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FROM - WASHINGTON

SUBJECT - Onchocerciasis Control Program - 698-0399

REFERENCE -

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10/20/77

Attached is a report prepared by the Onchocerciasis Control Program staff on the implications of extending the control area in Benin, Ghana, Ivory Coast, Mali and Togo. Comments on this report were requested in a recent cable from AID/W.

Comments are needed to arrive at an AID/W position of support or modification at the Fourth Meeting of the OCP to be held in Kuwait on December 5-7, 1977. Please cable comments Attention: AFR/RA by November 18, 1977.

Attachment: - ATTACHMENT TO BE RUN WITH JOB

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DRAFTED BY <i>E. Dennis Conroy</i> E. Dennis Conroy	OFFICE AFR/RA	PHONE NO. 29102	DATE 10/18/77	APPROVED BY: <i>E. Dennis Conroy</i> E. Dennis Conroy
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AID AND OTHER CLEARANCES

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Introduction

At the second meeting of the Joint Coordinating Committee (JCC) in December 1975, the delegations of Benin, Ghana, Ivory Coast, Mali and Togo expressed the wish that the existing program of control be extended in their countries. These requests were renewed in December 1976 at the meeting in Ouagadougou.

In order to deal with the issue, the JCC asked the Program to undertake a study of the implications of extending the control area including the entomological, epidemiological, economic and financial aspects.

This is the subject of the present report. It contains, country by country, a description of the available information and an assessment of what would be needed to make a decision both on the question of principle and on the question of how to implement an extension of the existing Program whose boundaries were designed to protect the savannah zone of the Volta Basin as well as the adjacent valleys -- Comoë and Leraba -- that had been studied by FED and CCGE.

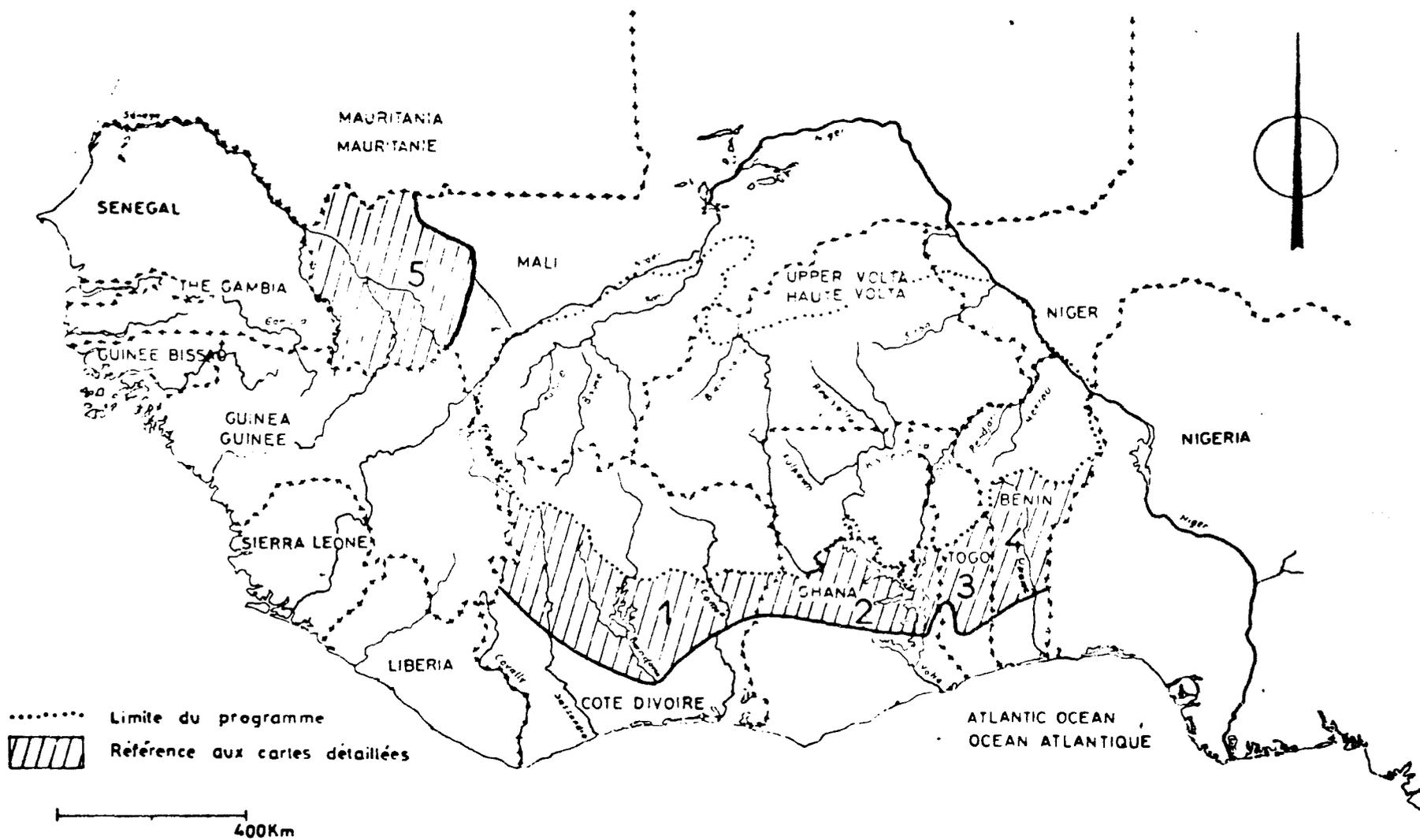
The southern limit was marked by two lakes, Volta in Ghana and Kossou in Ivory Coast, which serve as natural barriers against reinfestation and by the humid forest zone which is not infested by the cytotypes of the savannah vector.

In the north, the Niger River serves as a natural limit of the disease and of the vector.

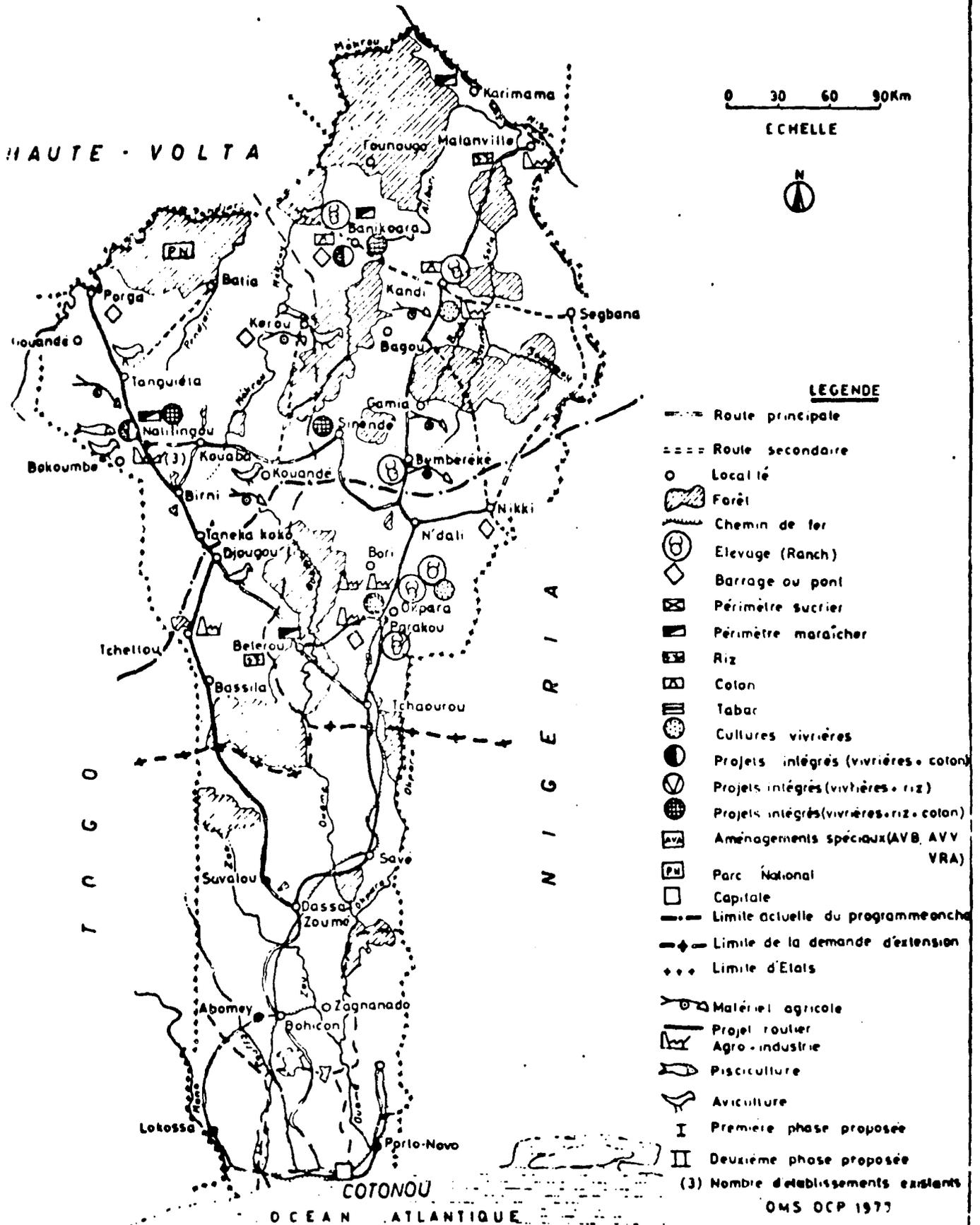
In this report, we have tried to summarize what is known about the entomological, epidemiological, hydrological and economic aspects of the areas for which the governments had requested extensions.

The data on the Ivory Coast is sufficient to permit a decision on extension, particularly for the Upper Sassandra and the Marahoué which seem to be permanent sources of reinfestation. The request of Mali concerns an area which would have to include Senegal in order to be operationally effective from an entomological point of view. Some preliminary contacts with Senegal would need to be made in order to ensure that the same approach is adopted. We have thus not been in a position to establish the data existing or needed for the Mali extension as we have done for the other countries.

SITUATION GEOGRAPHIQUE DES EXTENSIONS DEMANDEES PAR LES ETATS



REPUBLIQUE POPULAIRE DU BENIN



OMS OCP 1977

IBRD LANGUAGE SERVICES DIVISION	
CONTROL NO. E-307/76	DATE: September 7, 1977
ORIGINAL LANGUAGE: French (Onchocerciasis)	
DEPT. West Africa	TRANSLATOR: JC:ak

Review: OTS

BENIN

1. Introduction

In Benin, the Regional Programme covers the entire basin of the Oti-Pendjari and the tributaries of the Niger (northern parts of Atacora and Borgou provinces).

The extension sought covers the upper basin of the Ouémé (25,000 km²). Once this is added to the initial area the total population benefiting from the Programme will be 618,000.

2. Existing data

2.1 Epidemiology

Little is known about the present epidemiological situation in the extension zone, and such data as there are relate only to a small part of it (Picq et al, 1974; Falzon, 1975; Krämer, 1977). Hyperendemic foci certainly exist in the Okpara and Ouémé basins, and onchocerciasis is definitely a problem (Krämer, 1977). Vast areas throughout the upper basin of the Ouémé have been abandoned in consequence.

2.2 Entomology

This is also a subject about which little is known. A few partial surveys have been carried out, and these have shown that two savanna vector species of S. damnosum are to be found in the upper basin of the Ouémé and the Okpara.

Studies of population and transmission dynamics have been carried out by OCCGE in the Parakou region and in particular on the Okpara. Since 1976,

the Programme has ascertained that transmission in four areas of the upper basin is hyperendemic.

2.3 Hydrology

Because of difficulties of access there are only two hydrological stations (Bétérou and Savé) for 23,600 km² of catchment area. As in Ghana, hydrological data necessary to the planning and execution of a larva destruction campaign are not nearly adequate and need supplementing.

2.4 Economic development projects

For rural development purposes, these zones are attached to the CARDERS (Regional Action Centers for Rural Development) of Atacora and Borgou, which are designed along comprehensive lines.

For the development of agricultural resources, the following projects may be noted:

- establishment of the provincial farm in Okpara (1,000 ha), intended for both stockraising and crop farming;
- identification of areas suitable for development, the largest of these, Bétérou, being planned for rice, vegetables and fruit trees (1,000 ha).

Stockraising projects comprise:

- the Okpara ranch, which covers 33,600 ha and is designed to produce 5,000 head of Borgou cattle (for draft and breeding purposes), at a total cost of \$8 million;
- the EDF cattle-raising development program in southern Borgou, the main purpose of which is to assist SODERA (National Company for the Development of Animal Resources);

- fish farming development in Tanekka-Koko to produce young fish for distribution to other district chief towns. Total cost of the experimental operation: \$320,000.

For the development of forestry resources, three forests are included in the national program for the development of national parks and game areas.

There are two major agro-industrial enterprises:

- the IBETEX mills (Industrie Béninoise des Textiles), with investments of \$21 million, the Benin Government contributing 48%. The plant is of the integrated type and uses a total of 12,000 tons of cotton a year, providing employment for 2,340 persons;
- the cashew processing plant, which uses the production of 10,000 ha of cashew plantations and is financed by EDF.

Pre-investment projects consist mainly of soil maps to a scale of 1:50,000 of the Bétérou and Okpara regions, produced at the request of SONIAH (National Company for Irrigation and Irrigated Agriculture) by the National Soils Laboratory.

As regards agricultural machinery, COBEMAB (Benin Agricultural Machinery Cooperative), located in Parakou, has a potential production capacity of 5,000 plows a year, 1,500 carts, and 3,000 harrows.

As regards highway infrastructure and telecommunications, the following would be included in the extension zone:

- improvement of the Savalou-Porga road;
- studies for the asphaltting of the Dassa-Parakou road;
- establishment of telephone links between Parakou, Kjougou, Natitingou and Malanville.

3. Data to be obtained

3.1 Medical surveys

Benin has asked OCCGE to carry out a parasito-ophthalmological survey in the upper basin. In order to supplement the data for the least-known regions and to determine the southern limit to which onchocerciasis extends, this survey should be carried out in the following regions:

- along the Djougou-Bafilo axis, in the western part of the Ouémé basin;
- along the Parakou-Savé axis, in the east of the same basin.

In addition, a general supplementary survey is needed for basic appraisal purposes.

3.2 Entomological surveys

- Location of vector breeding sites

A complete aerial survey of the basin (upstream of Savé) will have to be taken at different times of the year.

- Vector population and transmission dynamics

A complete survey is required in this field, which will also make it possible to determine the exact distribution of the different S. damnosum species.

3.3 Hydrology

Eight hydrological stations should be installed and calibrated as soon as possible. However, as in the case of the survey work (fuel stores) and the population dynamics study (collection points), inaccessibility poses a big problem in this deserted region.

4. Plan of action

Bearing in mind the data yet to be obtained, the following plan of action has been proposed (see Annex 2 for breakdown of the cost of operations, which totals \$256,400 for two years).

4.1 Timetable

Year 1:

- obtaining of final medical data; basic appraisal;
- establishment of permanent access routes to the Ouémé and its tributaries;
- start of entomological surveys;
- installation and starting of calibration of eight hydrological stations.

Year 2:

- completion of entomological studies;
- continuation of calibration of hydrological stations;
- preparation of a larvicide campaign.

4.2 Resources required

4.2.1 For the medical survey

The supplementary medical survey will be carried out by a team composed of a parasitologist, an ophthalmologist, and a team of workers who can be made available by Benin. Estimated duration of the survey: 2 months (\$34,000).

4.2.2 For the entomological studies

The studies will require the establishment, at the beginning of year 1, of an appraisal subsector supervised by the Regional Programme Vector Control Unit. This subsection will be based in Parakou.

It will comprise:

- a technician (subsector chief) who will be trained at the IRO in Bouaké and the Programme itself (duration: 4 months);
- 17 workers (collectors, drivers, laboratory assistants, radio operator, etc.).

Annex 2 shows the cost of personnel, equipment and operation of the subsector, excluding the costs of renting premises and recurrent expenditures such as water, electricity and telephone, which will be paid by the Benin Government (\$83,000 for the subsector plus \$30,000 for the aerial surveys).

4.2.3 Hydrology

The Benin hydrology service should arrange as soon as possible for the installation and calibration of eight hydrological stations.

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Légende

--- Limite actuelle du programme

- - - Limite d'extension



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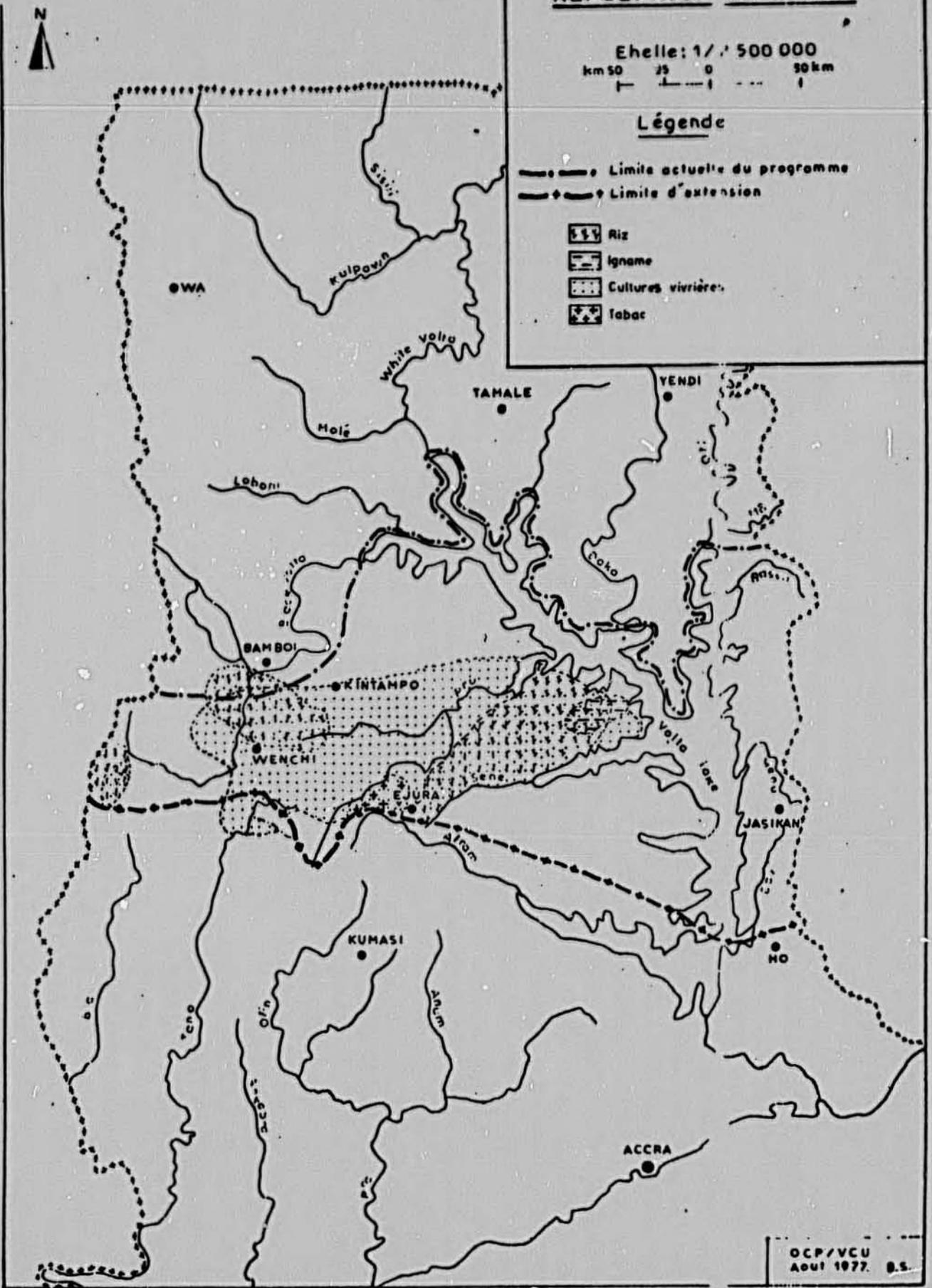
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Cultures vivrières



Tabac



IBRD LANGUAGE SERVICES DIVISION	
CONTROL No. E-307/78	DATE: September 9, 1977
ORIGINAL LANGUAGE: French	
DEPT. West Africa	TRANSLATOR: DRJE:ak

Review: OTS

GHANA

1. Introduction

In Ghana, the Regional Programme at present covers the Northern and Upper Regions, north of Lake Volta.

The extension zone requested by the Government of Ghana includes the Brong-Ahafo Region, lying west of Lake Volta, and the Volta Region, lying east of it.

This zone involves most of the rivers flowing into Lake Volta in the savanna area:

- west bank: the Tain, Subin, Oyolo, Pru and Séné;
- east bank: the Dayi, Waron, Asukawkaw and the tributaries flowing south from the last-named.

The Brong-Ahafo Region and the north of the Volta Region total 42,000 km², or approximately 19% of Ghana's surface area. (The region already under treatment covers 98,000 km², or 42% of the country.)

According to the 1970 census, the regions already under treatment (Northern and Upper) have a population of 1.6 million, the total population of Ghana being 8.6 million; the Brong-Ahafo Region has 800,000 inhabitants, or 9% of the national population.

2. Existing data

2.1 Epidemiology

A Programme mission to Ghana in 1973 enabled available information on the two regions concerned to be collected. The results of work undertaken

by the Medical Field Units (MFU Annual Reports for 1962 and 1963 and Onori, 1963) and the Volta Lake Research Project (Jones, 1973) are on file at Sunyani, Ho and Accra. They must be summarized as follows:

- East (Asukawkaw focus): "Very severe onchocerciasis foci exist in areas around Jasikan, Ahamansu, Asukawkaw and Tapa" (Onori, 1977). Surveys conducted by the MFUs and the Volta Lake Project show very high prevalence, universally hyperendemic in character, and a significant percentage of blindness due to onchocerciasis. These results are confirmed by the surveys carried out by the Regional Programme's Vector Control Unit in this area adjacent to the Programme zone: at each point, transmission is very high and in any month may reach the PAT (potential annual transmission rate) observed in hyperendemicity.
- West: "In the Brong-Ahafo Region, MFU surveys have shown that hyperendemicity conditions prevail in the areas around Kintampo, whilst meso-hyperendemicity levels were found in the Wenchi area and hyperendemicity further south" (Onori, 1977).

2.2 Entomology and hydrology

A number of surveys have been conducted in these two regions by the MFUs (identifying vector breeding-site series radiating from onchocerciasis foci) and by Regional Programme teams in the zones bordering the Tamalé entomological sector.

- Identifying breeding-site series

Two aerial surveys of the rivers flowing into the southwest of Lake

Volta made in 1976 and 1977 showed the existence of numerous sites along watercourses in the Kintampo and Wenchi regions. Partial surveys to the east, in both the dry and rainy seasons, have revealed a very high number of sites along the group of watercourses lying north of Ho.

- Distribution of species of the S. damnosum complex

Programme team surveys (Vajimé et al.) have revealed the presence of five of the six species of the S. damnosum complex, including the two responsible for most transmission on the savanna.

- Vector population and transmission dynamics

Since 1975 in the Kintampo region and 1976 in the Asukawkaw focus the Regional Programme has been monitoring several factors. The results confirm earlier medical data and show the existence of vector population :

- of high density, giving rise to very high transmission rates to the east (Asukawkaw focus) (see 2.1); and
- of medium density, giving rise to meso-hyperendemic transmission rates to the west (Kintampo region).

- Hydrology

Existing hydrological data, necessary for the planning and execution of a larvicide campaign, are clearly insufficient, since the basic hydrometric network covers only some of the watercourses involved, mostly in the Asukawkaw focus. The fact that all the rivers flow into Lake Volta is no basis for extrapolation, which might lead to over-dosages that would affect the aquatic fauna of the lake.

2.3 Economic development projects

The Brong-Ahafo Region is important in the production of rice, tobacco, yams and certain other food crops, as are the Upper and Northern Regions, which are already under treatment. Considering that the extension requested would increase the region treated to more than half the country, the importance to Ghana of a food-producing zone of this magnitude is obvious, while the impact of onchocerciasis control measures on the agricultural development of the country could well prove very significant.

Cattle-raising is an equally important element in the proposals forming part of the plan. Particular mention should be made of the Branam Ranch, located 32 km north of Wenchi in the Brong-Ahafo Region. It is 28,700 ha (72,000 acres) in size, enjoys a good reputation for its N'dama cattle and offers viable prospects for development.

- Campaign against the tsetse fly and trypanosomiasis

The tsetse fly, the vector for both human and animal trypanosomiasis in Ghana, is an obstacle to livestock development in that it is responsible on the one hand for an imbalance in the distribution of the human and animal populations and the water and land resources they require, and on the other for restricted agricultural production.

The Five-Year Plan therefore proposes that a unit responsible for a campaign against the tsetse fly and animal trypanosomiasis be formed from personnel belonging to Ghana's veterinary services. The unit would study the distribution patterns of the tsetse fly and assess potential danger to the livestock population.

3. Data to be obtained

3.1 Medical surveys

Existing data should be completed and updated through standardized parasito-ophthalmological surveys of all foci designed to:

- establish the base level in each of the villages selected;
- ascertain the boundaries of areas where severe onchocerciasis is present, particularly in the eastern region (Ho).

3.2 Entomological surveys

These will be designed to:

- identify vector breeding sites through aerial and ground surveys carried out during the different seasons of the year along all watercourses except those already investigated;
- extend studies of vector population and transmission dynamics throughout the zone.

3.3 Collection of hydrological data

The setting up of a network of hydrological stations on a scale to meet the requirements associated with extension will clearly cause major delays in planning and executing the work involved in that project. Eight additional stations need to be installed and calibrated.

4. Plan of action

In view of the importance of completing existing data in all spheres, the following plan of action is proposed. Annex 2 gives a detailed general cost estimate for a preliminary period of two years (\$466,600).

4.1 Timetable

Year 1:

- supplementary studies on the epidemiological and entomological situation of all the basins of rivers flowing into Lake Volta from the east and west;
- installation of eight hydrological stations (sites to be decided by the Regional Programme) during the first months of the year and starting of calibration.

Year 2:

- completion of entomological studies;
- continuation of calibration of the hydrological stations;
- formulation of plans for a larvicide campaign (end of year).

4.2 Resources required

4.2.1 For the medical surveys

The surveys, intended to serve as justification and provide a basis for evaluation, will be carried out by a team consisting of a parasitologist, an ophthalmologist and support personnel, of whom the latter can be furnished by Ghana (MFU). The time required is estimated at three months (\$51,600).

4.2.2 For the entomological surveys

Preliminary studies will depend on establishment at the beginning of Year 1 of two evaluation subsectors to be supervised by the Vector Control Unit of the Regional Programme. These subsectors will be located at:

- Wenchi, for the Brong-Ahafo region;
- Jasikan, for the Asukawkaw focus.

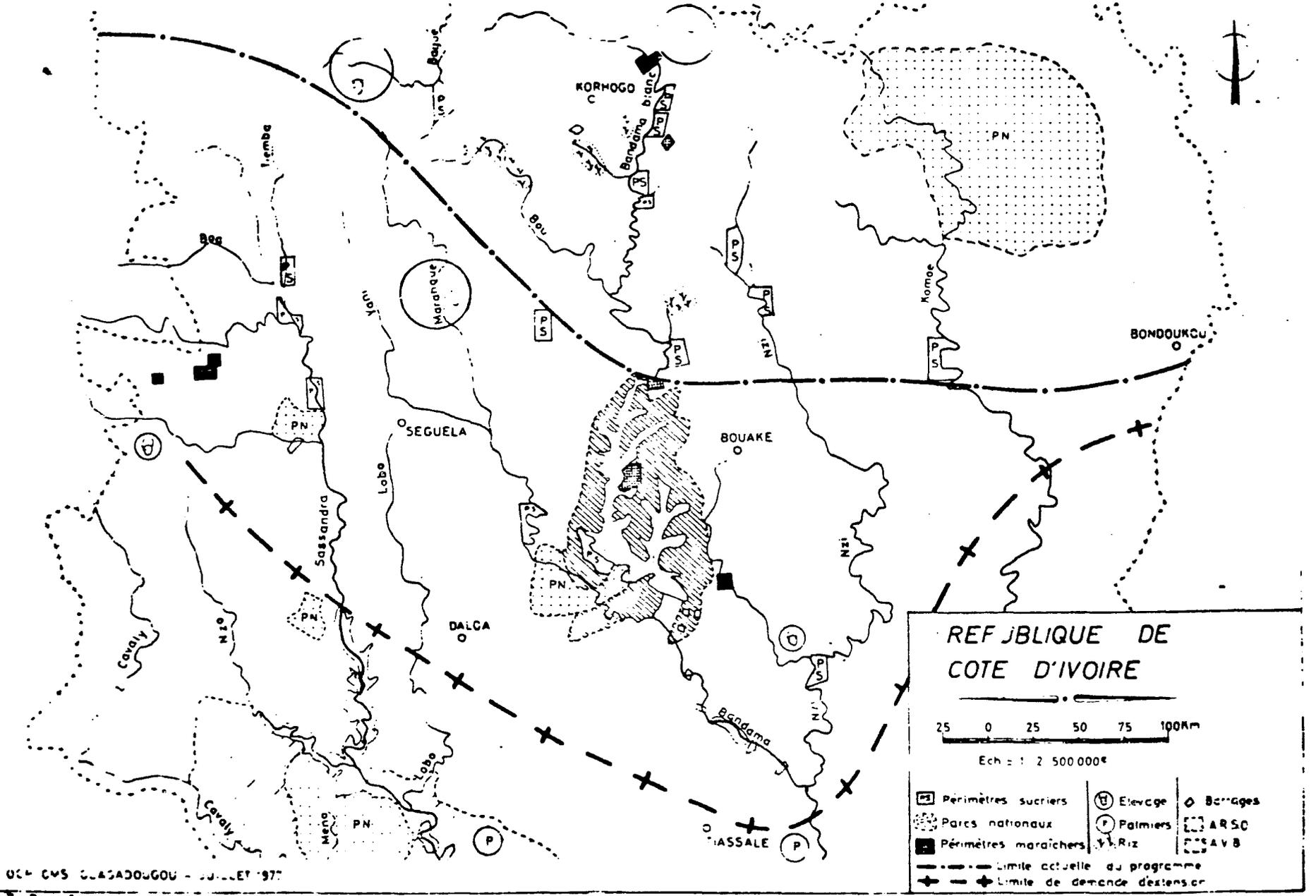
Each subsector will consist of:

- a technician, who will act as head and will be trained at the Bouaké IRO and in the Programme (duration: four months);
- 17 support personnel (collectors, drivers, laboratory assistant, radio operator, etc.).

Annex 2 shows the subsector personnel, material and operating costs, but not the cost of premises or overheads (water, electricity, telephone), which would be borne by Ghana (\$184,000 a year for the two subsectors plus \$24,000 a year for aerial surveys).

4.2.3 For the hydrological work

It is assumed that Ghana's hydrological services would be responsible for the setting up and calibrating of the eight new stations regarded as essential for the planning of the larvicide campaign.



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TERC LANGUAGE SERVICES DIVISION	
CONTROL NO. E-307/70	DATE: September 8, 1977
ORIGINAL LANGUAGE: French	
DEPT. West Africa	TRANSLATOR: OTS:ak

IVORY COAST

1. Introduction

In Ivory Coast, the Regional Programme covers the upper basins of the white Bandama, the N'zi, the Comoë, the Black Volta, the Bagoé and the Baoulé. The extension sought comprises the departments of Odienné (part), Touba, Séguéla, Dyankouma (south), Daloa (part), Bouaké, Bouaflé (part), Dimbokro (part) and Bondoukou, i.e. almost equivalent in extent to the area of the Regional Programme in Ivory Coast (110,000 km²) (see Map 2).

The total population of these departments is 2,644,433, or 39.64% of the national figure. This will triple the population of the present Programme area (708,404 persons). The average density for the total area is 17.64 persons per km², against a national average of 20.68. The region is essentially a rural one (84.77%), as is the present area (83.67%).

The river basins involved in the extension are the upper Sassandra, the part of the Bandama basin that has not yet been treated, and an additional part of the Comoë.

2. Existing data

2.1 Epidemiology

What is known regarding the epidemiological situation varies depending on the region.

2.1.1 Upper Sassandra

The survey carried out in May 1977 by OCCGE and WHO covered 23 villages in Odienné and Touba departments (Prost, Prod'hon, Thyleforss, Crozafon --

OCP/EPI/77.28).* This showed that the upper Sassandra basin formed the most serious onchocerciasis focus presently known, in terms of its size, the intensity of the parasite infestation, the extent of the ocular complications and also in terms of the truly catastrophic situation of certain zones. Of the 23 villages surveyed, only one has fewer than 75% of its population affected. The town of Borotou has more than 75%, which is exceptional for an agglomeration of its size. Finally, two villages are over 90% affected, a situation not previously encountered in any of the 300 agglomerations visited so far in the seven OCP States.

The prevalence of ocular onchocerciasis is the highest ever found by the OCP Epidemiological Evaluation Unit: over 60% of the people examined in five of the seven villages considered show signs of ocular parasitism. The proportion of serious (ocular) lesions is high, reaching 27.9% in Massadougou. Many young persons under age twenty are permanently handicapped. Onchocerciasis is, therefore, a serious obstacle to development in the upper Sassandra basin.

2.1.2 Bandama basin

- Marahoué (Red Bandama)

There are few data available, other than those given in the Rives and Série report of 1968 which shows, around abandoned areas along the water-courses, a classic epidemiological situation for a savana region. If the

*To avoid making this report too bulky, the complete references to the studies quoted are not repeated in a bibliography. These can nevertheless be consulted in the States, at OCCGE or at the Regional Programme offices.

transmission rates found during entomological surveys are taken into account, it can be presumed that the precise medical survey still to be carried out will show this to be a highly serious focus.

- Lower Bandama

The surveys by Lartique et al. (1964) and Boppe (1972) show, for this region, an epidemiological situation of the forest type: high prevalence (70-80% suffering from onchocerciasis) but few ocular lesions. Ivory Coast justifies its inclusion on the grounds of the harmful effects of the many blackfly bites.

- N'zi

With the exception of the survey made in 1977 (Prost et al.) in a region adjoining the Programme area (classic savanna facies), the epidemiological situation is little known and remains to be ascertained.

- Comoë

The surveys made by OCP inside the area treated, close to the extension zone sought, show a situation midway between the savanna and the forest epidemiological facies (high prevalence, seriousness varying from village to village).

2.2 Entomology and hydrology

2.2.1 Upper Sassandra basin

The situation of the vector breeding places in the different seasons of the year is known for the entire upper basin.

The distribution of the different species of the S. damnosum complex has been the subject of a number of surveys by the OCCGE/ORSTOM Onchocerciasis

Research Institute at Bouaké (Quillévééré et al.).

The blackfly population and onchocerciasis transmission dynamics are partly known.

The data obtained in this region corroborate the findings of the medical survey: there is an extremely large number of vector breeding places in all seasons, the vector populations are particularly dense and the rate of transmission is very high everywhere it has been studied.

Moreover, the studies and experimental treatments carried out in July 1977 have shown that this upper basin, together with that of the Marahoué, is the source of the reinfestation of the Bandama, Léraba and Bagoé basins,

Hydrobiological studies are currently being carried out by ORSTOM. In addition to the old stations forming part of the basic network, several hydrological stations have been established on the different watercourses in this upper basin. They are now being calibrated but, as the experimental treatment has shown, the data already obtained are sufficient for the implementation of a larvicide campaign.

2.2.2 Bandama basin

- Marahoué (Red Bandama)

Available data on the vector (location of breeding sites, distribution of species, population and transmission dynamics) are comparable to those for the upper Sassandra.

Like the latter, the region was suspected of being the source of the reinfesting females collected on the White Bandama and Léraba. The experimental treatment carried out from the end of June 1977 has confirmed this.

The hydrological network consists of nine stations of a good standard.

- Lower Bandama

The entomological data are good. The quantities of blackfly collected here are considerable, exceeding, in certain seasons, 5,000 per man per day. Transmission is of the forest type. As it was suspected of being a source of reinfestation, this reach of the Bandama was subjected to an experimental treatment in July 1976. The results were spectacular (fewer than 10 blackfly/man/day), although without any very noticeable impact on the reinfestation of the upper Bandama and Léraba.

The hydrological network is good.

The N'zi is currently the subject, over almost its entire length, of an experiment to determine the effects of a new insecticide (Chlorphoxin) on the environment. The distribution of the breeding places is known but more precise data are still to be obtained on population and transmission dynamics. The hydrological network is adequate.

- Comoë

The extension zone sought is small, involving no more than a few dozen kilometers downstream of the area treated since 1975.

2.3 Economic development projects

Fifteen major economic development projects are envisaged in the extension zone, involving essentially sugar, cotton, fruit and vegetables, rice and stockraising, plus the Bandama Valley Development Authority (AVB). Not counting the case of AVB, all the projects together will call for an investment of about \$400 million and will involve more than 7,000 families

(i.e. more than 65,000 persons), for whom more than 10,000 agricultural or industrial laboring-type jobs will be created. These projects are assigned priority in the Five-Year Economic, Social and Cultural Development Plan for 1976-80, in which agriculture and stockraising account for 23.7% of the approximately \$1 billion that it is planned to invest in the country as a whole.

The sugar development program comprises ten complexes that will take up the greater part of the 1976-80 Five-Year Plan investments (\$320 million), the 1976-78 Three-Year Law investments (\$520 million) and of the Special Agricultural Investment and Equipment Budget (\$40 million).

Each sugar complex is to be about 5,000 ha in size, employing between 3,500 and 4,500 workers (i.e. a total of 17,000 to 20,000) and producing, at normal operating levels, between 45,000 and 60,000 tons of refined sugar from 450,000 to 600,000 tons of sugarcane. The targets for 1985 are a total production of 600,000 tons of refined sugar, 500,000 tons of this being for export. The State corporation responsible is SODESUCRE.

The projects located in the extension zone and which have already been started or are to be started in the next few years, are:

Borotou (upper Sassandra): cost \$140 million, with financing by FAC, CCEC and COFACE; the agreement was signed in October 1976. The executing corporation is Société Française pour l'Aménagement et le Développement Agri-Industriel, ADRA. Completion of construction of the mill is scheduled for November 1978, with the first season to start in 1978; normal production will be 45,000 tons of sugar per year.

For cotton, the departments of Touba, Séguéla, Bouaflé, Bouaké and Dimbroko are involved in a national project to develop the cotton regions running from October 1975 to September 1981, covering an area of 108,000 km² at a total investment of \$50 million, with UNDP contributing about \$28 million. Implementation of this project has been entrusted to CIDT (Compagnie Ivoirienne pour le Développement des Fibres Textiles).

The fruit and green vegetables, pineapples, potatoes, onions, avocados, etc., program includes the Niambrun, Kan and Touba projects. The Niambrun project, started in 1975, is now becoming fully operational. The Kan Valley (N'zi) project, downstream of Tiébissou, was to be started in March 1977 and calls for a capital expenditure of \$6 million. The big Touba project (upper Sassandra), started in 1973, should enter normal production in 1977, with 300 ha, of which 200 ha suitable for irrigation, the project as a whole producing 8,000 tons of potatoes and 16,000 tons of onions.

The Société pour le Développement des Fruits et Legumes (SODEFEL) has been given responsibility for this sector.

The rice program comprises essentially the Touba (upper Sassandra) and Yabra (under execution) projects and those of the middle Bandama, around the AVH area. At Touba, the project -- started in 1974 -- has in three years succeeded in settling 6,000 farmers growing rainfed rice on a total of 10,000 ha, using draft oxen and small motorized cultivators. In addition, these farmers have been trained in the rice -- food crops -- cotton rotation sequence. The cost of the project is \$8 million. At Yabra, since the 1975-76 season 500 farmers have been the beneficiaries of a land redistribution

project started in 1970 and resumed in 1973. Rice-growing areas are also planned in the AVB area. Finally, the 1976-78 Three-Year Law provides for an investment of \$40 million in rice. The Société pour le Développement de la Culture du Riz (SODERIZ) is responsible for this sector.

Ivory Coast has decided upon a program of modern and industrial stock-raising designed to cover, between now and 1990, the greater part of its requirements and even allow of exports. The investments envisaged total \$105 million. The main operations would consist in the bringing into use of the empty areas in the intermediate zone from Touba (upper Sassandra) to Bondoukou (Comoë), private or semipublic ranching, the establishment of breeding and raising operations or of fattening areas adjoining the sugar projects, and the introduction of transhumant zebus in the developed valleys of the Bagoé, the upper Bandama and the Lokpoho. In the extension zone sought, the main projects are the Marahoué, Sipilou and Abokwamekro ranches, the Marahoué ranch being by far the most important. This State ranch is to develop 82,000 ha over 15 years, 42,000 ha of this in the first seven years (1975-81), along the Marahoué, in Séguéla Department. The aim is to provide the country's cattle farmers with bulls that will upgrade their stock and to produce young animals for fattening at a rate of 30,000 head when in full operation. The cost of the project is estimated at \$7 million.

3. Data to be obtained

3.1 Medical surveys

3.1.1 Upper Sassandra

Except for the Bafing region, where a supplementary survey will be

needed, the situation is now well enough known.

3.1.2 Bandama basin (Marahoué - Lower Bandama - N'zi)

The entire basin will have to be surveyed. Ivory Coast has requested OCCGE to take care of the part of the studies concerning the lower Bandama, at the beginning of 1978. This will therefore leave:

- the Marahoué in the Bouaflé, Zuénoula and Mankono regions;
- the N'zi in the Dimbokro, Bocanda and M'Bahiakro regions.

3.1.3 Comoë

Extension of the studies to the downstream part of the Comoë is needed.

3.2 Entomological surveys

Throughout all the basins, the surveys will have to be continued and increased in the areas of vector population dynamics and transmission dynamics.

It should be noted, however, that certain areas of the upper Sassandra and Marahoué included in the research program of the OCCGE/ORSTOM Onchocerciasis Research Institute at Bouaké are presently under study.

4. Plan of action

Bearing in mind:

- the status of the preliminary data obtained for the basins as a whole as regards entomology (IRO, Regional Programme);
- the serious epidemiological situation found in the upper Sassandra region;*

*It should be noted that treatment of the upper Sassandra basin, located in the extreme northwest of Ivory Coast, can provide no more than partial protection for the population of this region. While it is a source of blackfly for the areas to the east and northeast, it is itself subject to reinfestation by females from tributaries of the Sassandra or Niger that are located wholly or partially in Guinea.

- the responsibility, now proven, of the upper Marahoué and Sassandra basins in the reinfestation of the southwest of the present Programme area;

a plan of action can be envisaged that would make it possible, while starting the treatments in the above-mentioned two basins, to pursue and complete the medical and entomological surveys. Annex 2 gives a breakdown of the cost of the different operations, based on a preliminary two-year period (\$2,345,000).

4.1 Timetable

Year 1:

- treatment of the upper Marahoué and Sassandra basins;
- final studies of the epidemiological and entomological situation of the Bandama and Comoë basins downstream of the areas presently treated.

Year 2:

- continuation of treatments of the upper Marahoué and Sassandra basins;
- treatment of the Bandama and Comoë basins.

4.2 Resources required

4.2.1 For the medical survey

In addition to the one planned by OCCGE in the lower Bandama, the surveys to provide the justification and basic appraisal data can be carried out by a team consisting of a parasitologist, an ophthalmologist and operating personnel, of whom the latter can be furnished by Ivory Coast. The duration of these studies is estimated at two months (\$34,400).

4.2.2 For the entomological studies

- Establishment of a system of complementary and appraisal studies.

Right at the start of year 1, two appraisal subsectors should be established. They ought to be based on:

- Bouaké, for the completion of the studies in the Bandama basin and on the Comoë. From year 2 onward, this subsector will take charge of the entomological appraisal operations in the same area.

Each subsector will comprise:

- 1 technician (chief of subsector), who could be trained at the Bouaké IRO and in the Programme (duration 4 months);
- 17 operating personnel (collectors, drivers, laboratory assistant, radio operator, etc.).

Annex 2 sets out the personnel, equipment and operating costs of the subsectors (\$192,000/year for the two subsectors), not including premises and recurring expenses (water, electricity, telephone), which would be borne by Ivory Coast.

- Larvicide treatment operations

The treatment circuits have been drawn up for aircraft of the types used by the Regional Programme (Pilatus Porter plane, Bell 206B or Hughes 500C helicopters). The quantities of insecticide (Abate 200 CE), relatively large owing to the number of series of breeding sites, their permanent nature and the large water volumes of these rivers flowing through a high-rainfall area, have been based on the monthly modules of each hydrological station.

A detailed report (Orain and Hendrickx, 1977)* covering the number of hours to be flown and the quantities of insecticide needed for years 1 and 2, can be summarized as follows:

- Year 1:
- plane flying hours (plane coming from the Programme area and returning to it): 280 h (\$56,000)
- helicopter flying hours (helicopter coming from the Programme area and returning to it): 860 h (\$344,000).

With lengthening of the circuits and increasing of the number of guaranteed hours for each type of aircraft, the Programme's present fleet would be able to perform these treatments without additional aircraft being needed.

- Insecticide
 - Upper Sassandra 43,000 liters
 - Upper Marahoué 5,000 "
 - 48,000 liters (\$288,000)
- Transportation of aviation fuel (from Bouaké) and of insecticide (from Abidjan) (\$12,200);
- Year 2:
- plane flying hours (plane coming from the Programme area and returning to it): 500 h (\$100,000)
- helicopter flying hours (helicopter coming from the Programme area

*This report presents an estimate of the flying time and insecticide requirements for each watercourse. Any reduction in the size of the extension zone would therefore result in an immediate and corresponding reduction in these costs.

and returning to it: 1,150 h (\$460,000).

A detailed calculation (Orain and Hendrickx) shows that it is still possible and preferable to increase the guaranteed flying hours for the plane (90 hours/month) rather than add another aircraft to the present fleet (40 hours/month).

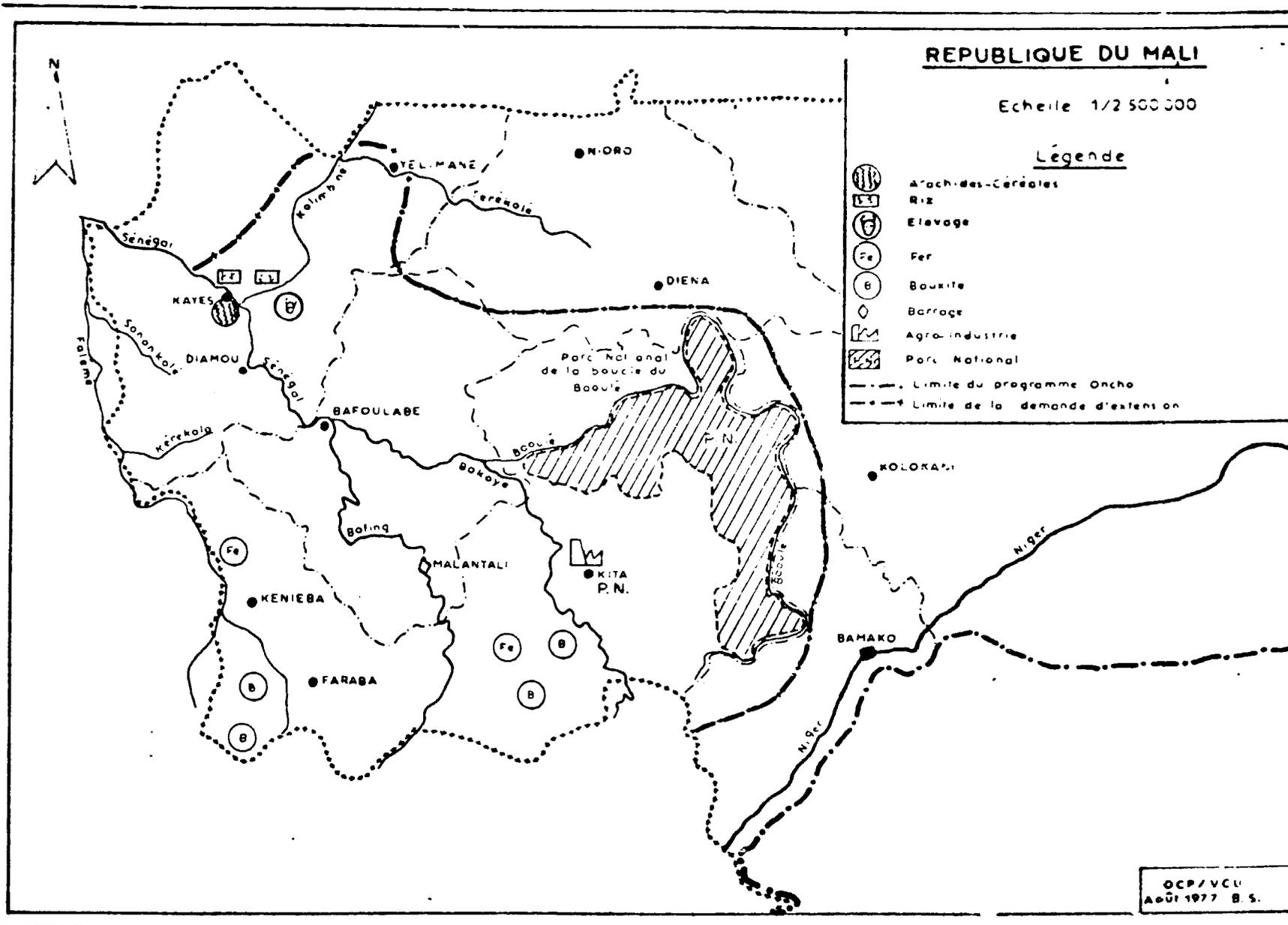
On the other hand, taking into consideration the number of helicopter hours to be flown, addition of another helicopter (65 hours/month guaranteed) will be necessary, as well as increasing of the guaranteed hours for the helicopters operating in the present west zone (65 hours/month).

- Insecticide

- Upper Sassandra	43,000 liters
- Bandara basin	48,000 "
- Comoë	<u>8,000 "</u>
	<u>99,000 liters</u>

in round figures 100,000 liters (\$650,000)

- Transportation of aviation fuel and insecticide (\$16,500).



OCP/VCU
Aout 1977 B.S.

Part 4 of 5	
IBRD LANGUAGE SERVICES DIVISION	
CONTROL NO. F-307/76	DATE: September 6, 1977
ORIGINAL LANGUAGE: French	
DEPT. West Africa	TRANSLATOR: Jhh:ak

Review: OTS

MALI

1. Introduction

In Mali, the Regional Programme includes all the tributaries on the right bank of the Niger basin. The extension requested would cover the Mali basin of the Senegal river (Baoulé, Bakoye, Bafing, Falémé, Sénégal), which would be inconsistent with the criterion of contiguity that provides the strategic basis for the present campaign against the vector of onchocerciasis.

This would be better regarded as the beginning of a new campaign that could include all the basins of the Senegal and Gambia rivers in the States of Mali, Senegal and Guinea.

2. Existing data

2.1 Epidemiology

Many parasitological and ophthalmological surveys of good quality have been made in this region (Picq et al., 1973; Picq et al., 1975; Prod'hon et al., 1976; Prod'hon et al., 1977).

They may be summarized as follows:

- severe foci of savanna onchocerciasis along the Falémé and the Bayoke;
- northern boundary foci (of abated severity) along the Bafing and on the Sénégal in the Bafoulabé and Kayes regions;
- along the Baoulé the severity of onchocerciasis increases from north (mesoendemic foci) to south (hyperendemic foci).

2.2 Entomology and hydrology

During the period since 1967 the OCCGE Onchocerciasis Research Institute has made numerous surveys and studies in the river basins:

- Sénégal (1967-69-70-71-75),
- Bafing-Bakoye (1975-76),
- Falémé (from the Sénégal in 1971).

In November 1977 an additional survey will be made in the Kéniéba region. The entomological situation there (distribution of the various species of the S. damnosum complex; population and transmission dynamics) is therefore relatively well-known but, in view of the immense area of the region as a whole and of the difficulties of access especially in the rainy season, it is vital to obtain further information particularly with respect to the location of breeding sites in each season.

So far as hydrology is concerned the basic hydrometric system is sound but on too limited a scale for the effective planning of a larvicide campaign.

2.3 Economic development projects

The proposed extension covers an area of some 120,000 km² with a population of 730,600 (1972).

Development projects for agricultural resources account for 16% of all national investments in the agricultural sector. Three major projects are of particular significance:

- a groundnut-cereal project providing for the introduction of the double cropping of rainfed groundnuts and cereals. The project is expected to have a life of five years from 1975 onwards at a cost of \$27 million;

- The Térékolé-Sénégal operations project, which is to prepare for the development of land to be improved through the construction of a dam at Manantali. This project will affect 3,200 farms on an area of 15,000 ha. Its cost is estimated at \$8.8 million;
- The Térékolé-Sénégal operation extension project: survey of 18,000 ha mainly in the Térékolé and Sénégal valleys. The cost of the studies is estimated at some \$4 million.

Livestock resources are being developed through a fattening project for small farmers in the western region that covers a period of four years from 1975 onwards. Its objectives are twofold: production of meat for external and domestic markets and supply of oxen for plowing. Project cost: \$3.4 million.

The total cost of the development of forestry resources is estimated to be \$2 million.

So far as the development of mineral resources is concerned, surveys and studies are to be made of the following: iron (Bafing-Mekamé basin: \$0.68 million over 3 years); bauxite (Manantali region: \$2.2 million over the period of the Plan); copper and associated metals (Kayes and Bafoulabé: \$1 million); and finally pegmatites (Falémé).

The principal factor in the development of water resources and energy production will be the Manantali dam across the Bafing, whose objective is multiple:

- construction of a 150-GW hydro-electric power station;
- regulation of the flow of the Sénégal so that it is navigable

up to Kayes;

- irrigation of 450,000 ha.

Finally, the major investment in agro-industry will be the Kita oil mill, which will have a processing capacity of up to 60,000 tons at a total cost of \$5.5 million.

Total investment in the extension area is expected to be of the order of \$92 million.

3. Data to be obtained

3.1 Medical surveys

A synthesis of existing data must be made. This will facilitate the identification of areas in which the data need to be clarified or updated and can provide a framework for basic evaluation.

3.2 Entomological and hydrological studies

- location of vector breeding sites

Additional studies in the form of aerial surveys should be made at various seasons of the year.

- Vector population and transmission dynamics.

A further study will have to be made in both these fields. Difficulties of access of certain foci during the rainy season will, however, present an obstacle to the rapid acquisition of adequate data.

- Six hydrological stations should be installed and calibrated

4. Plan of action

In view of the data still to be obtained, the following plan of action is proposed at a cost of \$230,400 (see Annex 2 for detailed cost figures).

4.1 Timetable

Year 1:

- contacts with the Republics of Senegal and Guinea with a view to coordination of studies;
- synthesis of data in the epidemiological field;
- establishment of an entomological study and evaluation system;
- installation and start of calibration of the six hydrological stations.

Year 2:

- additional epidemiological surveys of foci not previously studied;
- continuation of entomological studies;
- continuation of calibration of the hydrological stations;
- preparation of a plan for a larvicide campaign.

4.2 Resources required

4.2.1 For the medical work

Results could be collated by OCCGE, which has undertaken all the preliminary work in this area. The additional surveys, to be used for basic evaluation, could be carried out by a team consisting of a parasitologist and an ophthalmologist, together with operating personnel who can be provided by Mali. The surveys are expected to take two months (\$34,400).

4.2.2 For the entomological and hydrological work

The studies still needed will call for the strengthening, from the beginning of year 1, of the OCCGE unit located at Bafoulabé.

The team will consist of:

- one technician, who will have to be trained in the Bouaké IRO and under the Programme (duration: 4 months);
- seventeen operational staff (collectors, drivers, laboratory assistant, radio operator, etc.).

Annex 2 contains an estimated cost of personnel, equipment and subsector operations, excluding expenditure on premises and overheads (water, electricity, telephone) that could be borne by Mali (\$68,000) on behalf of the Subsector, plus \$30,000 for the aerial surveys.

The Mali Water Department will be responsible for the installation and calibration of the six hydrological stations (sites determined by the Regional Programme and IRO) required for the planning for a larvicide campaign.

REPUBLIQUE DU TOGO

CARTE DES PROJETS

ECHELLE 1/2 000 000

km 40 20 0 40 km

Légende

Elevage (Ranch) -

Barrage -

Périmètre sucrier -

Périmètre maraîcher -

Riz -

Coton -

Tabac -

Cultures vivrières

projets intégrés (vivrières+coton)

Projets intégrés (vivrières + riz)

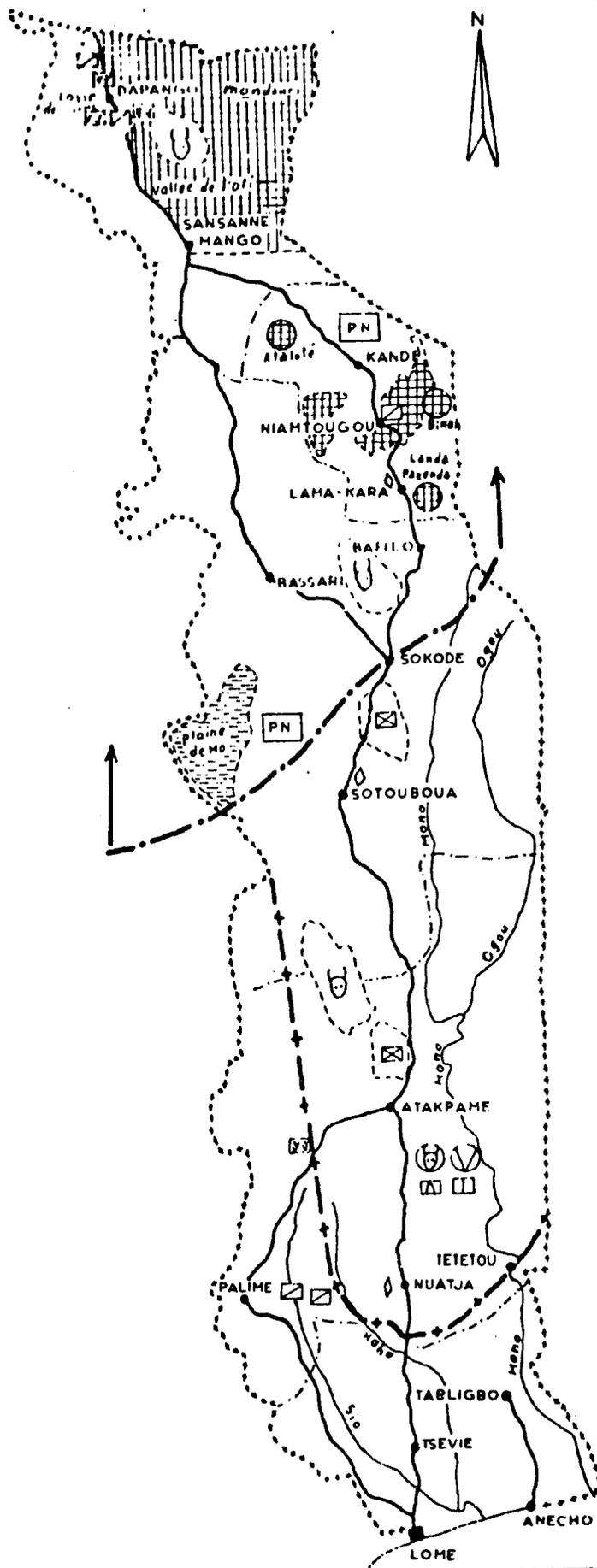
Projets intégrés (vivrières-coton-riz)

Aménagements spéciaux

Parc national

Limite actuelle du programme

Limite de la demande d'extension



TOGO

1. Introduction

In Togo, the Regional Programme comprises the whole of the Oti basin within the districts (circonscriptions) located to the north of Sokodé. The extension for which the Togolese Republic has applied covers the whole of the Mono basin (Sotouboua district, Atakpamé, Nuatja) (see Map 4), i.e. the southern half of the central region and the entire plateau region but excluding the Palimé region. The characteristic form of onchocerciasis in this region is the forest type. The topography is rugged and often unsuitable for low-flying aircraft.

The area of the proposed extension is about the same as that in the current program, i.e. some 23,000 km².

The population of the extension zone is as follows:

- central region: 315,000
 - plateau region: 521,000
- 836,000

The total population of Togo is 2,096,000 and the population of the area included in the existing program is 600,000.

2. Existing data

2.1 Epidemiology

Various surveys have been made in the Mono basin (Israel et al.; Prod'hon et al., 1976; Brinkmann, 1977). They all confirm the existence, as far as Tététou, of a serious onchocerciasis focus associated with a high level of prevalence (average: 60%), together with a significant

percentage of individuals with ocular lesions and blind persons. The last two studies mentioned can be used as a framework for basic evaluation.

2.2 Entomology and hydrology

With the exception of three aerial surveys (end of rainy season in the lower Mono; dry season and onset of rainy season in the upper basin adjoining the current program area) no data are available concerning:

- detailed location of breeding sites at various seasons of the year;
- vector population and transmission dynamics.

The findings on the distribution of the various species of the S. damnosum complex are more consistent and show that savanna species are to be found in the Mono up to the furthest downstream breeding site (Tététou).

The basic hydrological system is well distributed and of good quality: three additional stations should be established, however.

2.3 Economic development projects

The special geographical situation of the plateau region as a transition area between the climates in the north and south favors agricultural activities (cultivation of maize, cassava, yam, etc.) and stockraising. In 1973 there were 32,000 cattle and 130,000 sheep and goats.

The central region is suitable for growing maize, millet, cassava and groundnuts. In the livestock sector there are 50,000 cattle and 214,000 sheep and goats.

The principal objectives of the Third Five-Year Economic and Social Development Plan (1976-80) are to develop rural areas and expand stock-raising, through the regulation of water, with a view to ensuring self-sufficiency in food supplies.

Global investments under the Second Plan amount to \$1 billion. Projected investments in the extension area are of the order of \$220 million (i.e. 22% of the total), of which \$128 million is for sugar complexes, \$45 million for agro-industry, \$44 million for food crops (maize, millet, rice, sorghum), \$3 million for fruit-growing programs (cashews, pineapple, banana, citrus fruits) and \$2.6 million for animal husbandry. The areas involved are to be some 60,000 ha for agro-industry, 32,000 ha for cotton, 10,000 ha for sugar and 6,445 ha for fruit.

The major agricultural units to be developed in the area are:

- Tchoudjo sugar complex -- The area to be used, located at a distance of 25 km from Sokodé (central region), amounts to some 10,000 ha. The total project cost is estimated at \$128 million, of which \$12 million is earmarked for agriculture under the Third Plan.
- Plateau agro-industrial complex -- An estimated 50,000 ha of groundnut, cassava, maize and cotton cultivation together with stockraising. Total cost: \$45 million, of which \$9 million is to be provided under the Third Plan.
- Irrigation in the Haho valley (plateau region) -- This project is to cover 10,000 ha.
- Mono irrigation project -- General studies of the Mono basin (25,400 km²) are to be undertaken in 1978. \$2 million is programmed for a study of water resources and irrigation potential.
- Animal husbandry: establishment of the Adele ranch (located

between the central region and the plateau region). The estimated capacity of the ranch is 23,000 cattle and it is expected to produce between 870 and 900 tons of meat.

3. Data to be obtained

3.1 Medical survey

A survey designed to supplement existing data and to be used for basic evaluation will have to be made.

3.2 Entomological survey

- Location of vector breeding sites

Full aerial surveys will have to be made at various seasons of the year.

- Vector population and transmission dynamics

A survey will have to be made in these two fields. This will allow a more accurate definition of the distribution of the various species of the S. damnosum complex and of the vector efficiency of each species.

- Three additional hydrological stations are to be established and calibrated.

4. Plan of action

In view of the data still needed, especially in the entomological field, the following plan of action is proposed (see Annex 2 for details of the cost, which will amount to \$229,200 over two years).

4.1 Timetable

Year 1:

- Finalization of epidemiological data; basic evaluation;
- Initiation of entomological studies;

- Installation and start of calibration of three hydrological stations.

Year 2:

- Finalization of entomological studies;
- Continuation of calibration of hydrological stations;
- Preparation of a plan for larvicide campaign.

4.2 Resources required

4.2.1 For the medical survey

The medical survey will be undertaken by a team consisting of a parasitologist and an ophthalmologist, with support personnel that can be provided by Togo. The estimated duration of the survey is one month (\$17,200).

4.2.2 For the entomological and hydrological surveys

The preliminary studies call for the establishment, from the start of year 1, of an evaluation subsector to be supervised by the Vector Control Unit under the Regional Programme. This subsector will be based on Atakpamé.

It will comprise:

- a technician to be appointed Subsector Chief and to be trained at the Bouaké IRO and under the Programs (four months training);
- 17 operating personnel (collectors, drivers, laboratory assistant, radio operator, etc.).

Annex 2 contains an estimate of the cost of personnel, equipment and subsector operations, excluding the cost of premises and overheads (water, electricity, telephone) that would be borne by Togo (\$92,000 for the subsector, plus \$14,000 a year for aerial surveys).

The Togolese Water Department should assume responsibility for the installation and calibration of the three hydrological stations (sites determined by the Regional Programme) needed for the planning of the larvicide campaign.

IERD LANGUAGE SERVICES DIVISION	
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DEPT. West Africa	TRANSLATOR: OTS:ak

Annex 1

COST OF OPERATIONS (SUMMARY) (IN US\$)

Country	Year 1	Year 2	Total
Benin	141,400	115,000	256,400
Ghana	259,600	207,000	466,600
Ivory Coast	926,600	1,418,500	2,345,100
Mali	98,000	132,400	230,400
Togo	123,200	106,000	229,200
Grand Total	1,548,800	1,978,900	3,527,700

Annex 2

COST OF OPERATIONS (IN US\$)

Year 1 Year 2

BENIN

(For figures, please
see French original)

- medical surveys
 2 months x 2 consultants
 per diem - vehicle operation
 depreciation

 - entomological surveys
 - surveying - plane flying hours
 year 1: 20h x \$200
 year 2: 20h x \$200

 - helicopter flying hours
 year 1: 50h x \$400
 year 2: 70h x \$400

 - entomological appraisal
 establishment of a Subsector
 (personnel, vehicles, equipment,
 operation)
-

GHANA

- medical surveys
 3 months x 2 consultants
 per diem - vehicle operation
 depreciation of equipment

 - entomological surveys
 - plane flying hours (surveying)
 year 1: 20h x \$200
 year 2: 15h x \$200

 - helicopter flying hours (surveying)
 year 1: 50h x \$400
 year 2: 50h x \$400

 - entomological appraisal
 establishment of 2 Subsectors
 (personnel, vehicles, optical
 equipment, radio, operation)
-

IVORY COAST

- medical surveys
 - 2 months x 2 consultants
 - per diem - vehicle operation
 - depreciation, laboratory equipment
 - entomological surveys
 - entomological appraisal
 - 2 Subsectors (personnel, vehicles, optical equipment, radio, operation)
 - infrastructure (offices, water, elec., tel.) Iv. Coast Iv. Coast
 - treatments
 - plane flying hours
 - year 1: 280h x \$200
 - year 2: 500h x \$200
 - helicopter flying hours
 - year 1: 860h x \$400
 - year 2: 1150h x \$400
 - insecticide
 - year 1: 48,000 l x \$6
 - year 2: 100,000 l x \$6.5
 - transportation fuel and insecticide
 - year 1:
 - year 2:
-

MALI

- medical surveys
 - 2 months x 2 consultants
 - per diem - vehicle operation
 - depreciation of equipment
- entomological surveys
 - surveying plane flying hours
 - year 1: 30h x \$200
 - year 2: 30h x \$200
 - helicopter flying hours
 - year 1: 60h x \$400
 - year 2: 60h x \$400
- entomological appraisal (Subsector)

TOGO

- medical surveys
 - 1 month x 2 consultants
 - per diem - vehicle operation
 - depreciation

 - entomological surveys
 - surveying - plane flying hours
 - year 1: 10h x \$200
 - year 2: 10h x \$200

 - helicopter flying hours
 - year 1: 30h x \$400
 - year 2: 30h x \$400

 - entomological appraisal
establishment of Subsector
-