cuvette de RUSUMO.

La pulvérisation à la dieldrine fut entreprise alors en 1980 mais ne fut pas complète faute de produit.

En 1980-81, ce sont les travaux d'entretien des Couloirs antiglossinaires qui eurent lieu (3.560 Ha).

2. Besoins pour ce projet

A l'heure actuelle, toute la zone infestée de Glossines comprend une bande à RUSUMO le long de la rivière AKAGERA dans le Couloir anti-glossinaire de RUSUMO, le Corridor AKAGERA depuis le Nord-extrême du paysannat de RUSUMO jusqu'à KAGESE, le couloir anti-glossinaire en bordure du Parc National ainsi que la zone autour des Lacs NASHO-RWAMPANGA et RWEHIKAMA.
Ces zones sont infestées de Glossina morsitans West$_W$ et dans les fourrés entourant les lacs par Glossina pallidipes.
Il faut signaler ici que le PARC NATIONAL est infesté dans sa totalité ainsi que l'Ouest Tanzanien tout au long de la rivière AKAGERA.

Le présent projet tient compte des déboires passés et cherche à combiner plusieurs méthodes de façon à protéger la zone des sources d'infestation extérieures (Parc National - Tanzanie).
Les méthodes ici préconisées tiennent compte des observations et des recommandations d'une mission F.A.O. (Mr LEROUX .- Oct. 1981) pour une éradication plus ou moins définitive.

3. Projets antérieurs

Il y a eu des tentatives de traitements mais aussi incomplètes les unes que les autres (1977, 1978).

4. Agence d'Exécution :

L'Institut des Sciences Agronomiques du Rwanda (ISAR) possède un personnel qualifié pour la prospection et la pulvérisation.
Par ailleurs, le Projet B.G.M. emploie un Docteur Vétérinaire qui a suivi un cours des Spécialistes de la lutte contre la mouche Tsé-Tsé et la Trypanosomiase.
Ainsi le Ministère de l'Agriculture et de l'Elevage par l'intermédiaire de l'Institut des Sciences Agronomiques du Rwanda et du Projet BUGESERA et GISAKA/MIGONGO peut assurer l'exécution du Projet.

PARTIE C : DESCRIPTION DU PROJET

Cette méthodologie associe l'effet de la pulvérisation d'un insecticide avec la modification du biotope de la mouche tsé-tsé. De même la pose des pneus dans les Couloirs anti-glossinaires aurait pour effet la réduction du passage des glossines à travers elles.

Ainsi définie, cette méthode de lutte préconise les actions suivantes :

a - Pulvérisation de Dieldrine de manière sélective dans les zones de repos permanents des glossines.

b - Débroussaillement suivi d'application d'un herbicide systémique pour contrôler la végétation des couloirs anti-glossinaires ainsi que celle favorisant la reproduction des mouches. Ce contrôle permettrait également l'augmentation des surfaces pâturables par les animaux.
Comme dans toutes les campagnes de lutte anti-tsé-tsé, une équipe pour déterminer les zones à pulvériser est nécessaire. Celle-ci

Le présent projet ne prévoit pas l'achat d'un véhicule mais au cas où les autres opérations dans la même zone ne peuvent pas mettre à la disposition de l'action tsé-tsé des moyens logistiques, il faudrait prévoir l'achat ou location d'un pick-up tout terrain et d'un camion.

1. Description de l'Assistance à fournir par composants

1.1. Nettoyage du terrain

1.1.1.	Personnel d'Encadrement pour 4 équipes de 60 travailleurs chacune : (sur 16 mois) : 4 x 200 x 25 Hj/mois x 16	:	320.000.- FRW
1.1.2.	Main-d'oeuvre (1600 Ha) — FFU 100 x 60 x 4 x 25 x 16	:	~~9.600.000~~.- FRW
1.1.3.	Matériel (machettes - Haches)	:	600.000.- FRW
1.1.4.	Divers - forfait	:	300.000.- FRW
	TOTAL 1.1.		10.820.000.- FRW

1.2. Application de l'herbicide

1.2.1.	Superviseurs : 2 x 200 x 25 x 4	:	40.000.- FRW
1.2.2.	Pulvérisateurs (porteurs) 80 x 150 x 25 x 4	:	1.200.000.- FRW
1.2.3.	Herbicides (TORDON 101) — ? 5 160 x 5 x 900	:	23.220.000.- FRW
1.2.4.	Pulvérisateurs : 40 x 15 000	:	600.000.- FRW
1.2.5.	Matériel divers	:	50.000.- FRW
1.2.6.	Fonctionnement Camion	:	500.000.- FRW
	TOTAL 1.2.		25.610.000.- FRW

1.3. Etude de la Tsé-tsé

1.3.1.	Responsable de l'équipe : 15 000 x 9	:	135.000.- FRW
1.3.2.	6 Assistants : 7.500 x 9 x 6	:	405.000.- FRW
1.3.3.	Indemnités (50 % des Salaires)	:	270.000.- FRW
1.3.4.	Fonctionnement d'1 P.U. - 4 WD	:	750.000.- FRW
	TOTAL 1.3.		1.560.000.- FRW

1.4. Apllication d'Insecticide

1.4.1.	Superviseurs : 200 x 2 x 75	:	30.000.- FRW
1.4.2.	Pulvérisateurs : 150 x 20 x 75	:	225.000.- FRW
1.4.3.	Ouvriers : 100 x 12 x 75	:	90.000.- FRW
1.4.4.	Insecticides	:	700.000.- FRW
1.4.5.	Vêtements de protection	:	200.000.- FRW
1.4.6.	Fonctionnement véhicule	:	500.000.- FRW
1.4.7.	Imprévus	:	600.000.- FRW
	TOTAL 1.4.		2.345.000.- FRW

TOTAL GENERAL (11 + 12 + 13 + 14) = 40.335.000.- FRW

+ véhicule 1,20... 30,000.000

PARTIE D : BESOINS FINANCIERS

1. Totaux des besoins financiers : 438.853 US DOLLARS

PROJET " VALORISATION DES PRODUITS LAITIERS "

PARTIE A : RENSEIGNEMENTS DE BASE

1. Pays : RWANDA
2. Lieu du Projet : Autour du Lac NASHO; au Nord-Est de la Préfecture de KIBUNGO.
3. Titre du Projet : Valorisation des Produits laitiers.
4. Date de début du Projet : JUIN 1984.
5. Date d'achèvement du Projet : JUIL. 1989.
6. Service Gouvernemental responsable des questions relatives aux Réfugiés : MINASODECO.
7. Organisations chargées de la mise en oeuvre : MINASODECO/HCR/MINAGRI
8. Besoins financiers globaux : 368.130 US DOLLARS
9. Catégories de personnes à assister : E Réfugiés-Eleveurs de la Régio
10. Catégorie d'assistance à fournir : Assainissement du cheptel + Laiterie.

PARTIE B : DESCRIPTIF ET JUSTIFICATIFS

1. Historique des localités

La zone de NASHO était jusqu'ici vide d'animaux d'élevage. Quelques éleveurs des plateaux de Nyarubuye venaient faire paître leurs animaux en saison sèche. Depuis l'installation du Projet Agro-pastoral BUGESERA - GISAKA/MIBONGO dans une partie de cette zone, cette habitude avait momentanément disparu.

Des l'arrivée des Réfugiés ougandais, les animaux B.G.M. qui y pâturaient ont été transférés au Ranch B.G.M. de RUSUMO.

2. Besoins pour ce projet

Le présent projet cherche à valoriser les produits laitiers de la zone. Pour ce faire, la nécessité d'une laiterie s'impose.
Cependant, pour obtenir des produits de qualité il est indispensable de veiller à l'état sanitaire des animaux specialement en ce qui concerne les maladies transmissibles à l'homme. Un dépistage de ces maladies est donc à organiser.
Enfin, l'augmentation de la production implique l'amélioration génétique du cheptel par croisement avec des races exotiques déjà acclimatées dans le pays (JERSEY - SAHIWAL).

3. Projets antérieurs

Il y a eu une tentative de fabrication du Beurre à NYARUBUYE. Ce projet était modeste mais a démontré qu'il y avait des possibilités intéressantes. Il a échoué faute d'encadrement technique.

4. Agence d'exécution

Le Ministère de l'Agriculture et de l'Elevage affecterait un technicien laitier sous supervision de la Direction du Projet BUGESERA - GISAKA/MIGONGO.

PARTIE C : DESCRIPTION DU PROJET

1. Objectifs du projet

Le Projet a pour objectif de fournir aux éleveurs-réfugiés des possibilités de vivre décemment de leur Elevage en valorisant la production laitière de leurs animaux.
Les habitants du paysannat de Rusumo auraient aussi ainsi un outil de transformation de la production laitière de leurs animaux.
Le Projet laitier traiterait également le lait provenant de la Station d'Elevage (Ranch) de RUSUMO qui a l'intention de constituer un noyau laitier de 200 vaches.
De même, les éleveurs de Nyarubuye en profiteraient.

A terme donc, cette laiterie serait appelée à traiter les quantités suivantes et par jour :

- 700 litres de lait en provenance de Rusumo
- 200 litres de lait en provenance des plateaux de Nyarubuye
- 2000 litres de lait des animaux des Réfugiés de Nasho
- 100 litres de lait des animaux du Paysannat de Rusumo;

soit un total de 3.000 litres de lait par jour et à terme.

2. Description de l'Assistance à fournir par composants

Le Projet laitier aura ainsi trois phases successives dans le temps :

Phase I : Assainissement du cheptel

Cette phase est indispensable pour dépister et éliminer certains animaux porteurs de maladies dangereuses et transmissibles à l'honne par le lait. Il s'agit essentiellement de la Brucellose et de la Tuberculose.

Phase II : Amélioration génétique

Pour permettre un accroissement de la productivité du cheptel Ankolé, l'introduction du sang exotique type Jersey-Sahiwal s'avère nécessaire.

Phase III : Traitement du lait

Enfin, le lait produit par les Eleveurs devrait subir une pasteurisation au moins avant d'être livré à la consommation ou avant de subir d'autres traitements (beurre, fromage ...)

2.1. Assainissement du cheptel

2.1.1.	Identification des animaux (marques aux oreilles)	: 250.000.- FRW
2.1.2.	Tuberculination	: 500.000.- FRW
2.1.3.	Recherche de la Brucellose Why not Vaccinate	: 250.000.- FRW
2.1.4.	Indemnisation des Eleveurs (bêtes reconnues atteintes) - (5000/animal - 30 %)	: 18.000.000.- FRW
	TOTAL 2.1.	19.000.000.- FRW

2.2. Amélioration génétique + Sanitaire

2.2.1.	Introduction de géniteurs laitiers (Jersey-Sahiwal)	: 1.575.000.- FRW
2.2.2.	Vaccination antibrucellique (sur 5 ans)	: 750.000.- FRW
	TOTAL 2.2.	2.325.000.- FRW

2.3. Traitement du lait

2.3.1.	Laiterie (200 m2)	: 2.000.000.- FRW
2.3.2.	Pasteurisateur	} 3000.000- FRW
2.3.3.	Ecrémeuse	
2.3.4.	Barrate	
2.3.5.	Congélateur à pétrole	: 200.000.- FRW
2.3.6.	Frigo ELECTROLUX	: 150.000.- FRW
2.3.7.	Matériel divers	: 100.000.- FRW
	TOTAL 2.3.	.- FRW 5.450.000

2.4. Fonctionnement

2.4.1.	Personnel (1 A2 + 8 manoeuvres)	552.000.- FRW
2.4.2.	Fonctionnement véhicule	1.000.000.- FRW
2.4.3.	Divers	300.000.- FRW
	TOTAL 2.4.	1.852.000.- FRW

TOTAL GENERAL (21 + 22 + 23 + 24) 28.627.000.- FRW

PARTIE D : BESOINS FINANCIERS

1. Totaux des besoins financiers 368.130 US DOLLARS

2. Besoins et Sources possibles de financement par année civile

ANNEE	GOUVERNEMENT US DOLLARS	COMMUNAUTE INTERNAT US DOLLARS	TOTAUX (US DOLLARS
1984	6.006	239.636	245.642
1985	6.006	15.776	21.782
1986	6.006	15.776	21.782
1987	6.006	51.136	57.142
1988	6.006	15.776	21.782
TOTA.	30.030	338.100	368.130

3. Détail des différents volets et Budget alloué :

Assainissement du cheptel	: 206.724	US	DOLLARS
Amélioration génétique	: 25.296	US	DOLLARS
Traitement du lait	: 35.360	US	DOLLARS
Fonctionnement	: 100.750	US	DOLLARS
TOTAL	368.130	US	DOLLARS

SUPPLEMENT 2

Of

RWANDA REFUGEE RESETTLEMENT PROJECT PROPOSAL

Africare has prepared this paper in response to the concerns and questions, as recorded by Africare, raised in the USAID review of the Rwanda Refugee Resettlement Project on September 1, 1983.

Given the delicate nature of refugee resettlement, the primary focus of the project must be to create a sense of community among the refugees and to create a basis within this community for the evolution of economic activities. The goals of the project, economic self-reliance through the development of agricultural and pastoral activities, remain the same. However, given the complexity of the endeavor, the concern was that the stringent economic criteria against which the project's success is presently to be measured may be unnecessarily restrictive in that they could push certain economic activities upon the project beneficiaries before they have been adequately prepared.

All refugee situations, by their very nature, tend to be fluid and unpredictable. To assure appropriate support and adequate flexibility of the project to respond to the needs of the refugees, Africare proposes that the project be reviewed on a quarterly basis by the Technical Assistance team. Such reviews will determine the progress of the refugees in terms of the development of a coherent social setting, creation of a basis for economic evolution, and their integration into the larger Rwandan social setting. This will allow Africare to identify changes in the refugee situation, the nature of which cannot be predicted at this stage. This change in approach necessitates a new configuration of technical

assistance in the project. The strengthened technical assistance team will monitor and assure an adequate flow of goods and services to the refugees. In doing so, they will play a critical role in consulting with and advising the various GOR agencies on the appropriateness and adequacy of their support to the refugees.

Consolidation Phase

The purpose of the consolidation phase is to assure that the transition from dependency to self-sufficiency on the part of the refugees is given full support by the GOR and project resources. Eliciting and maintaining a sense of community, self-initiative, and involvement in the Rwandan social setting will be considered priorities during this phase. This transition period cannot be estimated precisely. However, it will be shortened to the extent that the refugees' expressed desires for settling in and working are supported by social and technical services provided by the GOR. Africare's technical assistance will be key in assuring that these requirements are met.

The project will be coordinated by an Advisory Committee comprised of representatives of the Ministry of Agriculture, Ministry of Social Development and Community Affairs, UNHCR, BGM, Red Cross, Ministry of Health, and the refugees. The Social Scientist and the Project Manager will sit on the committee for the project. The committee will meet regularly to coordinate GOR services and will serve as a forum for refugee needs and concerns to be expressed to the GOR.

One of the initial activities of the Advisory Committee will be to determine the participant selection process. Following discussions with the refugees, participants will be chosen from among those families expressing a willingness to be resettled under the project. All participants

must sign a contract agreeing to comply with herd levels, rotational grazing and other key elements of the project. The contract should reflect the land tenure arrangements agreed upon between the GOR and UNHCR as indicated in item 4, telex Kigali 82955.

Africare will work with UNHCR and the GOR to assure that basic services continue to be provided and that all efforts are made to develop a community that is fully integrated into the surrounding Rwandan setting. Emphasis will be placed on the refugees accepting as much responsibility for the improvement of their situation as possible. The Africare social scientist will, in concert with UNHCR and GOR, conduct an in-depth examination of the past and present social structure of the refugee community. Discussions will be held with the refugees on the appropriateness of various ways of organizing as a community. Also elicited will be the services they consider a priority and their suggestions as to how to achieve their notion of community. As much as possible, self-help will be encouraged to accomplish their goals.

Experience in other livestock projects has shown that a key element for success is the active participation of a local peer organization. In this project, such an organization will control numbers of cattle using the land, organize against brush fires, deal with water and land violations within the community, organize self-help activities, and be another mechanism for the community to deal with project and government authorities. This organization will be made up of one representative for each 20 families.

The local peer organization will establish rotation systems and determine when to change pastures once the pasture management system is in place. The organization will also make recommendations concerning the maintenance and

improvement of the pastures and the water systems. Members of the community will be encouraged to appear before the group to recommend changes to the existing systems and to express grievances. The organization will censure or otherwise control violators of the community regulations as decided upon by the community, project officials and the GOR. It is possible that the organization could form the basis for a future cooperative or credit union once economic activities have taken on a large enough scale. One of the Africare Technical Assistants will serve as advisor to the organization.

As part of the consolidation phase, the participants will be organized into groups of 20 families, which will occupy each ranch. Each group will choose a leader to represent them on the local peer organization.

After the establishment of an Advisory Committee, a Master Plan will be prepared with the assistance of the Africare Engineer. The plan will include a topographical survey of the area and a soil study. A scaled drawing will be produced which will designate the housing areas, forestry and cropping sites, water points, pasture, and roads. Sites for the support facilities and stores will also be indicated.

The Advisory Committee will coordinate the movement of the families onto the ranches. This will require planning with the participants and numerous family visits to the sites.

Once the families have been assigned homesites, plots for agricultural production, and pastureland, they will be assigned roles in improving their pasture, constructing their water supply systems, and contributing to the establishment of other communal facilities. Every effort will be made to create a sense of identity with the region through active participation in its development.

The most immediate obstacle to the development of an intensive ranching operation in the area is the overgrazing of the range. At the time of project design it was estimated that 7,000 head of cattle had to be removed from the rangeland if the quality of the pasture, and hence the health of the animals, was to be maintained. A recent cable from Rwanda (ref.telex Kigali 82955) indicates that between 3,000 and 4,000 head of cattle have already been sold from the refugee herd and that another 1,000 head are to be purchased by BGM. This would leave 2-3,000 head to sell. The cable indicates that the herders are willing to continue reducing their herds to prevent further loss as a result of pasture degradation. Additional public sales and a program of remuneration for the culling from the herd of tubercular and brucellor cattle are expected to reduce the herds to the prescribed size.

The remuneration program will pay a percentage of the value of a beast in good health. Africare has agreed to contribute $25,000 towards the fund. It is expected that a concerted effort to interest other donors in contributing to this aspect of the refugee relief program should be undertaken in Kigali.

From the very start of the project, everything possible will be done to improve the health of the remaining cattle and to encourage the continuation of sales. This will give the refugees a sense of economic independence and will relate improved returns to improved quality of cattle. It is hoped that this will convince the herders that their efforts in not overgrazing pasture and in following the animal health program implemented under the project will be financially rewarding. This will prepare them for the efforts that will be required of them in the pasture improvement program and, subsequently, in the program of intensive ranching.

In order to promote a sense of self-sufficiency, a priority will be placed on identifying agricultural land

and assigning plots to families so that they can begin to produce their own food. The Africare agronomist/range specialist will assure that appropriate tools, seed, and technical advice are provided. UNHCR will continue their assistance, including provision of food, until the refugees are fully able to provide for themselves.

Technical Assistance

The technical assistance being provided under the project has been altered to reflect the present formulation of the project. The roles of the Project Manager, who will be posted for the life of the project, and the short-term economic and range management consultants, remain unchanged. The following additions have been made.

Social Scientist: The Social Scientist will be assigned to the project for 3 years. He/she will work closely with the refugees during all phases of the project, but will be especially concerned with assuring that the refugees receive adequate services and that they have a clear understanding of the project. The Social Scientist will be responsible for the formation and operation of the Advisory Committee and the local peer organization until they are adequately institutionalized.

The Social Scientist will be expected to work closely with the Rwandan Sociologist in monitoring the progress of the refugees throughout the project. Initially, a survey will be made that would provide base-line data on skills, labor availability and other pertinent information that could be used to provide appropriate health, education and training services and to organize refugee participation in self-help projects, including the construction of the water systems and the pasture improvement program.

The Social Scientist will make a thorough investigation of the OVAPAM experience of settling refugees and Rwandans onto ranches in the north and will present the results of this investigation to the Advisory Committee.

Agriculturalist : The Agriculturalist will be assigned to the project for 3 years and will be responsible for the development of the agricultural production system for the project area and for the continuing operation of the livestock-related activities.

The Agriculturalist will work closely with the refugees to determine the type of agriculture with which they are familiar and to develop appropriate extension programs. The Agriculturalist will work closely with ISAR to determine appropriate technical packages for food and fodder crops for the project area and will organize any training necessary for the extension agents assigned to the project.

The Agriculturalist will coordinate all inputs related to agricultural and livestock production and will establish a record-keeping system for both inputs and outputs, in cooperation with the Range Management Consultant. The Agriculturalist will also work with the livestock expert and the economist to develop a marketing strategy for project participants.

The Agriculturalist will attend all planning and discussion meetings with the refugees and government agencies.

Engineer : The Engineer will be in the field for the initial 6 months of the project. During this period the Engineer will be occupied with all aspects of the water supply systems, including the bidding and contracting processes. The Engineer will coordinate the execution of the final plans and will develop guidelines for evaluating the work done under the contracts.

The Engineer will coordinate the development of the Master Plan for the project area.

Anticipated Project Accomplishments

The intent of the project is to bring the refugees from their present state of inactivity and non-productive-

ness to a state in which they are active members of a productive community that is well-integrated into the Rwandan social setting. The establishment of the Advisory Committee and the local peer organization is intended to create a sense of community among the refugees by making the authorities responsive to their expressed needs and by involving the refugees in the development of social and economic infrastructure in the area. The project will build upon this base to improve the refugees' ability to feed themselves and to generate a regular income. The ultimate aim is to create a self-sufficient, stable community.

The construction of dispensaries and potable water systems, participation in the Advisory Committee, the tse-tse control program, and the development of the veterinary support system will improve the condition of the refugees, the local population, and the health of their cattle. Additionally, marked increases in meat and milk production will result from the improved veterinary support and improved feed intake due to pastures and larger supplies of good dry season feed.

By eliminating the brucellosis-infected cattle and vaccinating the young, the disease should be eliminated. It is expected that conception and birth rates will increase, allowing for a greater off-take each year. The improved feed intake will lead to faster growth rate, and increased meat production. The calf death rate should decrease as the result of increased milk production and improved veterinary support.

It is expected that the price of cattle sold in the area will increase with the entrance of the La Rwandaise fattening ranch and dairy into the present market. It is expected they will purchase fattening cattle and milk from the refugees.

The project should leave a cadre of specialists, extension agents, and experienced administrators that will be invaluable for future training programs and agricultural development projects. These cadres will be able to extend the innovations developed in this project throughout Rwanda.

New varieties of crops and fodder, especially adapted for use in the project zone will be introduced. The seeds and knowledge of the cultivation practices necessary to successfully grow these varieties will be available for use by the general population of the area.

Best Available Document

REFUGEE RESETTLEMENT/NASHO, RWANDA
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
	AFRICARE STAFF SALARIES					
1	PROJECT MANAGER	35000	37450	40072	42877	155399
1	AGRONOMIST	30000	32100	34347	0	96447
1	SOCIO-ANTHROPOLOGIST	30000	32100	34347	0	96447
1	ENGINEER 6 MONTHS	15000	0	0	0	15000
1	ADMINISTRATIVE ASSISTANT	20000	21400	22898	24501	88799
2	SECRETARY	2100	2247	2404	2572	9323
2	MESSENGER	1200	1284	1374	1470	5328
2	GUARDIAN	1200	1284	1374	1470	5328
3	PROGRAM OFFICER/W 1/2 TIME	15000	16050	17174	18376	66600
3	SECRETARY/W 1/2 TIME	7000	7490	8014	8575	31079
	SHORT TERM SALARIES					
5	ECONOMIST					
	22 DAYS X 180/DAY	3960	0	0	0	3960
5	SOCIAL SCIENTIST					
	22 DAYS X 180/DAY	0	0	0	3960	3960
5	ENGINEER					
	11 DAYS X 180/DAY	0	1980	1980	0	3960
5	RANGE MANAGEMENT SPECIALIST					
	22 DAYS X 180/DAY	3960	3960	3960	0	11880
5	EVALUATOR	0	1980	0	1980	3960
	GRANTEE SALARIES					
8	RANCH CHIEF A2					
	24,500 RF/MO.	3196	3580	4010	4491	15277
8	ASST. RANCH CHIEF A2					
	15,000 RF/MO.	1957	2192	2455	2750	9354
8	SOCIOLOGIST					
	15000 RF/MO.	1957	2192	2455	2750	9354
8	VETERINARY EXTENSION AGTS.A3					
	11 X 13,500 RF/MO.	19370	21695	24298	27214	92577
8	AGRICULTURE TRAINERS A3					
	2 X 13,500 RF/MO.	3521	3944	4417	4947	16829
8	ACCOUNTANT					
	24,500 RF/MO	3196	3580	4010	4491	15277
8	FOREMEN					
	2 X 6000 RF/MO.	1565	1753	1963	2199	7480
8	ZONE CENTER GUARDS					
	9 X 5,250 RF/MO.	2054	2300	2576	2885	9815
8	SPRAYING TEAMS (ANIMALS)					
	27 X 3750 RF/MO.	13207	14791	16567	18558	63121
9	TSETSE (LAND CLEARING)					
	SUPERVISORS:					
	4X200 RF/DA.X25 DA/MO.X12MO.	2609	870	0	0	3479
	TSETSE LABORERS					

Best Available Document

REFUGEE RESETTLEMENT/NASHO, RHANDA
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
	60X100 RF/DA.X25MD/MO.X12MO.	78261	26087	0	0	104348
	TSETSE (SPRAYING) SUPERVISORS					
	2X200 RF/DA.X25 MD/MO.X 4 MO.	435	0	0	0	435
	TSETSE LABORERS					
	60X150 RF/DA.X25 MD/MO.X4MO.	13043	0	0	0	13043
	TSETSE STUDY TEAM LEADER					
	15,000 RF/MO. X 9 MO.	1467	0	0	0	1467
	TSETSE STUDY ASSISTANTS					
	6 X 7,500 RF/MO. X 9 MOS.	4402	0	0	0	4402
	INSECTICIDE SUPERVISORS					
	2 X 200 RF/DA. X 75 DA.	326	0	0	0	326
	INSECTICIDE SPRAYERS					
	20 X 150 RF/DA. X 75 DA.	2446	0	0	0	2446
	INSECTICIDE LABORERS					
	12 X 100 RF/DA. X 75 DA.	978	0	0	0	978
	PASTURE IMPROVEMENT LABORERS					
	120 X 100 RF/DA. X 300 DA.	39772	43603	25000	0	108375
	FORESTRY LABORERS	0	2319	2319	2319	6957
	SUB TOTAL ALL SALARIES	358182	288231	258014	178383	1082810
11 TO 20	FRINGE BENEFITS 25%					
	US HIRE 12%	19190	18541	19535	12032	69298
	HOST COUNTRY 25%	49566	33430	23806	19529	126331
22	RECRUITING					
	ADS: 3 X 275	825	0	0	0	825
	TRAVEL: 6 X 300 RT	1800	0	0	0	1800
	PD: 3 X 75 X 2 = 450	450	0	0	0	450
	3 X 76 X 2 = 228	228	0	0	0	228
	SUBTOTAL ALL FRINGE&RECRUITING	72059	51971	43341	31561	198932
	RELOCATION & INCIDENTAL					
23	ORIENTATION/PER DIEM					
	5 X 75/DA. X 14 DA. = 5250	5250	0	0	0	5250
	4 X 36/DA. X 14 DA. = 2128	2128	0	0	0	2128
24	TRAVEL INCIDENTALS					
	PASSPORTS,PHOTOS, PHYSICALS 9X300	2700	0	0	0	2700
25	RELOCATION, PERSONAL EFFECTS					
	4 FAMILIES X 3110 X 3.75	60563	0	23325	24880	108768
26	RELOCATION: TRAVEL					
	8 ONE WAY X 1,350	13200	0	5600	5700	24500
27	RELOCATION: PER DIEM					
	5 X 84 X 21 DA. = 8820	8820	0	336	336	9492
	4 X 42 X 21 DA. = 3528	3528	0	168	168	3864
28	SETTLING-IN ALLOWANCES	2500	0	0	0	2500

Best Available Document

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
29	HOUSEHOLD FURNISHINGS					
	5 X 7,500	37500	0	8000	0	45500
30	HOUSING REPAIR/MAINTENANCE					
	5 X 2,000	10000	4000	2000	2000	18000
31	HOUSING RENTALS					
	5 X 6000	30000	26880	30108	16860	103848
	GENERAL TRAVEL					
32	AFRICARE OFFICE TRANS./GAS	4000	5000	5500	6000	20500
32	AGRONOMIST	8000	9000	10000	0	27000
32	SOCIO-ANTHROPOLOGIST	8000	9000	10000	0	27000
32	PER DIEM					
	PROJ. MGR. 5 DA/MO X 56 X 12	3360	3600	3900	4200	15060
	AGRONOMIST 10 DA./MO.X56X12	6720	7200	7800	0	21720
	SOCIO-ANTHROPOLOGIST 10 DA/MO.X56X12	6720	7200	7800	0	21720
	ENGINEER 10 DA./MO.X 56 X 12	3360	0	0	0	3360
34	AFRICARE STAFF VEHICLE REPAIR					
	/MAINT. 3 VEHICLES X 3000 EA	9000	15000	15000	5000	44000
	INTERNATIONAL TRAVEL					
36	HOME LEAVE TRAVEL	0	0	22400	0	22400
37	CONSULTANTS					
	2 RT X 2700	5400	8250	5600	5700	24950
37	PROGRAM OFFICER/W	2700	2750	2800	2850	11100
38	ECONOMIST @ 85/DAY	2550	0	0	0	2550
38	SOCIAL SCIENTIST @ 85/DAY	0	0	0	3000	3000
38	ENGINEER 14 DA X 85	0	1260	1330	0	2590
38	RANGE MGT. 30 X 85	2550	2700	1330	0	6580
38	EVALUATOR	0	1260	0	1400	2660
38	PROGRAM OFFICER 14 DA X 85	1190	1260	1330	1400	5180
	SUB TOTAL ALL TRAVEL & RELOC	239739	104360	164327	79494	587920
	BASIC PROJECT EQUIPMENT					
40	PASTURE IMPROVEMENT					
	TOOLS	5600	1000	1000	0	7600
41	TSETSE FLY					
	TOOLS, SPRAYERS, CLOTHING	14296	1000	1000	0	16296
42	VETERINARY CENTER					
	LABORATORY	5108	0	0	0	5108
43	REFORESTATION TOOLS	0	1268	1268	1268	3804
	VEHICLE PURCHASES					
49	3 4-WH.DR.1/4T TRUCK(AFRICR)	45000	0	0	0	45000
49	4-WH. DR. PICKUP (BGH)	15000	0	0	0	15000
49	4-WH. DR. PICKUP (BGM)	15000	0	0	0	15000
51	10 MOTOR CYCLES (VETERINARY)	16300	0	0	0	16300
	AFR.OFFICE EQUIP.& FURNITURE					
52	PHOTO, TYPEWRITER, COMPUTER	20000	0	0	0	20000
53	FURNITURE X 5	25000	0	0	0	25000
	EQUIP. REPAIR/MAINT./OPER.					
54	2 PICKUPS	5217	5843	6545	7330	24935
	10 MOTOR CYCLES	1957	2191	2780	2662	9590
	TRUCK (RENTED)	2717	5435	2717	0	10869

Best Available Document

REFUGEE RESETTLEMENT/NASHO, [illegible]
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
55	TRUCK RENTAL	1630	3260	1630	0	6520
	SUB TOTAL ALL EQUIPMENT	172825	19997	16940	11260	221022
	BASIC PROJECT SUPPLIES					
56	REFORESTATION (NURSERY)	0	11649	11649	11649	34947
57	PASTURE IMPROVEMENT					
	SEEDS,	38290	0	0	0	38290
58	TSETSE FLY					
	HERBICIDES, INSECTICIDES	133809	0	0	0	133809
59	VETERINARY CENTER					
	LABORATORY	5434	761	852	954	8001
	GENERAL SUPPLIES					
63	AFRICARE OFFICE & TECH.	20000	15000	10000	2000	47000
63	BGM OFFICE	1000	900	900	900	3700
	SUBTOTAL ALL SUPPLIES	198533	28310	23401	15503	265747
	CONSTRUCTION CONTRACTOR FEES					
68	A WATER SYSTEMS (4)	600000	141000	0	0	741000
69	B HEALTH CENTERS (2)	125000	125000	0	0	250000
70	C VETERINARY CENTER	21739	0	0	0	21739
	CONSTRUCTION MATERIALS					
73	A PASTURE IMPROVEMENT					
	8 TROUGHS, HOUSE, FIREBREAKS	45652	2174	2174	2174	52174
74	B VETERINARY CENTER					
	DIP TANKS, SQUEEZES, HOUSES	174735	0	0	0	174735
75	APPROPRIATE TECHNOLOGY					
	BIOGAS APPARATUS	20000	20000	0	0	40000
	SUB TOTAL ALL CONSTRUCTION	987126	288174	2174	2174	1279648
	TRAINING					
80	TRAINING MATERIALS	10000	5000	0	0	15000
82H	SHOP.TRVL.&ALLNCS.(EXT.AGTS)	10000	5000	0	0	15000
82	COMPUTER TRAINING(AFR.STAFF)	2500	0	0	0	2500
	SUB TOTAL ALL TRAINING	22500	10000	0	0	32500
	GENERAL BUSINESS COSTS					
84	FREIGHT, HSG. OFF. EQUIP.	40000	4000	4000	2000	50000
85	VEHICLE INSURANCE	2025	2025	2025	675	6750
	OFFICE OCCUPANCY COSTS					
93	OFFICE RENTAL	6000	6720	7527	8430	28677
94	OFFICE OPER./MAINTENANCE	8000	8200	8400	8600	33200
	SUB TOTAL ALL OTHER DIRECT	56025	20945	21952	19705	118627
	TOTAL DIRECT	2106989	811988	530149	338030	3787206

INDIRECT I SALARIES, FRINGE, TRAVEL

REFUGEE RESETTLEMENT/NASHO, RWANDA
FOUR YEAR BUDGET
(US DOLLARS)

CC	YEAR 1 DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	TOTAL
	TRAINING,OTHER DIRECT @ 21.45% 358,182+ 72,059+ 239,739 + 22,500 + 56,025	160554	101996	104597	66311	433458
	INDIRECT IT EQ.SUPPLIES, CONSTRUCTION 10.7% X 172,825 + 198,533 + 987,126	145358	36003	4549	3096	189006
	SUB TOTAL INDIRECT	305912	137999	109146	69407	622464
	G R A N D T O T A L	2412901	949987	639295	407487	4409670

Best Available Document