POPULATION DYNAMICS IN RURAL AREAS FREED FROM **ONCHOCERCIASIS** IN WESTERN AFRICA

COMMITTEE FOR INTERNATIONAL COOPERATION IN NATIONAL RESEARCH IN DEMOGRAPHY

POPULATION DYNAMICS IN RURAL AREAS FREED FROM ONCHOCERCIASIS IN WEST AFRICA

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SYNTHESIS OF NATIONAL MONOGRAPHS

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Thank you.

[a)] "Institut de recherche sur le développement (IRD)" since 1998

ACRONYMS

AREA	Onchocerciasis Area covered by the study. The AREA covers Eastern Senegal, Northern and Central Guinea, Southern Mali, Northern and Central Côte d'Ivoire, Southern, Central and Western Burkina Faso, Northern Togo, Northern Ghana, Northern Benin and South-western Niger (Map 2)
AVV	*Aménagement des Vallées des Voltas* (Burkina Faso - Development of the Voltas Valleys (Burkina Faso)
CEFORP	*Centre d'Étude et de Formation en matière de Population* (Benin)
CERPOD	*Centre de Recherches Population et Développement* (Mali)
CICRED	Committee for International Cooperation in National Research in Demography
DHS	Demographic Health Survey
DNSI	*Direction Nationale de la Statistique et de l'Informatique* (Mali) *Division Nationale de la Statistique et de l'Informatique* (Guinée)
DPS	*Direction de la Prévision et de la Statistique* (Senegal)
DSCN	*Direction de la Statistique et des Comptes Nationaux* (Niger)
EAP	*Enquête Agricole Permanente* (Guinea)
ENSEA	*École Nationale de Statistique et d'Économie Appliquées* (Côte d'Ivoire)
FAO	Food and Agriculture Organization of the United Nations
GPC	General Population Census
GPHC	General Population and Housing Census
IDA	Institute for Development Anthropology (Binghamton, NY, United States)
INS	*Institut National de la Statistique* (Côte d'Ivoire)
OCP	Onchocerciasis Control Programme
ONAT	*Office National pour l'Aménagement du Territoire* (Burkina Faso)
ORSTOM[b)]	*Institut Français de Recherche Scientifique pour le Développement en Coopération*
ORZ	Onchocerciasis Reference Zone for each country
RIPS	Regional Institute for Population Studies (Ghana)
SDAA	Land Tenure Service, FAO
SNIS	*Système National d'Informations Sanitaires* (Guinea)
SNSA	*Service National de Statistiques Agricoles* (Guinea)
UERD	*Unité d'Enseignement et de Recherche en Démographie* (Burkina Faso)
UNDP	United Nations Development Programme
URD	*Unité de Recherche Démographique* (Togo)
WHO	World Health Organization

[b)] Cf. note a).

PREFACE

In response to the recommendations made at the ministerial conference on population and sustainable development of the Onchocerciasis Control Programme (OCP) zone in West Africa, held from 12th to 14th April 1994 at the World Bank head office in Paris, FAO was asked to prepare a plan of action for the sustainable socio-economic development of the valleys freed from the disease in the 11 countries participating in the programme.

The Organization undertook a dual approach: the re-elaboration of a list of natural resources in the areas affected by onchocerciasis using the latest data processing techniques; and the reinterpretation of the recommendations made based on studies by the Institute for Development Anthropology (IDA, N.Y.) in terms of the populating of the OCP valleys. Prior to formulating policies regulating the settlement of smallholders in these areas, FAO felt that it was necessary to obtain information on the socio-demographic situation in the valleys and on its internal dynamics to ensure the sustainable development of the natural resources of these areas.

Therefore, at the end of 1994, the FAO's Land Tenure Service (SDAA) asked the Committee for International Cooperation in National Research in Demography (CICRED) to carry out a study on the population dynamics in rural areas freed from onchocerciasis and for their sustainable development.

After one year of training of the national research teams in nine of the 11 countries in the programme, of field surveys, and of shared experiences, the results of the national population studies were presented at FAO.

The most innovative information emerging from this research turned out to be the high degree of mobility of the young adults whose families had settled in the OCP valleys, which meant that strategies for the settling of smallholders in the oncho-freed valleys could no longer be formulated without taking into account the mobility of this labour force.

Following the research carried out upon the request of FAO, CICRED and the national teams working on the population dynamics of the OCP areas further developed their research and refined their analyses.

The present "Synthesis of the National Studies" is the fruit of this in-depth work, the scope of which exceeded what FAO had expected from CICRED and the national research teams.

This pool of knowledge is now available to the OCP countries and to those countries who wish to benefit from this scientific information which we feel should continue to be exploited.

The conditions for the settlement and regulation of smallholders in the valleys require further reflection, due to the heterogeneity of the populations currently settled in the valleys, and the diversity in their social behaviour and farming practises resulting from the diversity of their origins.

The farming seasons in the valleys differ considerably from those of the farms on the interfluvial plateaux: in addition to cultural differences between the two ecological environments the periods of inactivity between sowing or planting and harvesting also vary. What consequences does this have on farm labour and its mobility?

Furthermore, if the ways in which the valleys are being repopulated were to continue as they are today, this would lead to an increase in the proportion of women and children in the agricultural work force with consequent decline in production capacities. In such conditions, one of the conclusions to be brought to the attention of national decision-makers would be the need to formulate rural development strategies that promote the rights of women and young people to benefit from their production.

After reading the report, it is clear that the conditions enabling increased productivity in the valleys are still lacking, that the phase of extensive farming has not yet been achieved: to food crops need to be added cash crops and livestock farming in order to maximize the potential of these valleys. This means that their rapid development requires a regional development plan that would promote synergies rather than competing productions.

The conclusions of the national demographic studies presented new perspectives for developing strategies for settlement in the OCP valleys, but it also provided an excellent example of the scientific and practical benefits to be gained from comparing demographic data - notably, those of the censuses for the populations concerned by the OCP - with data from agricultural censuses, in preparing policy decisions for the development of rural areas in a great variety of contexts.

River blindness was controlled through favourable circumstances – the distribution of Ivermectine being the most important element- and to the setting-up of innovative institutional mechanisms. The importance of these circumstances need to be stressed at a time when the programme is moving from the public health phase to that of the socio-economic development of the oncho-freed valleys: strong converging views of the three partner groups – the countries in the OCP, the donors and the four United Nations sponsoring agencies – concerning the measures to be taken as the different phases of the OCP unfolded, complete consistency in the means used to implement the programme which promised to be a long-term project and constant responses on the part of the countries and sponsoring organizations for the whole duration of the project.

Although not widely known outside the scope of the OCP, the system of permanent cooperation between the technical secretariats of the four

agencies, set up at the beginning of the project, and the annual tripartite meetings, have made it possible to adjust the field operations and to provide the partners with the necessary information for taking urgent decisions.

Moreover, this system for the management of the programme has made it possible to guarantee, over a period of 25 years, the indispensable unity of action and careful monitoring of the different notional, scientific and operational aspects of the programme.

In addition to its success in the field of public health and the prospects for socio-economic development that the control of the disease has made possible, the OCP has also shown the public that dedication to irrefutable results, even after such a long period of hard work, was enough to ensure the cohesion of the partners and the generosity of the donors as well as cooperation between the programme's member States.

It should be noted that for programme technicians or managers the simple fact of being part of the programme was enough to ensure that none of the fiscal regulations or customs controls usually carried out at the borders of sovereign States were imposed on them; neither were any such regulations or controls imposed on spraying equipment, transport equipment, and medical or chemical products. Following a tacit but effective agreement, the countries applied this special regime in favour of the OCP in the knowledge that this sub-regional programme was being implemented for humanitarian reasons and for the benefit of the local populations.

Whereas colonial borders have often artificially divided populations, the mobility of the vector of infection has made it necessary to fight the disease where it is to be found without any concern for political borders. Moreover, the logistical and health advantages brought about by this type of cooperation have made the States in the sub-region aware of its importance in ensuring their future.

It is up to the OCP countries to exercise wisdom by continuing sub-regional collaboration not only in launching the plan of action for the socio-economic development of the OCP valleys, but also once this plan of action has been implemented.

Gérard Ciparisse, Rome, July 1998

PRESENTATION

POPULATION DYNAMICS, A MAJOR CHALLENGE FOR THE SUSTAINABLE DEVELOPMENT OF RURAL AREAS IN WEST AFRICA

Because of its history and environment, West Africa has always been characterized by the disparity of its population. The population has concentrated in the areas belonging to the large kingdoms and chieftainships, in areas far from the often unhealthy large rivers, and around the hubs of the major communication routes. Since colonization, investments have been concentrated in the coastal regions, favouring cash crops and the export of products thus increasing the disparity: rural populations in Sudano-Sahelian regions, whether densely populated or not, emigrated to these coastal regions and to the major urban centres. Up until the 1950's in all the countries except for Ghana and Nigeria, the population growth remained under 2% per year. However, for almost 30 years the population growth has progressed at a rate close to 3%: the population has more than doubled and it has been redistributed in a way that cannot be simply attributed to rural exodus. In fact, as they were opened up, many rural areas in West Africa experienced the highest population growth in their history and at the same time their younger population cleared new farming lands or contributed to the growth of urban centres. Apart from population growth, the occupation of available land, and the development and mobility of the population are all key elements in the sustainable development of these rural areas.

These elements are currently interrelated with complex linkages. It is not a simple question of population growth, development modes and carrying capacity of the environment. Land and resources can be exploited without a settled population; certain forms of mobility may weaken the population whereas others may strengthen it; densification of the population may not lead to development, and the unsustainable exploitation of resources may also be the result of small and very mobile populations.

In general, the densification of rural populations, their heterogeneity, activities and the fragility of domestic units in terms of their capacity to maintain or establish viable agricultural exploitations because of the mobility of some of their members, are factors that need to be taken into account by

of some of their members, are factors that need to be taken into account by policies and programmes for sustainable agricultural development. In particular, the construction of roads, the establishment of new markets and food industries, the development of irrigation, etc., will result in a structuring of the population. The impact of these factors will lead to a sort of "redistribution" of demographic growth.

Population dynamics therefore appear as a phenomenon to be studied and as a means of analyzing the transformation of rural areas, whether it be for the localization of markets, the intensification of farm production, land tenure or the preservation of the environment.

The rural areas of the Sudano-Sahelian countries of Africa, currently protected from onchocerciasis, would require such an approach, in spite of the fact that they still have relatively low population densities, since they are often involved in government development programmes. Because of its objectives, its actions and its autonomy, the OCP (Onchocerciasis Control Programme), set up in 1974 in seven, and later in eleven West African countries, did not deal directly with the population of these areas. However, sponsoring agencies, especially FAO, soon became concerned with the consequences of the accelerated peopling of these valleys by groups which were rather dissimilar from one another and very different, especially in terms of the ways in which they exploited the land, from the local populations or populations already settled in the areas. Localized but important studies were carried out on these population aspects in the OCP[1]. Notably, the IDA carried out a study in 1988-1989, which attempted to analyze resettlement in OCP areas and to define favourable factors for the sustainable settlement, whether organized or spontaneous, of these areas. The resettlement processes were studied in several sites[2] but the size of the settlements and the population movements affecting these regions could not be assessed. The diversity and instability of the settlements observed by the researchers conducting the study required extra information and the monitoring of population movements. However, statistical offices and research departments able to carry out such surveys have so far had little contact with the OCP and are relatively unconcerned about the problem of the settlement of rural areas, since international migration towards forest areas or urban centres is their principal concern. In general, little attention is devoted to these processes by demographic studies since the general population growth and in particular that of urban populations is the main concern of researchers and sponsoring agencies.

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[1] For example the study carried out in the Bandama region in Côte d'Ivoire as well as studies carried out under the aegis of the Club du Sahel.

[2] A quantitative study conducted by IDA (Institute for Development Anthropology, Binghamton, NY, United States) was carried out at three levels: that of governmental and non-governmental organizations, regarding the situation of immigrant populations (integration and retention); that of the village chiefs or of the people in charge of areas being settled, concerning the settlement history of the villages; that of the immigrants themselves, covering their place of origin and the conditions in which they left and in which they settled (McMillan *et al.*, 1993).

Establishing a Network

CICRED decided to establish a network of centres in the 11 countries of the programme to encourage, through a study addressing FAO's concerns, research on the theme "Sustainable Population and Development" by the national statistical agencies and population research centres. A network made up of four statistical departments and five population research centres was set up in March 1995[3]. This group, coordinated by André Quesnel, had two meetings: the first one 8 and 9 May 1995 in Abidjan to define the scope of the problem and elaborate a plan of action and a schedule for the study; and a second meeting in Ouagadougou on 11, 12 and 13 October 1995 to discuss progress made and to present the provisional results of the national studies. The work was finished in April 1996 and the documents were presented in 1996.

The Institutions and National Representatives were:

Country	Institution	Director or Deputy Director *	Person in charge of the study
Benin	CEFORP	P. KLISSOU	P. KLISSOU
Burkina Faso	UERD	G. COMPAORE	B. BAYA
Côte d'Ivoire	ENSEA	N. KOFFI	B. ZANOU
Ghana	RIPS	M. SEMBAJWE	E. TAIWAH
Guinea	DNSI	M. KEITA	M. KEITA
Mali	DNSI	S. DIARRA *	S. DIARRA
Niger	DSCN	A. BEIDOU	A. BEIDOU
Senegal	DPS	A. THIONGANE	A. GAYE
Togo	URD	A. AGOUNKE	K. VIGNIKIN

Through the involvement of these population research centres in the study of the rural areas in the OCP programme they started to consider rural development from a different angle, in particular rapid growth and the imbalance of population structures by age and gender, imbalances which, in most cases, have led to extremely predatory forms of environmental exploitation. In addition, at a time when the rural areas are subject to unprecedented population growth, it is essential that the research should be more intensely concentrated on the mechanisms linking demographic movements and sustainable development so that policies ensuring a better control over such mechanisms may be developed. International coordination of the research is all the more necessary since all these countries share frontiers, certain regions have chosen similar development options[4] and the development carried out in one country can attract rural populations from

[3] No population research institutes from Guinea Bissau or Sierra Leone were able to take part in the project. In the first case we were unable to find an institute or researchers able to join the team at short notice once the project had started. In the second case because of the political situation we could not envisage conducting our research as we would have wished.

[4] Southern Mali, Northern Côte d'Ivoire and Southwest Burkina Faso have based their development strategies on cotton crops.

another country[5]. International coordination of research must draw the attention of decision-makers to the need to go beyond the routine observation of different categories of populations settling, moving, and working in rural areas. This is even more crucial today given the fact that the great majority of the countries involved will soon be carrying out population censuses.

General Approach to Studying Population Dynamics

The objective of this study is to evaluate the population dynamics as precisely as possible in those rural areas where onchocerciasis has been brought under control so as to be able to describe the effects of population dynamics on the available land and resources.

The first step is to take into consideration the distribution of the population, its overall growth rate and its redistribution within each of the areas freed from onchocerciasis, all of which are elements accompanying the emergence of new economic opportunities linked to the opening up of these areas, the building of commercial and social infrastructures, and the development of agricultural exploitations. In this manner the changes undergone by pre-existing settlements and the creation of new settlements are studied; in other words, an attempt is made to establish whether populations concentrate around pre-existing settlements, whether they spread, or whether they become dispersed.

The next step involves considering the active population and how it is changing in the different areas, as well as its redistribution in the different economic sectors so as to obtain a more detailed picture of the structure and mobility of the working population involved in agriculture. Simply studying changes in the structure of the working population in well-defined areas of activity should shed light on the type of settlement suitable for the different agricultural productions and the rural areas.

Such an approach should be possible once exhaustive information is available, such as that contained in population censuses, and as soon as this information can be geo-referenced[6] in a reliable and continuous manner over time. Thus, whilst remaining conscious of the inherent problems of such types of information we feel that given the computer technology now available for gathering and processing all sorts of data, censuses should be rehabilitated.

With a spatial approach to population dynamics our objective is also to develop an approach at different geographical levels, from the sub-region to the population unit, to be able to identify the different spatial continuities or discontinuities, whether demographic, economic, agrarian, etc.

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[5] We will see further on that development in Southwest Burkina Faso has encouraged the creation of "useful corridors".
[6] I.e., with geographic coordinates.

The idea underlying our approach is to exploit available data sources to establish the basis for a geo-referenced information system by using other sources of information such as agricultural censuses, ecological data, remote sensing data, etc.[7]

We have therefore adopted an approach to be carried out in two stages:

- The first stage consists of recovering and recycling available sources of demographic data, especially censuses, since they make it possible to follow population changes during the reference time and within a given area. From this point on the idea is to construct indicators able to directly or indirectly measure population dynamics. The aim is to define a typology of homogeneous areas according to types of population, activity and mobility. This should enable us to roughly identify the factors of these dynamics.
- Using such a typology as a starting point the second stage consists of constructing a sample of zones or villages which would form the basis for an observatory of population dynamics. This sample would make it possible to conduct detailed studies on mobility in relation to other characteristics, such as agriculture, health, etc.[8]

Following these principles we were able to asses the problems to be overcome in order to implement such an approach. We were obliged to stick to the first stage while trying to give a geographical representation of the population dynamics at the level of the smallest administrative unit above the village. In general, the limitations of the study are not so much due to the problems caused by the heterogeneous sources of data, which we will come back to later on in this report, rather than the problems of accessing these sources so as to carry out new analyses, a general problem linked to the scientific and institutional context of research in Africa. Coordinating the different institutions to draft a monograph of this type will at least have brought to light quite a few dysfunctions, that confirm the need for coordination at national as well as international levels for the production of data.

This study enabled each institution:

- to carry out an initial evaluation of available demographic data. Each of the institutions was able to evaluate the data (accessibility,

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[7] Spot images can provide regularly updated information on the development of agriculture and of rural and urban construction. Censuses provide information at ten-yearly intervals (or almost) on changes in the population. The benefits to be obtained from developing geo-referenced data seems obvious on the condition that there should be a clearly defined approach in this direction and especially if the data are reliable and available. This is far from being the case. The true value of censuses has not been recognized and they have not been conserved with such use in mind.

[8] A first approach referred to as "descending" was presented at the workshop held in Ouagadougou (Marchal, 1995)

archiving) and their analytical potential (scale, variables, indicators). In particular with regard to the censuses, and since the spatial level of analysis was detailed, i.e. at the level of the canton or the sub-prefecture, we realized that the data still remained to be fully exploited on condition that they had been properly preserved, which was rarely the case;

- to establish contacts with institutions working in areas affected by onchocerciasis[9], initially with the organizations implementing the OCP, and to initiate collaboration in the onchocerciasis zone and other rural areas by establishing relations with institutions producing economic, agronomic information, etc. The need for monitoring population dynamics as well as the development of farming activities at local level confirm that certain requirements regarding the gathering, management and archiving of data should be observed. Population censuses have been conducted, analyzed and published in an isolated manner without taking into account other census operations at national levels. Among other things, determining standard geographical reference units and categories suitable for everyone should be encouraged[10]. This would avoid repeating similar studies and makes it possible to study in greater detail issues raised at other levels or by other studies, such as the study on "Migration and Urbanization in Western Africa" conducted by CERPOD;
- to help national institutions become more autonomous. By ensuring that studies benefit from adequate follow-up and expertise, national institutions and decision-makers will be able to define more precisely their roles in the development of rural areas.

At the international level, when these countries share common borders and belong to the same sub-region, the study made it possible to:

- raise the problem of sustainable development linked to population dynamics and the economic dynamics of the area;
- compare, at sub-regional level, the ways in which data concerning rural areas are produced. Some countries, such as Côte d'Ivoire, more advanced in the field of the geographical computerization of census data, could therefore train other countries in these areas[11].

A network has been created to capitalize on the skills which must be preserved. The study stresses the need to pursue studies on population dynamics from the point of view of health as well as sustainable development of rural areas freed from onchocerciasis.

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[9] In this text we use interchangeably the terms “zone”, “onchocerciasis zones”, and “ORZ” (onchocerciasis referenced zone) for each country of the programme.

[10] It would seem that this is not the option chosen by the census departments. Thus in Burkina Faso it is very difficult to find the same categories in different censuses.

[11] Y. Merghoub worked with the partners in Côte d'Ivoire and Burkina Faso in 1995 to acquaint them with geo-referenced information systems.

With this objective in mind we asked two institutions (ENSEA and URD) to establish a team to draft a synthesis of national reports. ENSEA and URD, represented by Messrs Koffi N'Guessan and Benjamin Zanou and, Koukou Vignikin met five times:

- for the first time on 4 and 8 February to establish the work schedule, the study programme and to distribute tasks; ENSEA was to draft the synthesis of the studies conducted in the area which included Côte d'Ivoire, Ghana, Guinea, Mali, Senegal and the western part of Burkina Faso, and URD was to deal with the area including Benin, Niger, Togo and the eastern part of Burkina Faso;
- the second meeting was held from 21 to 26 April in Lome and its objective was to pool the results of the work carried out by the two teams; at this meeting a document was drafted which was later submitted to CICRED;
- then ENSEA and URD met with CICRED in Paris from 5 to 10 May 1997 to finalize the synthesis report under the supervision of André Quesnel.

After this meeting the team met another two times, once in Lome and once in Abidjan, to review the synthesis for publication.

This document especially focuses on the following aspects:

- the objectives, approach and limits of the national studies;
- comparison of the results of each of the studies taken into consideration in sub-regional areas;
- certain questions raised by the study as a whole, notably regarding the relations between population, development and mobility in the rural areas.

The main problem in drafting the synthesis concerned the differences in the national reports: in spite of the fact that the strategy for the study and the report plan had been elaborated in collaboration with all the national teams, the contents of the reports from the different countries varied in the way they were presented and in terms of the demographic indicators used. These differences in the reports are principally due to differences in the data sources used, problems in accessing some of the data, etc.

The scientific editors of this synthesis have based their work exclusively on the national reports. Apart from a few exceptions no complementary information has been used. Because of this, the recurrence of the expression "in the absence of available information" in the document refers to the national reports. However, in order to illustrate certain results the report drafted for this study by André Quesnel and Jean-Yves Marchal (1995) on the Kompienga and Nakomse valleys in Burkina Faso was used.

Because of the disparities between the national reports results are presented in what may seem to be a slightly fastidious manner, country by country, in most of the sections which follow our analytical approaches. Although the indicators used are not always built in the same way and the time frames are not always identical, these results were mainly taken into account due to their similarities and the differences they revealed between the different spatial units of the rural areas freed from onchocerciasis, in

other words for their ability to provide information on the spatial continuities and discontinuities in the population dynamics in this region of West Africa.

Mr Eric Vilquin, Professor at the "Institut de Démographie de l'Université de Louvain-la-Neuve" and member of the CICRED executive bureau reviewed the synthesis and provided editorial assistance.

André Quesnel, Paris, December 1997

LIST OF NATIONAL REPORTS

BENIN

Klissou P., Guingnido G. and Laourou M. (1996) - *La dynamique de peuplement des zones libérées de l'onchocercose au Bénin*, 55 p. xerox.

BURKINA FASO

Guiella G. and Baya B. (1996) - *Peuplement et développement des zones rurales libérées de l'onchocercose au Burkina Faso*, 39 p. xerox.

CÔTE D'IVOIRE

Aka D., Touré L. and Zanou B. (1995) - *Dynamique de peuplement des zones libérées de l'onchocercose en Côte d'Ivoire*, 54 p. xerox.

GHANA

Tawiah E. (1995) - "A status report on oncho-freed zone population in Ghana", 47 p. xerox.

GUINEA

Kéita L. and Bah M. (1995) - *La dynamique de peuplement des zones rurales libérées de l'onchocercose en Guinée*, 29 p. xerox.

MALI

Diara S. (1996) - *Projet " Peuplement et développement des zones rurales libérées de l'onchocercose " : cas du Mali*, 38 p. xerox.

NIGER

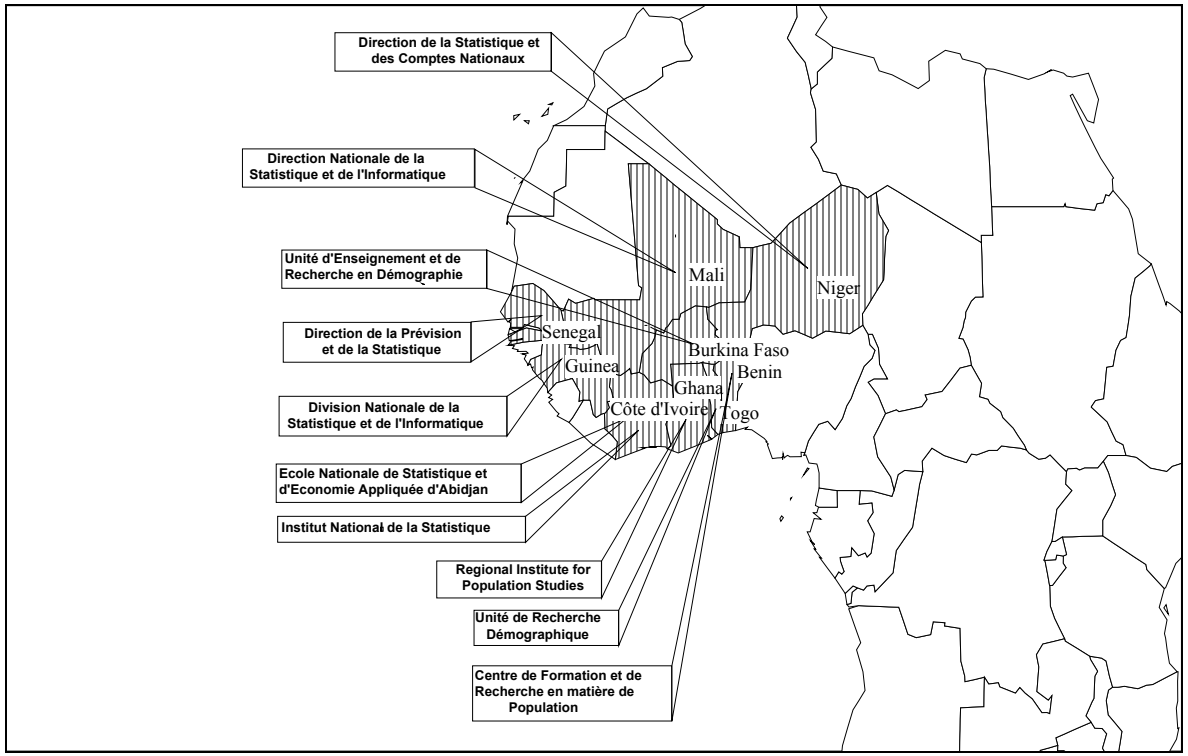
Béidou A. and Soumaïla B. (1996) - *La dynamique de peuplement des zones libérées de l'onchocercose au Niger*, 80 p. xerox.

SENEGAL

Gaye A. (1996) - *Étude du peuplement et du développement des zones libérées de l'onchocercose : le cas du Sénégal*, 44 p. xerox.

TOGO

Kouwonou K. and Vignikin K. (1995) - *Étude du peuplement des zones libérées de l'onchocercose au Togo*, 59 p. xerox.



Map 1: African Countries and Institutions Covered by the Study of Population Dynamics in Oncho-freed Zones

INTRODUCTION

Most of the rural areas of Sub-Saharan Africa are currently undergoing the highest population growth in their history. At the same time, migrations have increased and diversified. Such population dynamics lead to changes in the way labour is used and farmland exploited. It is crucial to understand these dynamics and to support the mechanisms which would make it possible to control them in order to achieve the sustainable development of the rural areas.

The oncho-freed zones in West Africa are a good example of this type of problem since they are not yet densely populated. They are experiencing high immigration flows of populations using different farming techniques. Their young populations continue to emigrate to the capitals, towns or rural areas of neighbouring countries or to Europe.

Rather than just taking into account the immigrants, it is the population dynamics of these rural areas as a whole which should be taken into account for the sub-region as a whole in order to identify the conditions in which populations can be stabilized and sustainable agriculture developed.

Understanding the mechanisms behind the stabilization process and defining the policy measures to be implemented in order to obtain such an outcome require a detailed spatial approach in analyzing the demographic processes. The study "Population Dynamics in Oncho-freed Rural Zones and Sustainable Development", coordinated by CICRED was designed with this purpose in mind. Its general objectives are threefold:

- to assess and evaluate available demographic data on the zones in the Onchocerciasis Control Programme (OCP);
- to evaluate the population dynamics of these zones;
- to assess their economic potential.

The current study is different from the many other studies carried out since the OCP was launched in 1974[12] because it focuses mainly on the population of the OCP zones which make up the AREA.

[12] Such as the study on the preparatory phase (1998), the study on population settlement (1990), etc.

The main objective of this synthesis is to study the population dynamics which for almost 25 years now have concurred in globally transforming the AREA[13], and to highlight the population mechanisms involved which must be taken into account in formulating strategies for the development of the 25 million hectares of arable land it includes. This transnational approach is crucial since it makes it possible to assess current demo-economic changes (population growth, migration, economic activity, etc.), to reintroduce population dynamics within a sub-regional context and to verify the hypothesis by which the AREA as a space undergoing permanent resettlement requires a specific development plan and the implementation of initiatives promoting viable economic programmes aimed at stabilizing the population.

Since one of the premises of the study was that the settlement of populations is only beneficial for sustainable development if carried out in an area benefiting from economic growth, a methodology was adopted embracing the geo-physical and geo-economic context on the one hand and population dynamics on the other, so as to distinguish which factors were favourable to development based on population.

The present paper is composed of four parts. The first part gives an insight into the physical context and the human and economic environments of the AREA. Not only does it highlight the vulnerability of the geo-physical environment and the obstacles, but also the advantages it presents in terms of settling populations. The second part covers the principal methodological aspects of the study. The third part deals with the situation and population dynamics of the AREA, by describing growth rates, changes in population density and spatial mobility. The fourth part describes the economic activities in the AREA, in particular its potential in terms of crop and livestock farming, and industry. In the conclusion the authors propose a number of possibilities and economic initiatives to be implemented for the sustainable development of the Onchocerciasis Reference Zones (ORZ's).

[13] The Onchocerciasis area considered here does not correspond to the epidemiological area covered by the OCP. In order to follow population changes, the AREA takes into account a savannah based on administrative and census units.

DATA SOURCES

This synthesis is based on demographic and economic data from the nine countries constituting the AREA (Map 1). These data come mainly from general population censuses, demographic surveys and other specific studies conducted during the last 30 years in these countries.

Benin

Before 1961, when the first national demographic sample surveys were conducted, the colonial administration periodically (every two years) carried out administrative censuses which provided information on the population of Benin. The first national census was conducted in March 1979. The main variables in the data gathered by this census were: place of birth, current address, previous address and the usual economic and demographic variables (age, sex, marital status...). The census was followed by a series of national demographic operations, the most important of which were the 1981-1983 multiround survey and the 1982 fertility survey. The second general population census in Benin was conducted in 1992.

Burkina Faso

Two general population censuses have been conducted in Burkina Faso. The first one was in 1975; the second one in 1985, followed by a demographic survey in 1991. However, efficient use of these census data was difficult due to the fact that in the period during which these different operations were carried out the administrative organization of the country changed. An administrative reform in 1984 and 1985 increased the number of administrative regions in the country from 10 to 300. In addition, larger administrative units were created. Of course, these changes would not have constituted an insurmountable problem if the basic unit of the village had been used to make up larger administrative units. But this was not the case. The data of the 1991 demographic survey only provided information at the level of the province which renders any analysis at a lower level difficult. On the other hand Burkina Faso has data from:

- the “Office National pour l'Aménagement du Territoire” (ONAT);
- the secretariat of the Onchocerciasis Control Programme
- the 1973 survey on migration and urbanization; and
- the 1973 Demographic Health Survey (DHS).

Côte d'Ivoire

Côte d'Ivoire conducted its first general population census in April 1975. The second survey was conducted in March 1988. During the period between these two operations several national surveys were conducted which included the following:

- the 1978-1979 multiround survey;
- the 1979 consumer budget survey;
- the 1980-1981 national fertility survey;
- the 1973 survey on the social aspects of structural adjustment;
- the 1993 national survey on migration and urbanization;
- the 1994 Demographic Health Survey (DHS); and
- the 1995 multiple indicator survey.

Ghana

Ghana has conducted two general population censuses: the first one in 1970 and the second in 1984. A demographic health survey was carried out in 1993.

Guinea

Guinea has conducted six administrative censuses (1962, 1967, 1972, 1977, 1990 and 1992) and a general population and settlement census (1983). Three national demographic and socio-economic surveys have also been carried out in the country:

- the first one in 1954-1955;
- the second one was the Demographic Health Survey of 1992;
- the third one was the migration and urbanization survey of 1993.

Apart from these traditional sources of demographic data the study benefited from an agricultural survey conducted in 1990 by the "Service National de Statistiques Agricoles" (SNSA - National Department of Agricultural Statistics) and data from the "Système National d'Informations Sanitaires" (SNIS - National Health Information System).

Mali

Two general population and settlement censuses have been conducted in Mali: the first in December 1976 and the second in April 1987. However, there have been many national surveys in Mali, including the following:

- the 1960-1961 demographic survey;
- the 1985 demographic survey;
- the 1987 Demographic Health Survey (DHS);
- the 1993 survey on migration and urbanization (REMUAO); and
- the 1995 Demographic Health Survey (DHS) (currently under way).

Other demographic surveys have also been conducted covering part of the territory, including, among others: the survey on migration in the valley of the Senegal river (1983) and the survey on integration in the urban environment of Bamako (1992).

Niger

Up until 1977, administrative and electoral censuses were the main sources of population information in Niger. Given what they were intended for these purposes, they only give a partial description of the population. Several national sample surveys have also been conducted which include among others the demographic health survey and the survey on migration and urbanization. But the results they provided were only significant at certain levels of the administrative units. In terms of demographic information at very detailed geographical levels, only the general population censuses are reliable. The first one was conducted in 1977 and the second one in 1988. The Demographic Health Survey was conducted in 1992.

Senegal

Senegal has conducted two general population censuses: the first one in 1976 and the second one in 1988. In addition, data are available from a number of demographic surveys conducted at national level, among which are the following:

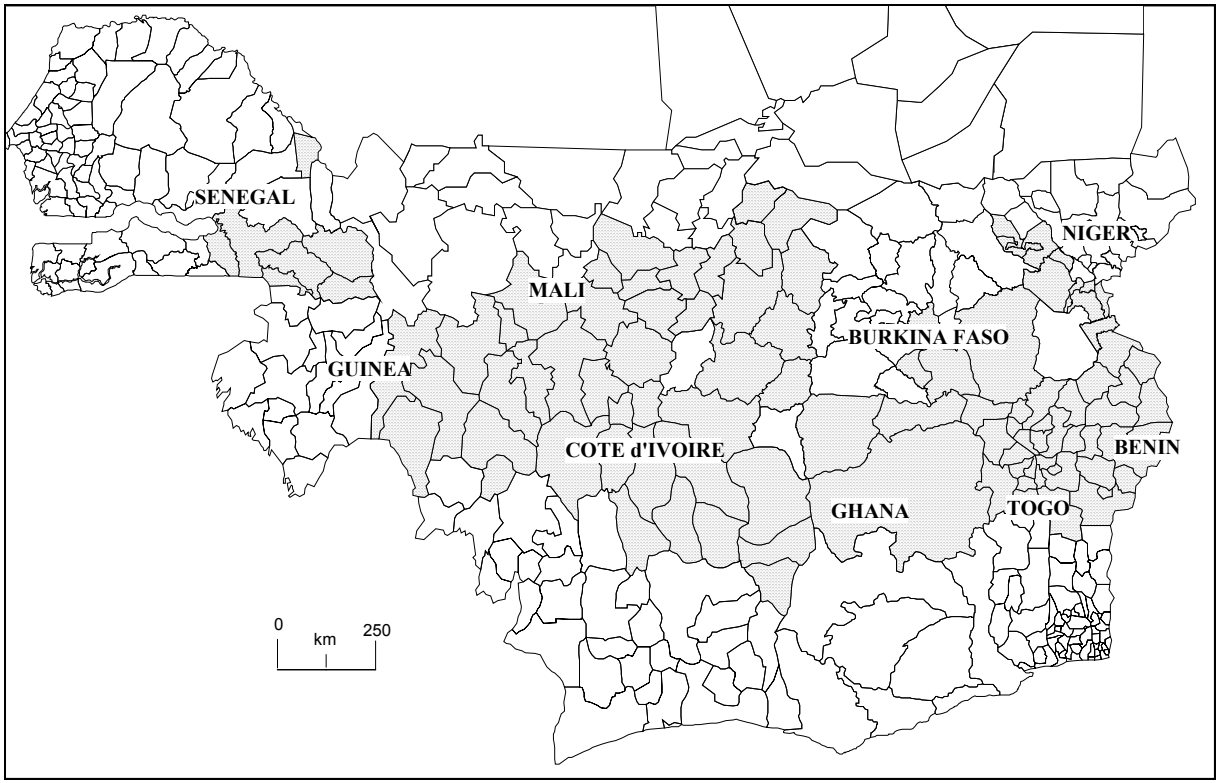
- the 1960-1961demographic survey;
- the 1970 multiround demographic survey;
- the 1978 Senegalese fertility survey;
- the 1992-1993 Demographic Health Survey; and
- the 1993 survey on migration and urbanization.

Although these surveys are representative at a national level, they do not provide demographic indicators sufficiently detailed in geographical terms. That is why the survey in Senegal was based on census results.

Togo

With three general population censuses (1960, 1970 and 1981), several demographic surveys and a variety of routine ministerial statistics Togo, as compared to other countries in the AREA, benefits from a wealth of statistical data on its population. Unfortunately, because of socio-political events in recent years which prevented the 1991 census from being conducted and ministerial statistics from being completed most of the available data are rather out of date.

From this succinct list of sources it would seem that the general population censuses, due to the fact that they are available in all nine countries and to their standardization, feature as the main exploitable source of data for making a comparative analysis of the AREA even if they do present certain limitations.



Map 2: Limits of the Reference Zone of the Study

CHAPTER 1

PRESENTATION OF THE STUDY AREA

The geographical AREA covers approximately 741 612 square kilometres: the northern part of Côte d'Ivoire, central, southern and western parts of Burkina Faso, the northern part of Guinea, southern Mali, eastern Senegal, northern Togo, northern Ghana, northern Benin and south-western Niger (Map 2).

Administratively each ORZ covers:

- *in Benin*: 2 *departments*, covering 83 723 square kilometres, i.e. 73% of the national territory; which included 1 477 233 inhabitants in the last census, 30% of the country's population;

- *in Burkina Faso*: 10 provinces, covering a total area of 47 000 square kilometres, i.e. 17% of the national territory;

- *in Côte d'Ivoire*: 11 *departments*, covering an area of 132 339 square kilometres, i.e. 41% of the national territory; which included 1 833 524 inhabitants in the last census, i.e. 15% of the total population of the country;

- *in Ghana*: 3 regions, covering a surface of 97 702 square kilometres, i.e. 41% of the national territory; which included 2 375 335 inhabitants in the last census, i.e. 19% of the country's total population;

- *in Guinea*: 8 *prefectures*, covering an area of 100 860 square kilometres, i.e. 41% of the national territory; which included 922 800 inhabitants in the last census, i.e. 13% of the country's population;

- *in Mali*: 4 regions, covering an area of 202 655 square kilometres, i.e. 25% of the national territory; which included 3 534 609 inhabitants in the last census, i.e. 47% of the country's total population;

- *in Niger*: 3 “arrondissements”, covering an area of 23 546 square kilometres, i.e. 2% of the national territory; which included 407 976 inhabitants in the last census, i.e. less than 6% of the country's total population;

- *in Senegal*: 7 “arrondissements”, covering an area of 33 555 square kilometres, i.e. 17% of the national territory; which included 170 346 inhabitants in the last census, i.e. 3% of the country's total population;

***- in Togo*:** 2 economic regions, covering an area of 20 232 square kilometres, i.e. 36% of the national territory; which included 755 556 inhabitants in the last census, or 28% of the country's total population.

Table 1
Administrative Units in the Countries of the AREA

Countries	Administrative Units			
	Level 1	Level 2	Level 3	Level 4
Benin	Village	Municipality	Sub -prefecture	Department
Burkina Faso	Village	Department	Province	Region
Côte d'Ivoire	Village	Sub–prefecture	Department	Region
Guinea	Village	Municipality	Sub-prefecture	Prefecture
Ghana	Village	Local authority	District	Region
Mali	Village	"Arrondissement"	Circle	Region
Niger	Village	Canton	"Arrondissement"	Department
Senegal	Village	Municipality	"Arrondissement"	Department
Togo	Village	Canton	Prefecture	Region

Sources: National reports.

Table 2
Population Density in the Countries of the AREA (inhab./sq. km)

Zone	Benin (1992)	Burkina Faso (1991)	Côte d'Ivoire (1988)	Ghana (1984)	Guinea (1990)	Mali (1987)	Niger (1988)	Senegal (1988)	Togo (1981)
ORZ	17.6	29.6	11.0 (rur.)	24.3	9.1	17.4	17.3	5.1	37
Coun-try	42.8	33.5	34.0 (tot.)	52.5	30.0	6.2	5.2	6.9	48

Sources: Censuses.

The population density in the different oncho-freed reference zones is globally lower than the population density for the whole country. However, it varies greatly from country to country. We will see that generally the greatest differences are to be found within ORZ's.

In general, from both the physical and human perspective, these national ORZ's greatly resemble one another but there are also some differences which will be examined in the first section of the study.

I. – VARIATIONS IN THE PHYSICAL ENVIRONMENT

In the description of the physical environment, the following elements were taken into account: relief, climate, vegetation and soil hydrographics.

1) The Relief

The relief of the AREA varies from one ORZ to another as well as from one administrative subdivision to another. On the whole, the relief is broken with plateaux, planes and cliffs in some areas. Altitudes generally vary between 200 and 300 metres and rarely exceed 500 metres. In certain regions such as the foothills of Fouta-Djalon or the mountain region of Côte d'Ivoire on the border with Guinea, altitudes reach 1 000 metres with summits sometimes exceeding 1 200 metres. From east to west, the relief of the AREA varies in aspect.

To the East

A mountain range composed of schist formations, facing NE-SO with a maximum altitude of 600 metres extends from Niger through Togo and reaches into Ghana. In Benin, where it occupies part of the Atacora district, it is called "The Atacora Range". In Togo it is called "The Togo Mountains" where it spans the Kara region. This is a very rocky area and a watershed for the main rivers in the region. This range continues into a succession of mountains which, in Benin, constitute the Birni quartz mountains in Taneka, Kouande and Aledjo, and in Togo, the Kabye, Assere and Siriabe gneiss mountains (600 metres) to the east, which run roughly parallel to the Togo Mountains.

The plains follow the major river beds. To the east we find the plains of the River Niger. The plain of the Oti, carved out of the sandstone and the schist of the Volta region, extends westwards towards the wide plain of the Volta in Ghana. Along its upper reaches the Mouhoun river flows across the middle of a plain of colluvio-alluvial embankments as wide apart as 7 kilometres in some places. Other smaller plains have smaller rivers which cross the zone.

In the northern part of the Oti plain and of the Atacora range, the relief is characterized by wide flat surfaces scattered with contrasted reliefs. The Mango plain ends in the Gourma peneplain which stretches beyond Togo crossing the Dapaong plateau. In the territory of Burkina Faso the morphology of the granitic and birrimien plateau offers a gently undulating landscape with, in places, units with no connecting slopes between the conglomeratic plate and the lower glacis. The slopes have a low gradient (2 to 5%) and the altitude rarely exceeds 300 metres. The relative monotony of these landscapes is interrupted by reliefs formed by the emergence of rock outcrops which can reach altitudes of up to 500 or 550 metres. In the north-east, beyond the Atacora Range, the Borgou peneplain stretches out as far as the south-west plateaux of Niger, with its highest points reaching a little over 300 metres in altitude.

To the West

The relief is broken up and made up of a succession of plateaux separated by basins and plains. The Manding plateau ends in the west with the Tambaoura cliff overlooking the Faleme plain. In the south-west, the last hard pan plateaux of the Manding Mountains rise above the basin of the Upper-Niger with a big cuesta approximately 300 metres high. Beyond the bend of the River Niger and proceeding north one enters the Sahara where huge low-lying plateaux partially covered by ergs stretch out.

A second series of sandstone plateaux stretches out to the south-west of Upper-Niger and Bani near the border with Burkina Faso. The tabular reliefs of Sikasso extend the Banfora plateau into Burkina Faso. They stretch out between the small tributaries of the Bagoe. Further on, the "Dogon Plateau", or Bandiagara Plateau, stretches over almost 3 degrees of latitude from Koutiala to Doentza. It is only 25 kilometres wide at the level of San but widens further to the north-east reaching a width of 80 kilometres. To the north, the Dogon plateau is a vast and very hard sandstone table inclined towards the west. On its eastern edge it reaches an altitude of 791 metres whereas in the western sector it does not rise higher than 500 metres.

2) A Rather Dry Climate

The AREA has a Sudano-Sahelian climate with a long dry season and a shorter rainy season. The rainfall varies between averages of 800 and 1 800 millimetres per year. One of the main characteristics of this rainfall is its unequal distribution over the year. Temperatures are high with an annual average varying between 22 and 30 degrees centigrade. The following features should be noted:

- the southern band of the ORZ's in Benin and Togo has a Sudano-Guinean climate with a rainy season lasting from April to September and an annual rainfall of approximately 1 000 millimetres;
- a bit further towards the north, at the limits of the border between Togo and Burkina Faso the dry season lasts longer (October-May);
- the perimeter of the Voltas belongs to the Sudanese zone with an average yearly rainfall between 800 and 1 000 millimetres;
- in the western parts of the AREA, notably in the ORZ of Guinea, the rainfall varies between 1 200 mm in the savannah and 1 900 mm in the forest.

3) Varied Vegetation

In the AREA the vegetation is principally of the type found in wooded savannahs and prairies with tall grasses. Depending on the location one of these different types of vegetation prevails over the other. In the ORZ in Niger, for example, there are relatively sparse Sahelian forests separated by savannahs with a wide variety of trees and bushes including: acacia, albida, balanite, aegiptiaca, etc. In this country there is also an area covered by

bush land, including the main herbaceous plants. Further to the west of the AREA the vegetation made up of savannahs with trees and bushes is replaced along the rivers by gallery forests.

In general, the plant cover of the AREA is greatly degraded because of land clearing for farming and the excessive use of wood for fuel. Severe droughts during the 1980's also contributed to the destruction of the plant cover, especially in Sahelian countries.

4) Hydrographics

The rivers in the AREA can be considered as part of two large hydrographic networks: the Volta and the Niger.

The Volta Basin

This basin covers all of the ORZ in Burkina Faso, Ghana and Togo. The main rivers in this basin are:

- in Togo: the Oti, the Keran, the Koumongoug, the Kara and the Mô;
- in Burkina Faso: the Nakambe-Nouhao, the Nazinon, the Mouhoun-Bougouriba, the Mouhoun-Poni, the Mouhoun-Sourou, the upper and lower Mouhoun-Cours, the Kompienga and the Sissili;
- in Ghana: the Kulpawn, the Tono, the Sissili, the Morago, the Dake and the Oti.

The Niger Basin

The hydrographic basin of the Niger river drains all of the ORZ in Niger and a part of the ORZ's in Benin, Mali and Guinea. The main rivers in this complex are:

- in Benin: the Mekrou, the Alibori and the Sota;
- in Guinea: the Tinkisso, the Niandon and the Milo;
- in Mali: the Otio, the Parako, the Ouonourou, the Banifing IV and the Koni-fawara;
- in Niger: the Sirba, the Goroubi, the Diamangou, the Tapoa, the Mekrour and the Dargol.

In additon to these large basins several smaller basins constitute part of the hydrographic complex of the AREA. They are:

- the Oueme basin in Benin;
- the Comoe basin in Burkina Faso and Côte d'Ivoire;
- the Bandama and Sassandra basins in Côte d'Ivoire;
- the Bafing and Sankarami basins in Mali and Guinea;
- the basins of Faleme and Gambia in Senegal.

5) Soils and Agricultural Potential

In general, the AREA has good agricultural potential. As a result of the climate and orography there are tropical ferruginous soils especially favourable to a variety of crops such as yam, sorghum, cotton, peanuts, etc. However, because of poor hydrographic conditions, high sunlight exposure and evaporation-transpiration a large part of these lands are subjected to long periods of drought which affects their protection. On the other hand, the river basins offer hydromorphic soils rich in limons and swelling minerals. This is the case of the Oti valley (Togo) and some of the major rivers in the Volta basin (Burkina Faso), which are unfavourable to fluvial agriculture and irrigation. Globally, the ORZ's are made up of several different types of soils. Of course, this pedological diversity is a determining factor in the settlement and development of these zones. However, in many cases it will be less of a determining factor than the conditions in which they are developed. For example, farmers in southern Sahel, who work on gravel soils with hoes, are unable to farm valleys requiring the use of tractors.

In Benin

Ferruginus soils with little clay leaching are the most widespread; they are appropriate for different crops (yam, sorghum, millet, peanuts, cotton, etc.). Certain levels have hardpan soils and are not suitable for growing crops: these areas are used for livestock farming. Lastly, there are hydromorphic soils in the valleys which are rich in loams and minerals.

In Burkina Faso

In Burkina Faso, the ORZ is mainly composed of the Volta valleys and their tributaries. The structure of these regions is made up of two geological elements: the shelf, including crystalline granitic-gneissic rocks and the birrimian and conglomeratic series, and the sedimentary formations composed of silicious, schistous and dolomitic sandstones as well as quartz pebble sandstone.

In the sedimentary zones, high plateaux dominate the plains and the lower plateaux. The rivers create wide valleys which are characterized by three types of pedological profiles:

- lands which can only be farmed during the rainy seasons, including the leached tropical ferruginous soils with deep or medium-depth concretion or induration, located on low gradient slopes;
- the hydromorphic soils of the Mouhoun and the outlying depressions suitable for rainfed and irrigated crops;
- poor soils and indurated ferruginous soils which constitute re-forestation zones.

In Guinea

There are several types of soils in the ORZ in Upper-Guinea:

- ferrallitic soils which make up most of the soils in this region; they are exploited for rainfed rice crops, millet, sorghum, tubers, etc.;
- poor erosion soils which are of limited use for crops;
- fluvial deposit soils, commonly called plain soils which often lack organic matter, they are used for growing rice;
- hydromorphic soils found where there are rivers and which are a part of the fluvial deposit category essentially used for rice crops.

In Niger

In the ORZ in Niger there are three main morpho-pedological zones:

- The alluvial valleys and the highlands dominate the southern and western parts of the Say "arrondissement". This zone is different from the others because of its lack of deep sandy soils. The valleys are mainly occupied by clay alluvions which are heavy and difficult to farm. In the valleys too, loam banks occupy a slightly higher position in relation to the terraces; the soils are loamy, gravelly, moderately deep, lying on a lateritic hardpan. Erosion is the main constraint to developing these soils. The risk of erosion is moderate for the clay and loam alluvial soils of the valleys but is very high for the plateaux soils.
- Sandy valleys and the plateau areas are mainly located in the eastern part of Say. They are characterized by the presence of hardpan plateaux or hills, separated by large sandy valleys where almost all farming is concentrated. These valleys are good for rainfed crops whereas the plateau soils are usually ill-adapted to such crops because of their shallow depth. This area is subject to a high risk of erosion from both wind and runoff water.
- The area of sandy plains is located in a very small region near Say on the River Niger. There are deep sandy soils which have developed from eolian sands deposited on old dunes. This zone is exposed to a great deal of erosion, from both wind and runoff water.

In Senegal

The geomorphologic study of the ORZ in Senegal has revealed four types of ecological zones:

- The continental terminal plateaux composed of more or less clayey sandstone; and lower glacis on Cambrian sandstone in the centre. This zone is mainly composed of tropical ferruginous soils which are good for cereal crops, agriculture, livestock farming, fishing, banana plantations, etc.
- The lower glacis of the Faleme with an alluvial bank to the east. This area has leached tropical ferruginous soils without any ferruginous spots,

with concretion and xenolithized mineral soils. It is suitable for irrigated crops when the river levels drop and for small ruminant livestock.

- The *department* of Kedougou has glacis, dismantled hardpan soils on rocks from the primary era with enclaves of mountainous zones, and depressions which vary in the surfaces they cover. This area is good for forestry, mining, rubber plantations, etc.

- In the Missirah "arrondissement" there are many poor eroded soils lying on ferruginous hardpans with enclaves of soils with little leaching and with ferruginous spots and concretions. This area is suitable for forestry, livestock farming, banana plantations, etc.

II. – HUMAN ENVIRONMENT AND POPULATION HISTORY

The AREA is characterized by a great diversity of ethnic groups most of which come from the major Mandingo, Volta, Poular and Sudanese groups. Among the most representative ethnic groups are: the Bariba, the Peuhl, the Mossi, the Dagare, the Malinke, the Senoufo, the Bambaa, the Songhai, the Djerma, the Moba, the Kabye, the Gurma, the Mole-Dabani, etc.

Among these populations there are two major religious groups: Moslems who are mainly to be found in the ORZ in Senegal (95%), in Guinea (97%), in Mali (96%), in Côte d'Ivoire, in Niger and Burkina Faso; and the Animists who are mainly in the ORZ in Benin (40%) and Togo (70%). In addition to these two groups there is also a large proportion of Christians in the ORZ in Benin (26%) and Togo (10%).

The population of the AREA is the result of a complex mixing of populations over centuries. During the period which led up to colonization, the whole territory of the AREA was subjected to several waves of invasions and migrations. The ORZ's therefore had to accommodate populations from neighbouring countries and even from countries further away. The main migration flows described below were directed North-South and South-East.

In the ORZ in Togo the most important migration streams came from the west and the north. Between the 17th and 18th centuries, the Tchokossi (from Côte d'Ivoire), the Konlomba and the Mamproussi (from Ghana) arriving from the west settled within the limits of the ORZ in Togo. The Gourma and the Losso apparently came from Burkina Faso during the same period. The Bassari also came from the west, the Bariba and Djerma from the north-east and the Neo-Sudanese from Niger and Sudan. In addition, many invasions forced some of the earlier occupants, such as the Kabye, to find refuge in the mountain areas.

The ORZ in Benin received immigrants from many different directions. Most of the migrations were from the north-west, the north and the north-

east. The Berba, the Yowa, the Gulmanceba and the Gourmantche came from Burkina Faso. The Fulbe, the Tchenka and the Dendi came from the north (Mali and Niger). In this ORZ, there were also population migrations originating from the north-east. The Baatombu were among the oldest populations to settle and came from Boussa (Nigeria), and in the 14th century, other groups came from Nigeria, mainly the Boko and Mokole. Later, still from Nigeria, came the Yoruba (from Oyo) via Nikki before moving down to Save.

Most of the trans-border migrations towards the ORZ in Niger came from Mali. Most of the migration flows seem to have departed from Massina in Mali and to have followed different routes. This is the case of the different Peuhl tribes who started to settle in the 16th century. Grouped today in the Say "arrondissement", the Gourmatche were the first ethnic groups to settle in the ORZ. The Songhay, who had settled after an exodus caused by the Moroccan invasion of the Songhay empire in 1591. They followed the River Niger, from Gao to Zama before settling on the right bank of the Gourma river.

Available data on the population of the ORZ in Burkina Faso do not provide any information about past trans-border migrations. Before the colonial period, the valleys of this ORZ were empty. Some areas outside these valleys were, however, densely populated, as in the case of the Mossi and Bissa districts in the Nakanbe and Nazinon regions. The colonization by the French stopped the Mossi and Dagomba incursions and facilitated the settling of empty areas by populations who had until then been living in other areas.

The ORZ in Côte d'Ivoire was populated by waves of migrants between the 15th and 17th centuries. The Malinke came from Mali and founded the cities of Odienne and Seguela after having chased the Senoufo away from the area. The Mande Dioula, originally from Gao came in through the north-east frontier and founded the Kong kingdom. Later, other peoples came from the eastern part of the territory. This is the case of the Akan and Dankira who came from Ghana.

The population of the ORZ in Ghana is the result of a mixing between native populations (the Kusai, the Talensi, the Mamrusi, etc.) and populations coming from intermittent migrations and population movements in the Upper-Niger, from east and west Sudan (the Gurma, the Grusi, the Mole-Dagbani, etc.). This mixing has not always been peaceful. Consequently, the current political structure of the ORZ reflects a social stratification which clearly differentiates between conquering and vanquished ethnic groups.

The settling of the peoples from Upper-Guinea in the Guinean ORZ was mainly due to the major upheavals of the Sudanese empires in the 16th century. The decline of the Malian empire led to the migration of its nationals, the Malinke, towards the territory of Upper-Guinea. This

happened in several waves. The first wave was led by the Conde, Kourouma and the Konate, who followed the Niger valley to Faranah, driving the Djallonke east. The second wave was that of the Keita, the Oulare, the Mara and especially the Camara who were able to go as far as the sources of the Niger. The third and last wave, with the Camara and various other groups moved to the region currently named Siguiri right up to the edge of the forest region. They drove part of the Kissi, Guersz and Toma in this direction.

The history of the population of the ORZ in Senegal, which covers the region of Tambacounda (this region represents 91% of the Senegalese ORZ), is linked to its diversity and to the paleo-migration waves that have occurred there. The first well documented migrations are those of the Mandingo who moved westwards and eastwards. In addition, the decline of the Malian empire provoked the displacement of several ethnic groups in the 18th century, especially that of the Malinke, towards the lands of the Kedougou area. Their migration was certainly facilitated by the many roads that headed towards Sierra Leone and the southern coasts. These roads were used by the merchant caravans which came from Upper-Niger and the Sahel. This ORZ, mainly populated by the Peuhl and the Mandingos, experienced from the beginning of the 20th century a number of Wolof migration waves, especially into the "arrondissement" of Kidira and the department of Kedougou. This zone also underwent a number migrations of the Toucouleur (towards the Boncoto "arrondissement"), the Serrer (towards the Missirah "arrondissement" and the Kedougou parish) and the Sarakhole (mainly towards the Kedougou department and the Missirah and Bonconto "arrondissements"). Until the middle of the 20th century there were huge migrations towards the zone with a predominance of migration streams coming from Fouta-Djalon (in the Republic of Guinea). The Djalonke who fought for a long time with the Peuhl and the Fouta-Djalon settled along the Ghanaian border.

On the whole, the national frontiers inherited from colonial times did not entirely prevent the age-old mixing of populations within the AREA. The installation of kindred social and ethnic groups on both sides of these borders still facilitates their social interpenetration.

CHAPTER 2

PROBLEM AND APPROACH

I. – SOME ASPECTS OF THE POPULATION PROBLEM IN ONCHO-FREED RURAL ZONES

Onchocerciasis was not the main cause for the depopulation of the valleys

Due to the population density of the valleys affected by onchocerciasis, it was assumed for a long time that the disease was responsible for the state of affairs whereas it only contributed to it, adding to historical causes of a different nature and even to the effects of diseases such as trypanosomiasis. Therefore, in these rural zones there are a variety of situations which do not allow clearly defined relations to be established (Hervouët, 1992, p. 275-276).

Low population densities, however, contributed to the development of the disease and the valleys were abandoned

An in-depth analysis of the contradictions between the development of the disease and the low population densities clearly indicates the risks attached to low population density in terms of the development of the illness and the implementation of agricultural development programmes. Indeed, "for populations, a dilution of settlements and of farmed land within the area increases the risk of the disease taking a greater hold. On the other hand, high population densities, grouped settlements, and an intensive production system in farmlands which are not propitious to the movement of the simulia have every chance of succeeding" (Hervouët and Prost, 1979, p. 187).

Development and population operations were implemented very early and independently from the OCP

In Burkina Faso, for example, the OCP and the programme for the development of the Volta Valleys (AVV Aménagement des Vallées des Voltas) were launched at practically the same time. The AVV programme "is

an operation which is intended first of all for the development of natural resources... [and] secondly for the establishment of domestic farming production units" (Autorité AVV, 1979, p. 276). Under such conditions, here as elsewhere, it is an operation to recruit people for settlement rather than a settlement and land development operation in itself. Also, at this time, the results concerning the settled population and its maintenance in the developed sector were disappointing, especially due to the continuing installations in the traditional regions of emigration (Boutillier *et al*., 1977). We will see that the situation is different today: it is these same valleys where roads and hydro-agricultural infrastructures have been developed and which have been freed of onchocerciasis that are drawing the greatest numbers of new settlers.

The opening up of the oncho-freed zones has created crop and livestock farming opportunities which intensify spontaneous migrations

During the 1970's, there were many examples of development operations carried out regardless of the sanitary conditions that prevailed at the time: AVV in Burkina Faso, Ferkessedougou Sugar, Marabadiassa and Borotou in Côte d'Ivoire, etc. Today, development programmes are carried out independently from health programmes. But spontaneous settlements or the development of new farming zones following a very dispersed plan of occupation raise new health problems such as those linked to trypanosomiasis and malaria.

The populations in onchocerciasis zones are dispersed and unstable. However they are becoming denser

The old areas to which populations withdrew, often less affected by emigration than in the past, have been subject to further settlements following the construction of roads and interfluvial reliefs downstream from hydro-agricultural installations. On the other hand, this has led to a very mobile occupation of the crop and livestock farming lands outside these settlement areas. Therefore, today, although the arable lands are not extensively settled they are subject to much dispute.

In much the same way as in many rural areas in West Africa, the AREA zones are experiencing unprecedented population growths

With lower child and maternal mortality, the natural population increase has often exceeded 3% per year over the last 25 years. In spite of the rural exodus, the global growth rate has remained very close to 3%, and higher than that in certain regions. This demographic growth directly affects the installation, structure and organization of agricultural exploitations.

Beyond demographic growth, population dynamics are the issue from the perspective of sustainable development

Oncho-freed zones are often, as in the past, at the root of outward migrations on the part of natives as well as outsiders. The increasing importance of agriculture does not prevent the younger population from moving. The circulation of young people between the different poles of the residential system is significant when they leave for long enough to save enough money to settle as farmers, when the farm does not provide enough income or when the other poles which make up their residential system are more adapted for permanent residence. In the latter case, the migration will become emigration. Women may emigrate to towns for reasons of survival.

In areas with high population growth the question is whether the exploitation of land is accompanied by lasting or sustainable installations, or whether they are transcient exploitations from a fixed base. Another question could be whether the mobility of the young active population excludes the creation of sustainable production units, or whether, on the contrary, temporary migration strengthens the permanent installation of such farming units. Lastly, an important question concerns the pressure on the environment of economic activities resulting from population dynamics.

It is therefore important to take another look at the disparity in population settlement, its territorial or reticular distribution, and the associated occupation of the land according to the types of mobility and activities of the different populations already settled or currently settling there.

The instability of population settlements and the mobility of household members, once again, raise questions concerning development policies and programmes for sustainable agriculture

The ways in which the active population is redistributed determine the possibilities for intensive and sustainable agriculture. The structure and development of the agricultural sector will differ according to the sex ratio of the population, its age structure and degree of involvement in agriculture, livestock farming or non-agricultural activities.

It is by attempting to come to terms with the settlement and mobility of the population, in other words by trying to encourage permanent installation - as crop farmers, livestock farmers, fishermen, etc. - whilst allowing for a certain mobility that a stabilization of production systems will be possible. Agricultural development, whether managed by natives or by more or less recently settled immigrants, cannot be considered separately and independently from their local, national, or international economic context. In fact, the individuals who make up the farms belong, because of their mobility and different activities, to other farms, companies, and rural areas. In other words, it is within the context of economic but also political and institutional dynamics that the national development projects for these rural areas should

be considered. For the decision-makers this question is raised, above all, in terms of land development (along with the construction of roads), soil management, land tenure, controlling demographic growth, etc. At the local level, increased mobility among young rural populations and the spreading of their activities over a trans-national area, as we will see in the case of the valleys in eastern Burkina Faso, are not sufficiently taken into consideration although highly relevant to even the smallest projects.

The population dynamics of the rural areas where onchocerciasis has been brought under control must be redefined in the national, trans-national and sub-regional economic context

These rural areas play a key role in the countries they belong to. In Mali, Burkina Faso and Niger, they represent a potential in terms of fertile lands and are in many cases under-exploited; they are a sort of "south" towards which rural populations from more densely populated or more impoverished areas of the country move. In Côte d'Ivoire, Ghana, Togo and Benin, on the contrary, these areas are located in the north from where the people have been leaving for several decades to look for work in the coastal regions in the south. In Guinea and Senegal they remain mainly tied to the capital cities which absorb most of the emigrants.

The mobility within each of the rural areas is therefore essentially determined by their position in relation to the country as a whole. It is then determined by the position each area occupies within the trans-national entity it forms with the other areas across the borders. It is therefore essential to clearly define the elements which do or do not mark the limits between the "southern" and the "northern" part of the countries concerned and to gain an understanding of the exchanges between the different sub-regions.

II. – THE STUDY, A FIRST STEP: STRATEGY AND LIMITS

The main objective of the study is to evaluate the population dynamics of oncho-freed rural zones at the smallest spatial level, mainly based on census information.

1) Definition of the Onchocerciasis Reference Zone: the ORZ's in the "North" and in the "South"

The OCP reference zone has been extended for the purpose of epidemiological surveillance. In each of the countries it is usually composed of territories crossed by rivers; it may therefore, in certain cases, include more than three quarters of a national territory. But some regions, such as the Savannah Region in Togo, may be far from the zone being monitored. It was agreed that the reference zone of our study would be determined

according to the census areas it belonged to whether or not it was a part of the zone being monitored in the OCP. Lastly, as we will see in the presentation of the study zone, only the savannah area was considered. We have therefore decided to group together the zones in Mali, Burkina Faso and Niger, which we will call "Southern" ORZ's, the zones in Côte d'Ivoire, Ghana, Togo and Benin, which we will call "Northern" ORZ's, and lastly the zones in Guinea and Senegal.

As suggested earlier we will then attempt to take a global look at two trans-national entities: that of Mali, Côte d'Ivoire and western Burkina Faso and that of Niger, eastern Burkina Faso, Togo and Benin.

2) Statistical Units and Indicators

The censuses in the countries concerned by the study are generally conducted at four administrative levels, from the village to the region (or department according to the terminology employed). It has been agreed to use the level 2 census area sub-division immediately above that of the village (level 1) as a statistical unit.

Obviously this unit covers areas and populations which, from country to country, vary much more than the village unit.

The censuses have the advantage of generally presenting the same individual variables. It is therefore possible to build a series of indicators of changes between two censuses allowing for comparisons between countries. Four types of indicators were chosen:

- *population indicators*: density; sex-ratio; structure by major age groups; proportion of natives within the population unit; ethnic composition; proportion of the population living in villages with less than 500 inhabitants; number of villages with less than 500 inhabitants;

- *socio-economic indicators*: household size; proportion of working people in households; sex-ratio of working populations in agriculture; proportion of heads of households in agriculture; mean age of heads of households in agriculture; distribution of status according to agricultural activity; ratio of population in agriculture/livestock farming;

- *mobility indicators*: proportion of migrants; proportion of latest migrants;

- *economic and health indicators*: access to markets; education: number of primary schools per 100 inhabitants; health: available water supplies.

3) Limits of the Study

The study presented here was intended as a first stage. During this stage, two types of limitations were observed:

• limitations inherent to the study of the population dynamics:

- census data are status data which do not enable us to measure migration; mobility can only be accounted for through stocks of non-natives, or indirect indicators such as the sex ratio;
- status variables or categories are often highly aggregated, at least in publications: for example, no distinction is made between crop farmers and livestock farmers and secondary activities are not recorded;
- in the gathering of the data certain categories or statuses are under-estimated or hidden: for example, women's agricultural activities are often considered secondary or are either not well registered or not registered at all;
- categories may differ according to region and even more so according to country;

• limits inherent to the material conditions of the study:

- the state of the archives and the conservation of the older census information does not allow for computerized data processing and therefore does not allow for a comparative analysis of successive censuses in spatial detail; that is why we were forced to stick to spatial level 2, and in some reports to spatial level 3;
- the listings and maps: even when the basic files had not disappeared they did not help to overcome the problem of changes in census areas between censuses;
- the censuses: when census data cannot undergo further computer processing they do not permit extensive comparative analyses; in other words, only countries which still have two censuses directly accessible by computer will be able to pursue the approach adopted;
- lastly, it must be pointed out that census data in the possession of statistical departments is not always available to research institutions. In the best cases it is possible to obtain complementary tables but no unpublished data on a specific region.

Therefore, the unequal status of the data provided by the institutions involved in the study, in terms of accessibility, quantity and type of data, resulted in a presentation by country in which the results are not totally comparable as they could not be compiled exactly in the way decided at the preparatory meetings.

In addition, even if indicators are of the same type they do not refer to the same time-frame: for a variety of reasons the African censuses were not conducted at the same time nor did they respect decennial periodicity.

We therefore considered the results at the level of each census area unit for each country for their value in terms of population dynamics and in terms of their spatial continuities and discontinuities.

CHAPTER 3

DEMOGRAPHIC DYNAMICS AND POPULATION OF THE ORZ'S

The demographic dynamics of the AREA have not yet been the object of much research insofar as the disease has been brought under control only relatively recently (since the 1980's). We will attempt to analyze these dynamics through the demographic growth of the census area units that constitute the ORZ's of each country. We will then analyze the impact of this demographic growth on the settlement zones: are we witnessing a consolidation, an extension or a dispersion of the population?

From the census data it appears that during the OCP period of intervention the populations of the ORZ's increased. However, increases vary very much between countries and within each country. In this respect, the coastal countries generally differ from the Sahelian countries: in the latter, the rate of population growth is always positive and remains on average rather high, whereas in some administrative units in the coastal countries, the rates are negative.

The following has generally been observed:

- the ORZ's in the north (Côte d'Ivoire, Ghana, Togo, Benin) have experienced demographic growths exceeding 2 or 3% per year; all of them are still regions of emigration towards coastal areas;
- the ORZ's in the south (Mali, Burkina Faso, Niger) have experienced large immigration flows which have resulted in inter-censal growth rates exceeding 3% per year;
- in the economically enclaved regions of eastern Senegal and Guinea the growth rates have not reached 1.5%.

I. – THE POPULATION OF THE ORZ'S IN THE "NORTH"

The onchocerciasis zone represents over one-third of the national territory of each of the four countries north of Guinea. The area comprises between 15% (Côte d'Ivoire) and 47% (Mali) of the population. Population density is globally quite high, often over 20 inhabitants/square km except in Côte d'Ivoire where it barely exceeded 11 inhabitants/square km in 1988. However, there remain substantial differences between the large

administrative or regional units and within each of these units. These differences have increased over the last decade because of population growth which, while generally remaining close to 3% per year, has also experienced sharp regional variations, as we will see later.

Table 3
Annual Mean Inter-Censal Growth Rates and Population Densities in the Northern ORZ's

Country and period	Administrative Unit	Mean annual growth rate of the population (%)	Density (inhab./sq. km) (date)
Benin 1979-1992	*Departments*:		(1992)
	- Atacora	2.3	20.5
	- Borgou	3.9	15.9
	Whole ORZ	3.3	17.6
	Whole country	2.8	42.8
Côte d'Ivoire 1975-1988	*Departments*[15]:		(1988)
	- Ferkessedougou	5.1	7.9
	- Boundiali	4.8	13.5
	- Korhogo	2.7	22.4
	- Tanda	1.6	29.6
	Whole ORZ (rur.)	3.3	11.0
	Whole country	3.8	34.0
Ghana 1970-1984	*Regions*:		(1984)
	- Northern	3.4	17
	- Upper West	2.5	24
	- Upper East	2.2	87
	Whole ORZ	2.9	24.3
	Whole country	2.6	52.5
Togo 1970-1981	*Regions*:		(1981)
	- Savannah	2.7	38
	- Kara	1.4	37
	Whole ORZ	2.0	37
	Whole country	2.9	48

Sources: National reports.

[15] Only the most representative departments have been included.

1) Demographic Growth Accentuating Population Differences

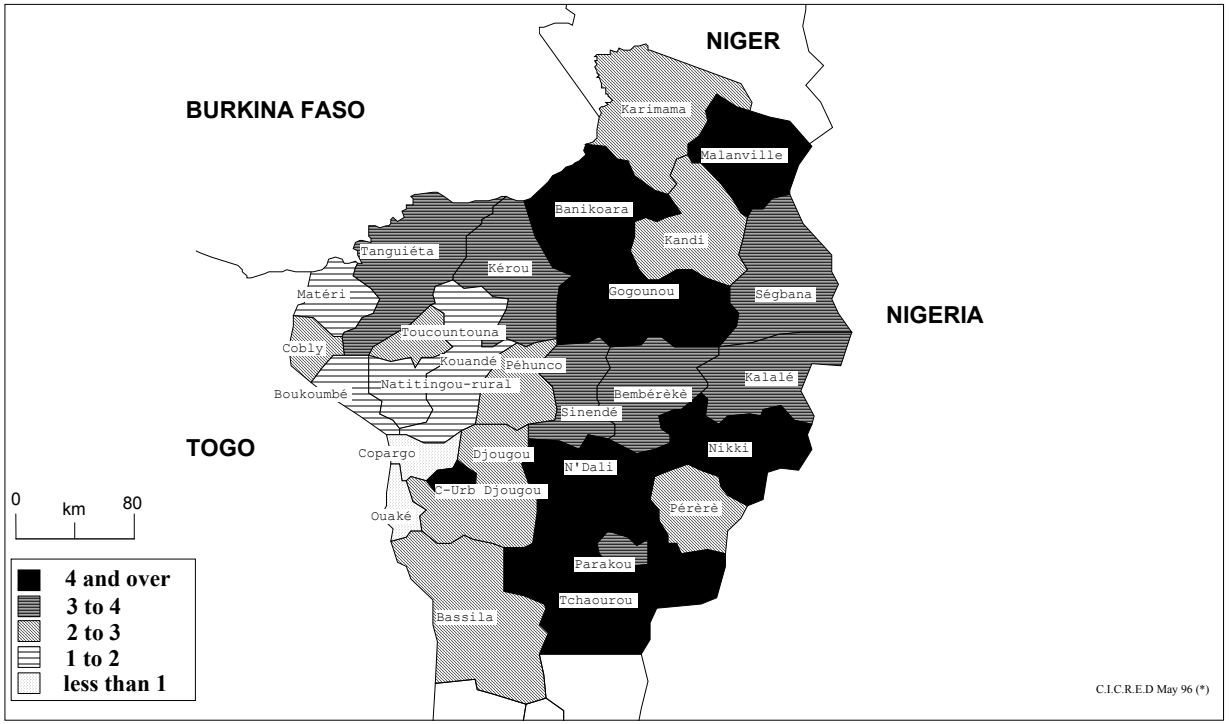
In Benin: the city of Parakou generates the demographic growth of the rural areas

In the two departments which make up the ORZ (Borgou and Atacora), the population increased at a mean annual rate of 3.3% between 1979 and 1992 but only Borgou, with a rate of 3.9%, has exceeded the national average (2.8%). In Atacora, however, the growth rate was lower because of the migrations to other regions in the country, mainly the Borgou and Atlantic regions. A more detailed analysis of the annual population growth rates in the sub-prefectures of the Department of Atacora between the two censuses effectively shows that this lower population growth cannot only be attributed to natural phenomena (Map 3). In fact, two sub-prefectures in the department have experienced rates below 1% (Copargo (0.2%) and Ouake (0.5%)), and three sub-prefectures have experienced rates between 1% and 2% (Boukoumbe (1.6%), Kouande (1.3%) and Materi (1.8%)). On the other hand, many adjoining sub-prefectures situated along a north-south line passing through the town of Parakou and close to the borders of Burkina Faso, Niger and Nigeria have experienced inter-censal growth rates exceeding 4% a year. It has been noted that the rural areas in the sub-prefectures surrounding the town of Parakou (Borgou) have experienced a growth rate of over 3% per year during the inter-censal period.

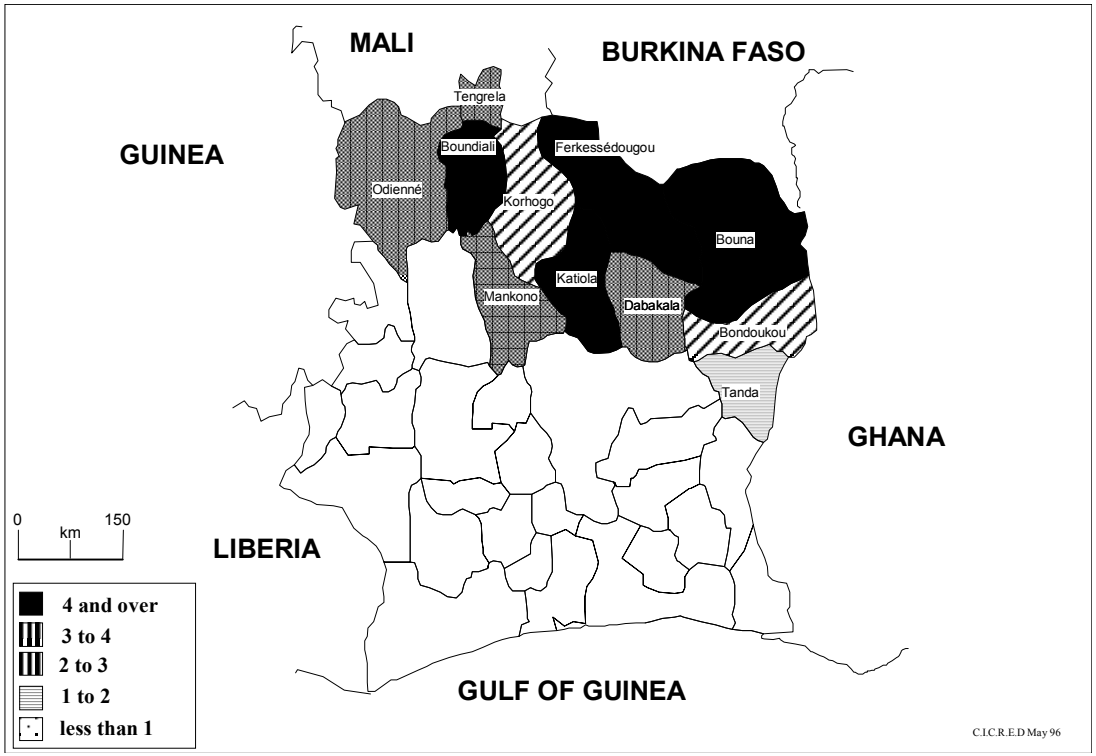
In Côte-d'Ivoire: high variations in population growth between departments

The population of the ORZ in Côte d'Ivoire experienced an annual growth rate of 3.3% between 1975 and 1988 (below the national average which is 3.8%). However the rate of population growth varies substantially depending on the department and the populated area. Of all the different populated areas, the departments of Ferkessedougou (5.1%), Bouna (4.4%), Katiola (4.3%) and Boundiali (4.8%), which surround the department of Korhogo, have the highest mean annual growth rates in the region (Map 4).

We believe that this rapid increase in the population is linked to a relatively high fertility rate and a large influx of immigrants caused by the creation of agro-industrial units, mainly the sugar production complexes of Ferke.1, Ferke.2 and Katiola-Marabadiassa (1974 and 1979) which have transformed the zones into veritable centres of demographic and economic growth in the region. Concerning the Department of Bouna, its high growth rate is essentially due to the influx of Lobi immigrants from Burkina Faso in search for farming land.



Map 3: Northern-Benin. Annual Population Growth Rate (%) per Sub-Prefecture, between 1979 and 1992



Map 4: Côte d'Ivoire. Mean Annual Population Growth Rate (%) per Prefecture, between 1975 and 1988

The Department of Korhogo (2.7%) owes its lower growth rate to the fact that its northern region is less adapted to agricultural production than its southern region. However, as we have already said, the population is increasing all over the department, including in the capital Korhogo, the historical centre of the northern region, which has experienced a mean growth rate of 7% per year and doubled its population between 1975 and 1988.

The departments of Bondoukou (2.3%) and Tanda (1.6%) in the south-east of the ORZ and the Department of Odienne (2.5%) in the north-west have a slower rate of growth. These capitals are also historical centres and currently have rather stable growth rates. These zones which were initially very densely populated and where fertile land is scarce and overexploited, have experienced departures towards other zones which are more favourable for food production.

Globally, the rural ORZ experienced an average annual growth rate of 2.8% between 1975 and 1988. This average masks extreme differences with rates varying between -1.1% and 12.2% at the level of the sub-prefectures. Thirteen sub-prefectures have experienced growth rates equal to or above 5% (comparable to growth rates in towns), thirteen others are above the national average, whereas two sub-prefectures (Guiembe and Tanda) have experienced negative growth rates.

In the first category, three sub-prefectures have exceptionally high growth rates: 12.2% in Tortiya, 6.6% in Diawala and 7.3% in Nassian. In the case of Tortiya the increase is linked to the presence of gold mines exploited on a small-scale which attract many people from the sub-region. In the cases of the other sub-prefectures the increase is due to the fact that they are located close to the country's northern and eastern frontiers and are important commercial centres.

The high growth rate of the sub-prefectures of Tarife (7.2%) and Ferkessedougou (5.3%) is due to the presence of sugar factories which draw many inhabitants from neighbouring rural areas and from further away. The growth rates exceeding 4% in the other sub-prefectures of the department of Ferkessedougou (Nielle (6.4%), Ouangolodougou (6%) and Koumbala (4%), can be explained by the fact that they belong to a big cotton producing region. The principal cash crop in the north is cotton and in the case of the first two sub-prefectures the growth rate is due to the impact of the agro-industrial centres in the region and to their being located close to the northern borders of the country along the main roads connecting Côte d'Ivoire, Burkina Faso and Mali, as well as in areas of intense commercial activity.

The high growth rates of the sub-prefectures of Dioulatiedougou (6.2%), Odienne (5.8%) as well as those of the sub-prefectures of Minignam (3.3%), Seydougou (3.2%) and Tienko (3.7%) in the Department of Odienne, for which we noted relatively low growth rates, indicate a re-distribution of

the population within the departments and a strengthening of internal differences. In the same way, a demographic growth of more than 4% in many sub-prefectures such as Kolia (5%), Bouna (4.7%), Satama Sokoro (5.7%) and Dianra (5.5%), in different departments, indicates that in spite of the overall situation in the department at least one township in each of the sub-prefectures plays a commercial role and draws part of the population to the department.

The population growth of the sub-prefectures of Assuefry (5.2%) and of Transua (4.6%) in the Department of Tanda in the forest region of the north-eastern part of the District of Abron is probably due to coffee and cocoa production, which are the main labour intensive export crops of the country.

Lastly, we must draw attention to the population growth of the sub-prefectures of Dikodougou (3.2%), Komborodougou (3.4%), Niofoin (3.4%) and Sinematiali (3.7%) which is in line with that of Korhogo.

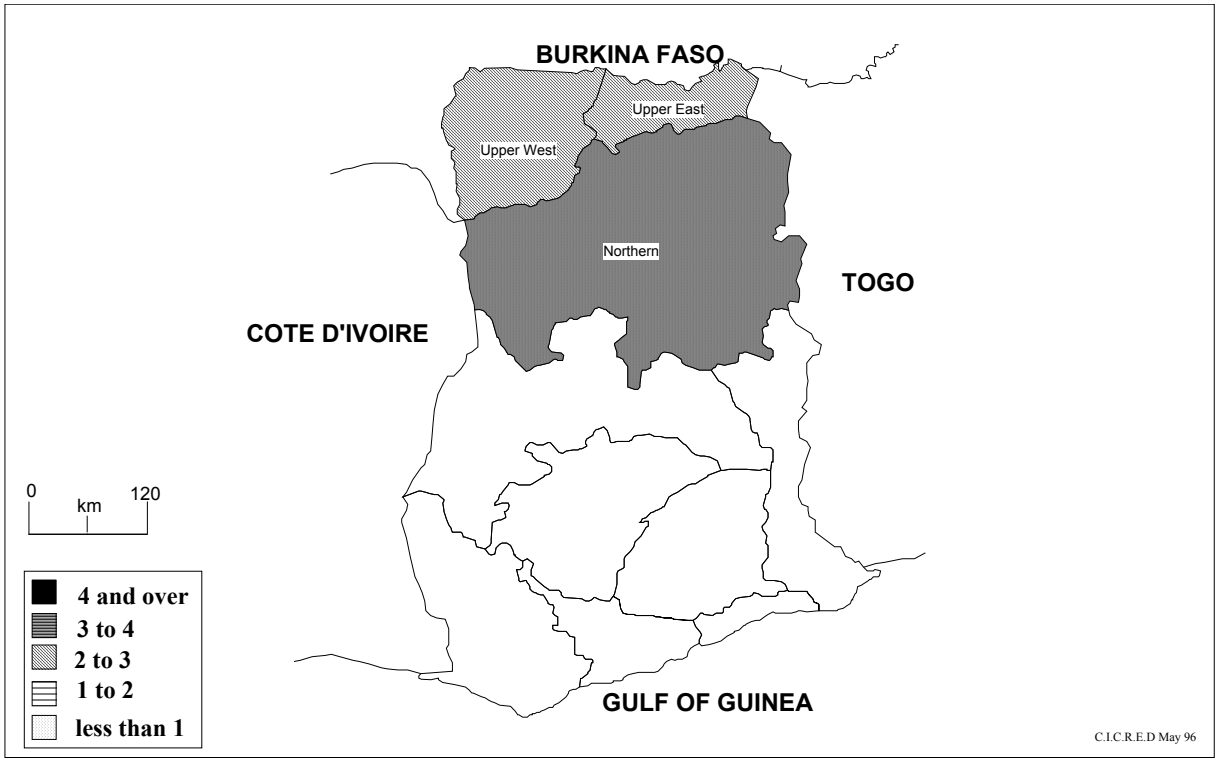
In Ghana: High and very differentiated growth

The demographic growth of the Ghanaian ORZ's is superior to the national average: 2.9% compared with 2.6%. This growth varies substantially between the three regions under consideration and within each one of them. The Northern region (Map 5) had the highest recorded rate of growth (3.4%) between 1970 and 1984. In this region, local authorities have recorded growth rates which vary greatly: up to 4.4% in Gushiegu-Chereponi and not exceeding 1.% in Bimbila. In the "upper" regions to the east and west population growth is lower, between 2.2% and 2.5%, but it is also subject to marked differences. However, the two local authorities located along the border with Togo, Nalerigu and especially Gushiegu-Chereponi, receive immigrants (probably from the Savannah region in Togo).

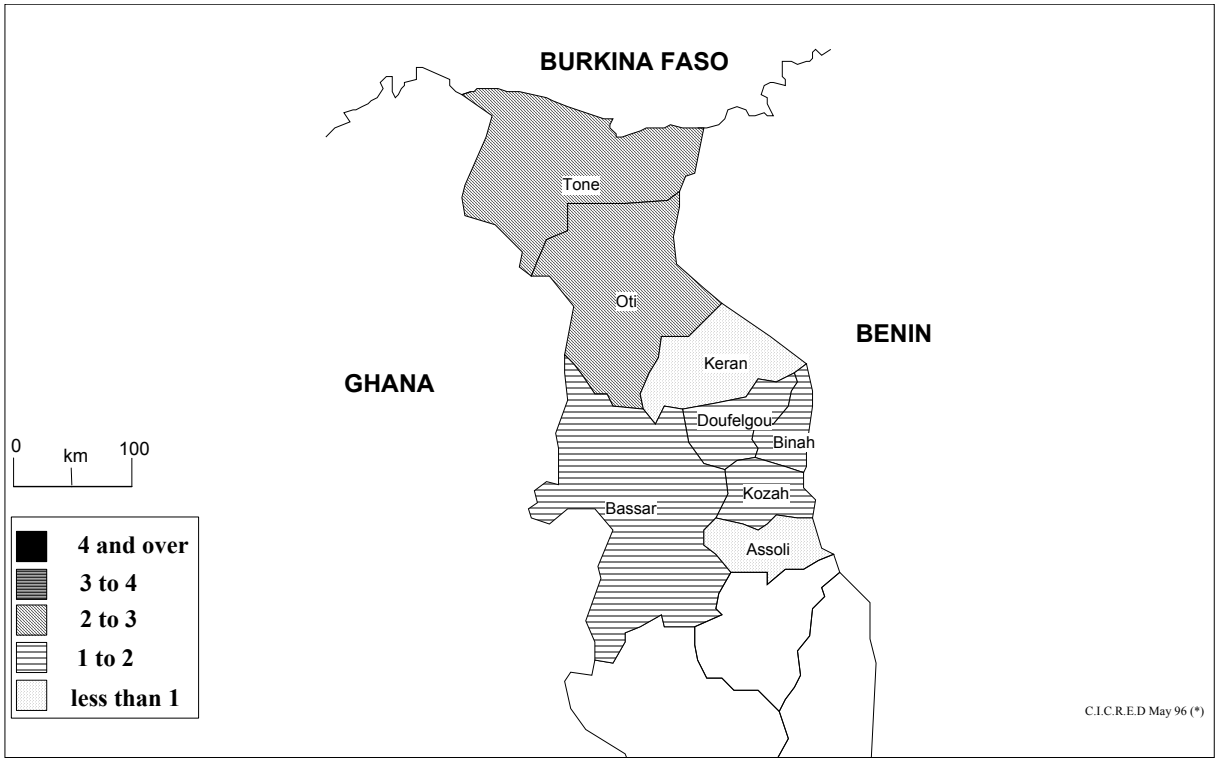
In Togo: moderate population growth, but at two speeds

In Togo, population growth in the ORZ between 1970 and 1981 was relatively moderate with a mean annual growth rate of 2.0%. However, the Savannah Region (2.7%) is in marked contrast with the Kara region which experienced a growth of 2.2%. As we will see in the section dealing more specifically with geographic mobility, this decline in population growth is partly due to the high emigration of the working population of the region towards other regions in the country and notably towards the areas being developed for coffee and cocoa production in the Plateaux Region. These emigration trends are so strong that the 1981 census revealed that half the native population of the ORZ lived in the Central and the Plateaux Regions.

Population growth in these Northern ORZ's is generally quite close to the national average; it reached 3% per year during the inter-censal period. This period, which lasted 12-13 years, depending on the country, occurred



Map 5: Ghana. Mean Annual Population Growth Rate (%) in the Region, between 1970 and 1984



Map 6: North-Togo. Mean Annual Population Growth Rate (%) per Prefecture, between 1970 and 1981

between 1970 and 1992. With a mean annual growth rate of 3% from 1974 to 1997 the populations of the Northern regions freed from onchocerciasis have doubled since the implementation of the OCP.

2) Densification of Old Population Zones Around Agro-Industrial Centres

As a rule, the older more densely populated zones have consolidated because of past relations between the different populations and the old settlements along rivers, roads and railways. In some cases the population has densified only along communication infrastructures. In other cases, on the contrary, there has been an extension of the population over the whole area. And in certain other cases some of the least densely populated areas have been opened up and experienced spectacular growth.

At the level of the sub-regions of each ORZ the highest population growth has, in certain cases, such as in Togo and Ghana, occurred in the old zones of refuge traversed by the old settlement axes and where population densities were already the highest. In Ghana and Togo, the population disparities have increased. The distinguishing factor in Togo is that the people have concentrated on the old cultivated lands which may have reached the limits of their carrying capacity; thus, in the Savannah Region emigration has been highest in areas with a density exceeding 75 inhabitants/sq. km.

However, in Benin and especially in Côte d'Ivoire, high population growth rates have been registered in the least densely populated regions, due to immigration towards commercial centres such as Parakou in Benin or agro-industrial centres in Côte d'Ivoire. The population growth therefore varies substantially in the ORZ with differences ranging from 1 to 4. In such cases it can be deduced that demographic growth "redistributes" the population.

When this occurs in the old settlements, demographic growth should contribute to a reduction in the number of localities with less than 500 inhabitants; when it is due to colonizing agricultural immigration or the recuperation of lands freed from onchocerciasis it should lead to the founding of new small settlements. The densification or expansion of the population are alternatives which raise new questions in terms of agricultural development and health.

Regarding agricultural development, the crucial question remains the spatial occupation and distribution of installations. In Burkina Faso there has been a division between land development schemes and the population in the Kompienga valleys: the population units, especially in the case of old settlements, are sometimes located far from the places where new exploitations are being developed (Quesnel and Marchal, 1995). This new aspect of the development of land exploitations is due to a high degree of fluidity (sex, age, status, activity) of the population structure. This reveals the

need for research at a regional level of population movements and their redistribution. For the time being, there is not enough census data for an in-depth analysis of the situation and we can only highlight certain aspects.

In the cases of onchocerciasis and trypanosomiasis there is a risk of the disease spreading again when settlements are dispersed (Hervouët and Prost, 1979). Another aspect is that the multiplication of small settlements in certain agricultural areas or downstream from hydro-agricultural developments requires the special attention of the health authorities.

Table 4
Population Density in the Northern ORZ's

Country and date	Administrative unit	Density (inhab./ sq. km)
Benin 1992	*Sub-prefectures*:	
	Bassila	8.2
	Boukoumbe	56.2
	Cobly	46.5
	Copargo	40.7
	Djougou	23.0
	Kerou	11.3
	Kouande	15.4
	Materi	33.6
	Natitingou	42.7
	Ouake	49.0
	Pehunco	16.8
	Tanguieta	7.4
	Toucountouna	19.8
	Banikoara	23.7
	Bembereke	17.9
	Gogounou	10.2
	Kalale	17.5
	Kandi	21.4
	Karimama	4.8
	Malanville	22.3
	N'dali	12.1
	Nikki	20.9
	Parakou	234.9
	Perere	13.5
	Segbana	7.2
	Sinende	17.8
	Tchaourou	9.1
	Whole ORZ	17.6
	Whole country	42.8
Côte d'Ivoire 1988	*Departments:*	
	Bondoukou	14.0
	Bouna	5.5
	Boundiali	13.5
	Dabakala	7.4
	Ferkessedougou	7.9
	Katiola	10.3
	Korhogo	22.4
	Mankono	10.3
	Odienne	6.7
	Tanda	29.6
	Tengrela	14.4
	Whole ORZ (rur.)	11.0
	Whole country	34.0
Ghana 1984	*Local authorities*:	
	Bole	10
	Damongo	4
	Salaga	10
	Bimbila	24
	Sabola-Zabzugu	16
	Yendi	19
	Gushiegu-Chereponi	15
	Savelugu	22
	Tamale	697
	Tolon	60
	Walewale	19
	Nalerigu	30
	Wa	48
	Nadawli-Funsi	14
	Lawra-Jirapa	45
	Lambussie-Nandom	79
	Tumu	8
	Sandema	30
	Navrongo	72
	Chiana-Paga	114
	Bolgatanga-Tongo	112
	Bongo-Nabdam	161
	Kusanaba-Zebilla	65
	Tempane-Garu	82
	Bawku	155
	Pusiga-Pulimakum	172
	Whole ORZ	24.3
	Whole country	52.5
Togo 1981	*Prefectures:*	
	Assoli	35
	Bassar	19
	Binah	108
	Doufelgou	53
	Keran	41
	Kozah	72
	Oti	21
	Tone	52
	Whole ORZ	37
	Whole country	48

Sources: censuses.

On the whole, the population densities of the ORZ's in the north range from 11 inhab./sq. km in Côte d'Ivoire (1988) to 37 inhab./sq. km in Togo (1981), whilst national averages were respectively 34 and 48 inhab./sq. km. However, mean densities sometimes hide more profound differences within and between the national ORZ's.

In the ORZ in Togo the most remarkable geo-demographic aspect remains the unequal concentration of the population within the regional perimeter. Whereas the north-west remains relatively densely populated the rest of the region has a low population density. This contrast is even more surprising given the fact that in the area of 8 533 sq./km covered by the Savannah Region only 4 650 sq. km are currently inhabited or developed. Part of the remaining area is occupied by national parks, protected forests or other administrative reserves. Elsewhere, the differences in densities are due to natural causes.

Conversely, especially in Ghana, where isolated densely populated areas coexist with other almost uninhabited areas, the population growth is accompanied by increasing numbers of human settlements of less than 500 inhabitants. This would mean that the region is being colonized. The population of the ORZ living in this type of villages ranges from 40.9 to 47.4% of the total population of the region. This region is therefore experiencing population growth with increased dispersion.

Elsewhere, areas that are becoming more densely populated coexist with areas where the population is expanding and becoming dispersed. However, in Benin the population is becoming denser in all areas, whereas Côte d'Ivoire is undergoing all the different population processes at the same time.

3) Redistribution of the Population and Emigration towards the Coastal Regions

Onchocerciasis has been considered as one of the causes for depopulation and emigration from the ORZ's in the 1960's and 1970's. Farming opportunities increased during the mid-1980's and the OCP actions and other development programmes encouraged migration which repopulated the ORZ's, notably in the valleys. We find that the existence and intensity of this resettlement deserves being measured. To do so, we will proceed by describing the spatial mobility of the population of the ORZ's based on non-natives[16].

Although it is difficult to evaluate with any precision the numbers of departures and returns by only using census data it is even more

[16] We would like to point out that this makes it possible to divide the population into three categories: people born in a reference census area who have been surveyed through a census conducted in that area; people surveyed in the reference census area but who were born in another census area of the country; and lastly, people surveyed in the reference census area but who were born outside the country.

complicated to determine whether the control of onchocerciasis in the ORZ's has really brought about any return migrations and to measure these returns in the absence of specific studies or recent data on these migrations.

In Benin: Immigration into Borgou and from Atacora

The two departments of the ORZ in Benin are different regarding their populations' migrations and the attraction they exert on populations from the other regions in the country (Table 5).

Table 5
Distribution of Non-Native Migrants[17]
According to Census Area and Type of Migration (ORZ in Benin, 1979)

Census Area	Internal Migrants (non-native)			External Immigrants
	Immigrants	Emigrants	Balance	
Atacora rural	7 083	11 562	-4 479	11 657
Atacora semi-rural[18]	7 095	7 488	-393	1 924
Borgou rural	11 256	7 070	+4 186	6 019
Borgou semi-rural[19]	6 815	7 052	-237	1 046
Parakou	12 678	8 108	+4 570	1 028

Source: Guingnido, 1992, quoted in the national report.

Table 6
Distribution (%) of Non-Native Immigrants
According to Census Area and Place of Origin (ORZ in Benin, 1979)

Census Area	Immigrants (non-native)			Total
	Internal	External		
		Beninese	Foreigners	
Atacora rural	37.8	56.2	6.0	100
Atacora semi-rural	78.7	17.9	3.4	100
Borgou rural	65.2	16.5	18.3	100
Borgou semi-rural	86.7	5.9	7.4	100
Parakou	92.5	3.9	3.6	100

Source: Guingnido, 1992, quoted in the national report.

Regarding the department of Atacora, the 1979 census showed the remarkable importance of migration exchanges with areas outside the ORZ[20], in particular between rural areas and sub-regional areas (Table 6):

[17] Cf. note 20.
[18] In 1979 semi-rural Atacora included the sub-prefectures of Natitingou, Kouande and Djougou. The rest of the departement was considered as rural.
[19] In 1979 semi-rural Borgou included the sub-prefectures of Kandi, Bembereke and Nikki. Parakou is the main city and the rest of the departement is considered as rural.
[20] It was not possible to apply to the 1992 census the analysis carried out by Guingnido (1992) based on the 1979 census.

62% of the migrants surveyed in sub-prefectures other than Djougou, Kouande and Natitingou came from abroad; among them, the Beninese returning migrants were the greatest in numbers. On the other hand, exchanges between the three sub-prefectures and the rest of the country are substantial even though a considerable number of migrants come from outside.

Concerning the Borgou department, its rural areas attract people from other areas of the country and from neighbouring countries: 18.3% of the total number of immigrants counted are from abroad.

In fact, globally the 1979 census revealed, on the one hand, high emigration of populations from the Department of Atacora to other countries and other regions of Benin, and on the other hand an attraction exerted by the department of Borgouon on rural populations from the rest of the country and from neighbouring States. In addition, an evaluation of the migratory exchanges between the different regions in the north with the rest of the country revealed the following:

- a negative balance of internal migration between the Department of Atacora and the rest of Benin;
- a distinctly positive balance of internal migration between the Department of Borgou and all the other departments.

Very early the town of Parakou became the regional capital: it is, among other things, the centre for the transshipment of goods being sent to Niger and the whole of northern Benin.

In Côte d'Ivoire: Emigration towards Coastal Regions, Redistribution of the Population Inside the ORZ

Contrary to Benin, in Côte d'Ivoire it seems that the proportion of non-natives is low (16.8%) compared with the rest of the country. It is in the rural areas that it is the lowest: 13.5% compared with 31.3% in urban areas (Table 7). The non-natives from rural areas vary from one department to another from 31.3% (Katiola) to 5.9% (Korhogo).

At the level of the sub-prefectures of the ORZ, in the absence of data allowing for an evaluation of the migratory flow between the ORZ and the outside, we have used the proportion of natives in order to have some indication of mobility.

Table 7
Proportion of Natives by Department
(ORZ in Côte d'Ivoire, 1988)

Department	Proportion of natives (%)	
	Urban	Rural
Bondoukou	69.3	93.5
Bouna	73.5	90.8
Boundiali	70.5	92.6
Dabakala	63.6	93.4
Ferkessedougou	69.8	76.6
Katiola	67.9	68.7
Korhogo	69.5	94.1
Mankono	71.2	72.6
Odienne	66.3	90.0
Tanda	70.9	82.6
Tengrela	61.2	91.6
Whole ORZ	68.7	86.5

Source: GPHC 1988.

The proportion of natives is higher than that of non-natives in almost all the sub-prefectures. It varies from 98.6% in Komborodougou to 43.4% in Tortiya. It seems that the sub-prefectures with the highest growth rates are those with the highest proportions of non-natives. This is the case of Nielle (29.4%), Tarife (30.3%), Tortiya (56.6%), etc. The relation between the rate of population growth and the proportion of non-natives seems evident and therefore we were able to attribute the population growth to immigration in these localities. This was the case of Tortiya which has the highest growth rate but which also has the highest proportion of non-natives. These figures, in the case of Côte d'Ivoire, reveal the fact that many people who are born in the region remain there and that the region attracts few people from the rest of the country and especially from neighbouring countries (except for the agro-industrial complexes mentioned earlier).

It should be pointed out that, in general, mobility within, and especially towards the ORZ is lower than elsewhere in the country. It seems, however, that more people are leaving the zone but that their numbers are more difficult to evaluate at sub-prefectoral or departmental levels given the data available.

However, the sex ratio per department reveals a deficit in males. In fact, the sex ratios for the population aged 15 to 39 in all the departments of the region, except for Katiola, vary between 71 and 88% in 1975 and 1988. This substantial difference between the numbers of men and women cannot be accounted for only by emigration (Table 8).

Table 8
Sex Ratio of Population Aged 15-39 by Department
(ORZ in Côte d'Ivoire, 1975 and 1988)

Department	1975	1988
Bondoukou	75.8	73.7
Bouna	80.6	72.2
Boundiali	73.0	70.8
Dabakala	87.7	84.3
Ferkessedougou	79.6	85.9
Katiola	87.5	106.8
Korhogo	71.9	73.9
Mankono	84.3	87.4
Odienne	75.5	79.1
Tanda	85.1	75.2
Tengrela	75.2	77.4
Whole ORZ	78.2	73.7

Source: GPHC 1988.

In Ghana: High Internal Mobility in the ORZ

In Ghana, it seems that growth in the oncho-freed zones, which are mainly rural, is fed by immigration. What sort of immigrants are they? The problem with the census in Ghana is that it only takes into account the Ghanaian population, while almost half of the men over 40 years of age were born outside the census area. Almost 15% were born in another region. There is therefore, high internal mobility in each of the three regions.

Table 9
Distribution of the Population According to Place of Birth and Census Area, by Sex (ORZ in Ghana, 1984)

Place of Birth	Census Region					
	Northern		Upper West		Upper East	
	Men	Women	Men	Women	Men	Women
Same census locality	72.7	61.7	80.8	57.8	88.7	60.8
Other locality in the same region	18.0	29.2	11.2	34.9	5.1	32.5
Other region	8.7	8.4	6.6	5.7	5.8	5.4
Elsewhere	0.6	0.7	1.3	1.6	0.4	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: GPC 1984.

In Togo: Emigration is Continuing towards Coastal and Plantation Areas

Of the whole AREA apparently only the ORZ in Togo has not experienced a substantial return of the population. As mentioned above, the slowing down or stabilization of the population growth of this ORZ can be explained essentially by the emigration of young people to the agricultural localities of the Central and Plateaux Regions. The 1960, 1970 and 1981 census results indicate that these emigration flows concerned mainly three ethnic groups in the ORZ: the Kabyen, the Lamba and the Losso. In 1960, 50% of this Diaspora lived outside the zone; in 1970, the proportion was 58%, and in 1981 66% (Table 10). Onchocerciasis is rarely given as an explanation for these migrations, while the following reasons are usually invoked:

- strong population pressure on agricultural lands;
- soil exhaustion, reduction in fallow land and abandon of manuring;
- a strong attraction exerted by the fertile lands of the Central and Plateaux Regions;
- the self-sustaining aspect of migrations through family ties, etc.

Table 10
Distribution (%) of Non-Natives
According to Prefecture of Origin and Place of Settlement
(ORZ in Togo, 1981)

Prefecture of origin	Place of Settlement			
	Kara region	Savannah region	Elsewhere in Togo	Total
R. of Kara				
Assoli	27.2	2.1	70.7	100.0
Bassar	12.6	4.3	83.1	100.0
Binah	8.0	0.8	91.2	100.0
Doufelgou	14.4	1.4	84.1	100.0
Keran	20.6	13.2	66.2	100.0
Kozah	10.4	1.2	66.2	100.0
R. of Savannahs				
Oti	31.8	23.8	44.4	100.0
Tone	9.5	37.9	52.6	100.0

Source: GPHC, 1981.

Globally, the Savannahs Region experienced between 1970 and 1981 a negative migratory balance (4 000 people approximately). Although the migrations outside the region are not substantial it is estimated that 22 000 people have migrated inside its perimeter (estimated at 7% of the population in 1981). In this region there are two types of internal migrations: spontaneous migrations resulting from high population pressure in the overpopulated zones in the north-west, and forced migrations induced by the

expulsion of populations following the creation or the extension of protected areas.

On the whole, the distribution of the migration streams according to distance indicates that in the Kara Region only 15.6% of the migrants (non-native) leave a prefecture to move to another in the same region, less than 4% leave for the Savannahs Region and almost 81% choose a region outside the ORZ. Inversely, the Kara Region attracts many more people in proportion than the Savannahs Region (Table 10). The ORZ encounters several problems in retaining its populations, especially those of the Kara Region.

In the ORZ's of the North population densification follows the main roads. The population growth is highest at communication hubs. The townships, as transit and service centres, constitute markets which draw rural people from the hinterlands while favouring immigration in the rural areas of another population circle. Another element is the structure of this population with a relatively high growth rate and a deficit in young men who commute while waiting to settle in either their place of origin or place of arrival, depending on the opportunities presented to them.

II. – THE POPULATION OF THE ORZ'S OF THE "SOUTH"

Southern Mali, Burkina Faso and Niger have the richest lands in all of these countries. These lands were also greatly developed during or after the implementation of the OCP. These lands are those zones protected from onchocerciasis with little or no population, subject to intense agricultural colonization. However, apart from the southern part of Niger that is experiencing a rapid settlement of lands which previously had a density of less than 10 inhab./sq. km, in the ORZ's in Mali and Burkina Faso agricultural colonization is being carried out between the interfluves of former settlements with population densities substantially higher than 50 inhab./sq. km. The recent settlement of the valleys of the former Voltas (since the beginning of the 1970's) is a good example of this phenomenon and is also a reminder that valleys affected by onchocerciasis were not depopulated everywhere and that their rate of occupation has never been nil[21]. The valleys have never been "virgin" lands.

[21] In this chapter we have used parts of the report drafted by André Quesnel and Jean-Yves Marchal on the study they conducted in the Kompienga valleys in November 1995. From this report a presentation was made at a seminar organized by ORSTOM on "Rurality in Southern Countries at the End of the 20th Century", in Montpellier in April 1996 (Marchal and Quesnel, 1997). We have also used the works of authors who have made detailed analyses of the repopulation process in the valleys in Burkina Faso (Hervouët, 1983; Hervouët, Clanet *et al.*, 1984; Paris, 1992; Remy, 1981).

Whichever period is taken into consideration (before or after 1974) parts of the valleys were populated and remained so with corresponding land development. Since 1974, immigrants have settled everywhere in great numbers whether spontanously or directed to do so. Today (twenty years later) there is a high rate of occupancy of the fields and pastures in the valleys.

In these three countries the densification of the population through the immigration of crop and livestock farmers from the poorest regions of the Sahel is also affected by a strong mobility towards the coastal areas. Whereas in Niger there is a lot of immigration, mobility is reduced in Burkina Faso as well as in Mali where, paradoxically, there appears to be high mobility among young men between the age of 15 and 39 in the areas where the population of the valleys is highest. This has led us to examine the conditions in which young farmers settle, and to study the role of this mobility and its impact on the production systems: installations in valleys, relay installations.

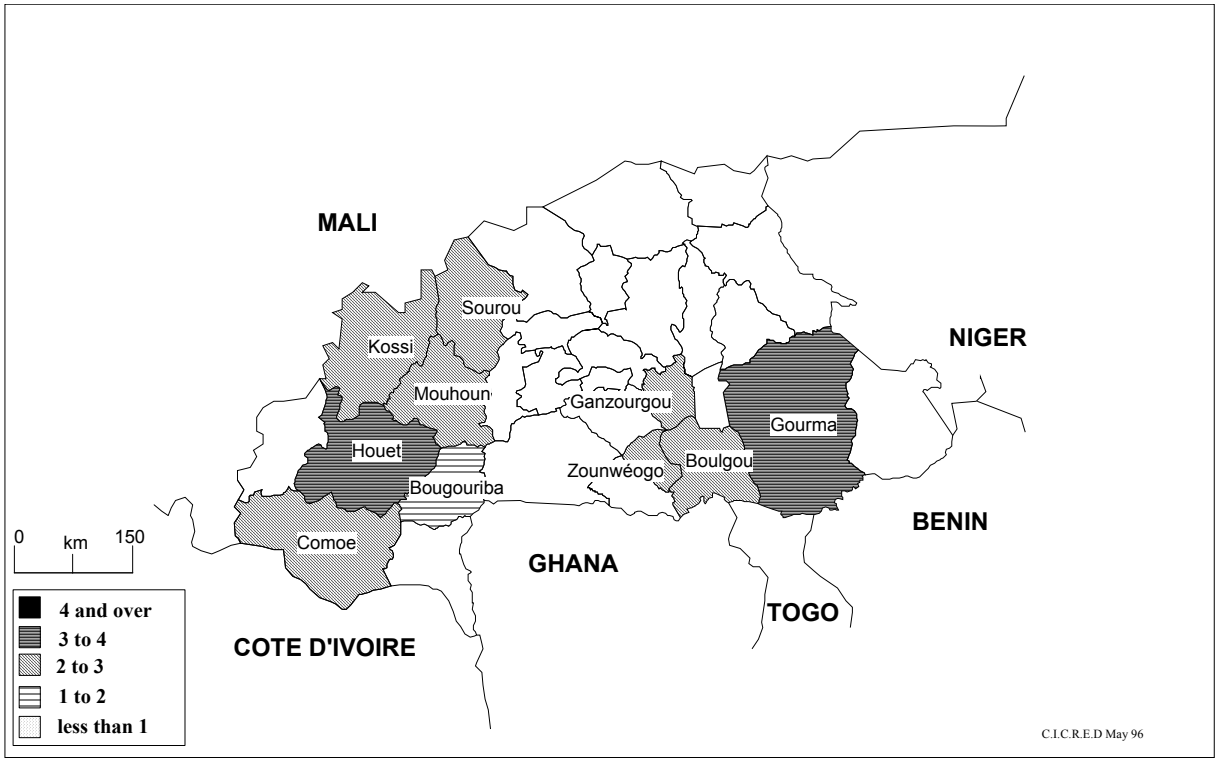
Finally, it should be stressed that the population growth, densification of space and intensification of mobility in the three countries are population phenomena that spread from concentrations of populations, whether old or recent, provoked by agricultural development projects (such as cotton plantations) or hydro-agricultural developments.

1) Moderate Population Growth in Old Settlements and High Growth Rates in the Valleys Protected from Onchocerciasis

Like the ORZ's of the "North" those of the "South" have all experienced a positive population growth during the last 20 years. This high growth rate varies from one ORZ to another.

In Burkina Faso: Very High Population Growth Linked to Agricultural Colonization

In terms of population growth, all the provinces of the ORZ in Burkina Faso have experienced positive growth, sometimes higher than the national average, between 1975 and 1985. The province of Mouhoun experienced an average annual growth rate of 3.7% between 1975 and 1985 and of 2.2% between 1985 and 1991. The province of Houet almost doubled its population between 1975 and 1985, registering a mean annual population growth rate of 6.5% between 1975 and 1985 and of 3.7% between 1985 and 1991 (Table 11, Map 7). This can be explained by the fact that the ORZ in Burkina Faso was subject to rapid colonization already in the 1980's, so that by 1984 for example, all the available lands had been developed at Yeraba on the Nakambe. The same phenomenon of land re-colonization is occurring in Nazinon valley where 900 sq. km of lands have been cleared. In the Comoe basin in the south-west of Burkina Faso the village farmlands had already doubled in 1984, with 400 sq. km of lands converted back to farming.



Map 7: Burkina Faso. Mean Annual Population Growth Rate (%) by Province, between 1985 and 1991

Table 11
Mean Annual Inter-censal Growth Rate and Population Density in the ORZ's of the South

Country and period	Census area	Mean annual population growth rate (%)	Density (inhab./sq. km) (date)
Burkina Faso 1985-1991	*Provinces*[22]:		(1991)
	- Houet	3.7	43.5
	- Mouhoun	2.2	31.5
	- Comoe	2.9	16.1
	Whole ORZ	++	29.6
	Whole Country	2.9	33.5
Mali 1976-1987	*Regions*:		(1987)
	- Koulikoro (Dioïla)	3.0	12.5
	- Mopti (Bankass)	0.6	16.2
	- Segou (Baraoueli)	1.5	20.7
	- Sikasso (Koutiala)	2.8	18.7
	Whole ORZ	2.0	17.4
	Whole Country	1.7	6.2
Niger 1977-1988	"*Arrondissements*":		(1988)
	- Kollo	3.7	23.0
	- Say	7.8	12.3
	- Tera	2.9	24.7
	Whole ORZ	4.7	17.3
	Whole Country	3.3	5.2

Sources: National reports.

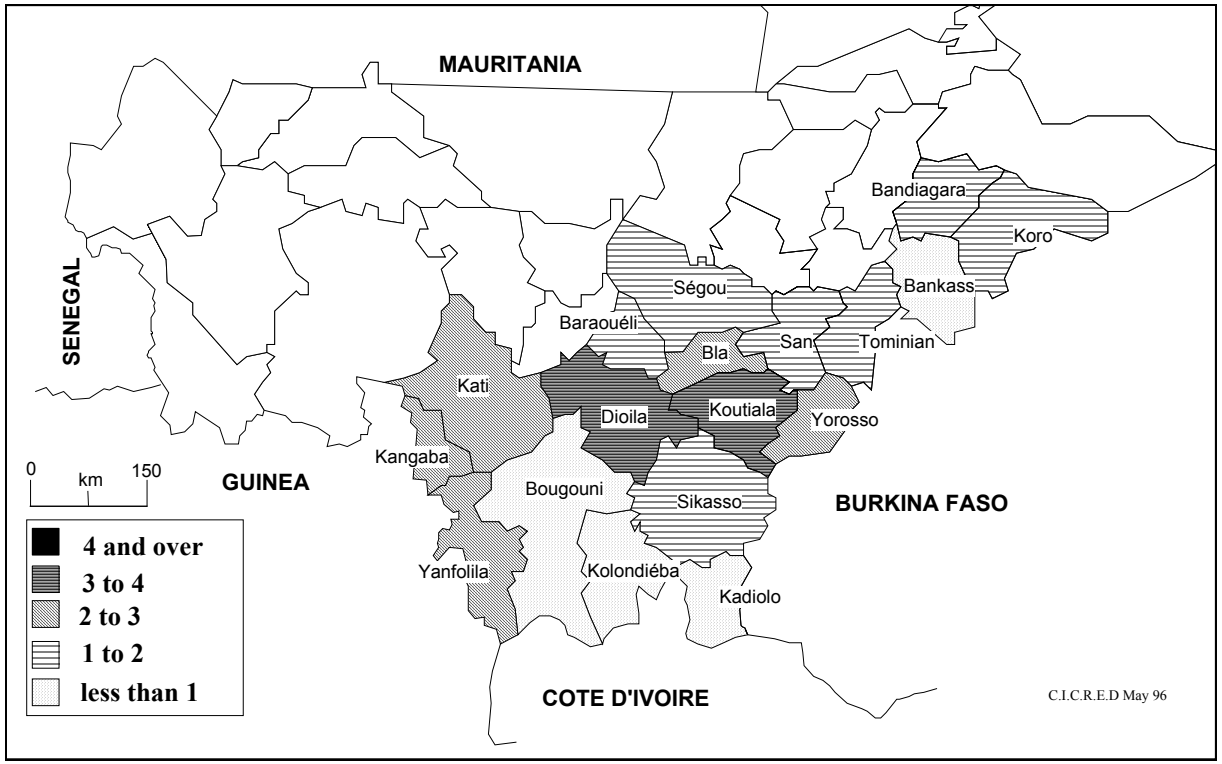
In Mali: A Growth Rate Exceeding the National Average

In Mali, the ORZ includes 18 circles belonging to the Koulikoro, Mopti, Segou and Sikasso regions; only the last region falls entirely within the study, and covers nearly 43% of the ORZ and 37% of its population which counted over 3.5 million inhabitants in 1987.

The ORZ in Mali experienced a global growth rate of 2% per year between 1976 and 1987 (Table 11, Map 8). All the circles of the zone registered positive growth rates between 0.6% and 3.5%. Because of this diversity, the circles are classified in three categories according to their population growth rate:

- circles with low growth rates (less than 2% per year): these are the circles of Bougouni, Kadiolo, Kolondieba, Sikasso (in the Sikasso Region), Baroueli, Segou, San, Tominian (in the region of Segou), and Bandiagara, Bankass, Koro (in the Mopti Region);
- circles with average growth rates (between 2 and 3% per year): this category includes the circles of Kangaba (in the Koulikoro Region), Yanfolila, Yorosso (in the Sikasso Region), and Bla (in the Segou Region);

[22] Only the most representative provinces are included.



Map 8: Southern Mali. Mean Annual Population Growth Rate (%) by Circle, between 1976 and 1987

- circles with high annual growth rates (3% and more): this category includes only two circles, Dioïla (in the Koulikoro Region) and Koutiala (in the Sikasso Region).

The growth rate of the ORZ is relatively low compared with the other regions but remains higher than the global rate in Mali (1.7%). In other words, with a natural growth rate of 2.7% the ORZ appears to be less affected by emigration than the rest of Mali. However, the growth rate reaches and sometimes exceeds 3% per year in the most densely populated "arrondissements".

This is also the case of the circles located to the southeast (Kati, Kangaba, Yanfolila) and east (Dioïla, Koutiala) of Bamako which are crossed by the two major communication routes leading to Côte d'Ivoire, directly in the first case and via Burkina Faso in the second case. Therefore, it is not surprising to note that the same circles register migration deficits of males between the age of 15 and 39. Although these circles may truly be considered as immigration poles linked to the extension of cotton production, we are, however, tempted to look at the communication routes crossing these "arrondissements" with the highest population growth more in terms of "useful corridors" than as actual population areas. This impression is further reinforced in south-east Burkina Faso. These are two reticular population areas in two neighbouring valleys facing north-south in the direction of Benin, Togo and Ghana. These spaces connect with the interfluves and the three main roads.

In Niger: Very High Population Growth Rate in Valleys Freed from Onchocerciasis

In Niger, the ORZ includes 10 cantons contained within three "arrondissements": Say, Tera and Kollo which represent 58%, 32% and 10% respectively of the survey area. The population concerned is small: with little more than 400 000 inhabitants in 1988, it represents 5.6% of the total population of Niger. Its area covers 41%, 45% and 13% respectively of the three "arrondissements"; almost all of the population is rural (95.3%).

The population growth rate for the whole of the Nigerian ORZ is considerable since it reached 4.7% between 1977 and 1988 (Table 11) whereas the mean population growth rate for the whole of Niger is 3.3% per year.

The case of Niger is interesting for the purposes of our study insofar as the country has been little affected by onchocerciasis compared with the other countries, except for the Tapoa and Mekrou valleys which cross the Say Department. However, it seems that the Say "arrondissement" which had been hit the hardest by Onchocerciasis has the highest growth rate: 7.8% per year. All the cantons of this "arrondissement" have growth rates of more than 5% (Table 14). The highest growth rate is that of the canton of Tanou (14.8%), which represented the lowest density in 1977. But it is the

canton of Torodi, where there was the highest population concentration of the ORZ after the canton of Dargol (16% and 27% respectively in 1977), which seems to attract the highest number of inhabitants from outside: its growth rate is 7.2%. In 1988, almost 21% of the population of the zone resided in this canton.

It should be stressed that, except for Diagourou, the cantons with the highest population densities have maintained a respectable growth rate, often higher than the natural growth rate.

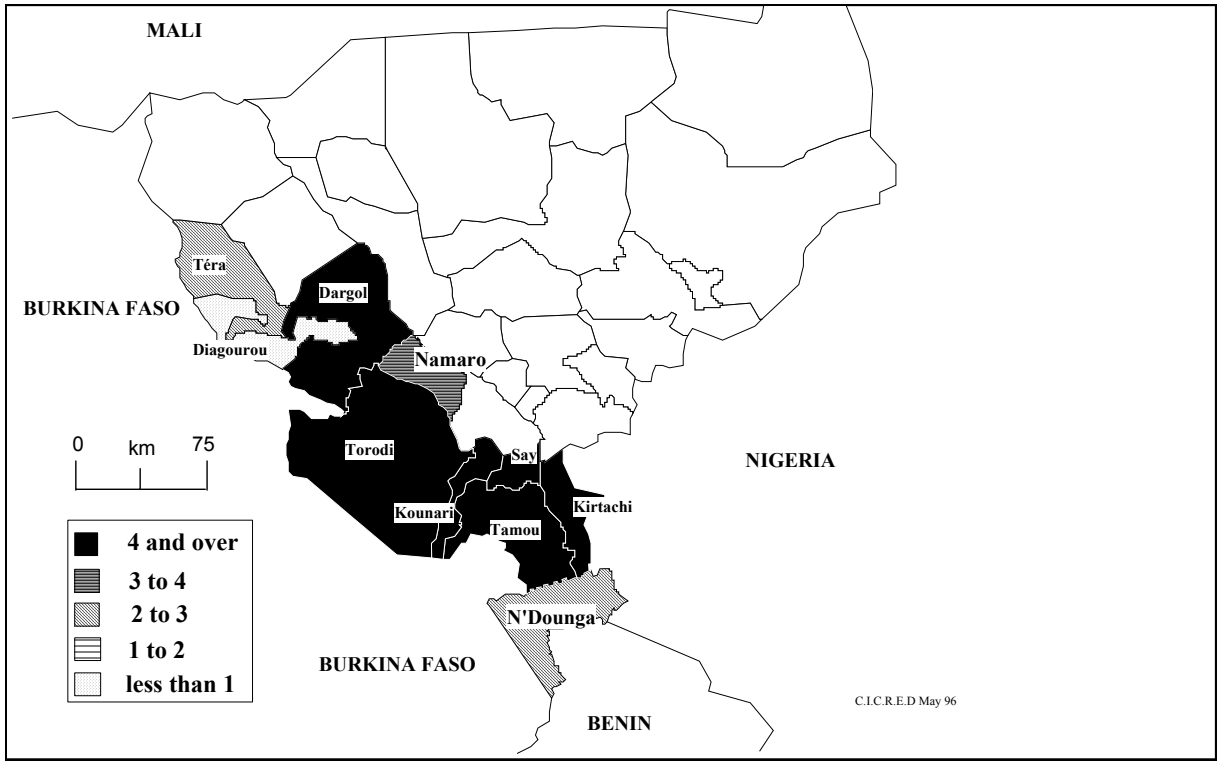
2) Immigration Zone or Relay Zone towards Coastal Countries? The Case of Burkina Faso

All of the regions in southern Burkina Faso, Mali and Niger now freed from onchocerciasis, and especially those with the lowest population densities, have had high population growth rates due to immigration. Densities have more than doubled there during the last 20 years (Table 12). However, this high immigration rate hides an emigration towards the coastal countries and, more globally, the increasingly complex mobility in these regions.

In Mali, as in Niger, the proportion of individuals coming from other regions in the country and settling in the ORZ's is currently increasing. However, especially in Mali, it remains small (Table 13). Moreover, there might be a stronger retention of native inhabitants of the ORZ and/or many people from the immigrant population continue to move to other locations. In other words, do the settlement problems in the ORZ's make them relay zones towards the coastal countries? Or is it possible for a group to settle at the cost of the mobility of some of its members? The data supplied by the censuses do not provide an answer to this question. However, we are able to study the phenomenon in greater depth by considering the special case of Burkina Faso.

In Burkina Faso, the proportion of people born outside the ORZ ranges from 22% in Houet to 75% in Boulgou, whereas in the provinces outside the ORZ this proportion does not exceed 5%.

Almost all of the provinces which make up the ORZ are situated in the Sudano-Guinean region. They therefore have plenty of rainfall (900 to 1 200 mm) and relatively good agricultural lands. The ORZ has the best agro-climatic potential in Burkina Faso. Contrary to the zone of the central plateau which has experienced many departures principally due to the search for arable lands and pasture for livestock, the ORZ is a region favoured by immigrants.



Map 9: Niger. Mean Annual Population Growth Rate (%) by Canton, between 1977 and 1988

Table 12
Population Density in the Southern ORZ's

Country and date	Administrative Unit	Density (inhab./Sq. km)
Burkina Faso 1991	*Provinces*:	
	Bougouriba	34.3
	Boulgou	51.6
	Comoe	16.1
	Ganzourgou	54.7
	Gourma	13.2
	Houet	43.5
	Kossi	29.5
	Mouhoun	31.5
	Sourou	33.0
	Zoundweogo	50.7
	Whole ORZ	29.6
	Whole Country	33.5
Mali 1987	*Circles*:	
	Dioïla	19.7
	Kati	21.4
	Kangaba	11.9
	Bankass	22.7
	Bandiagara	25.4
	Koro	19.7
	Ségou	38.9
	Baraouéli	29.3
	Bla	24.5
	San	28.3
	Tominian	19.7
	Bougouni	11.6
	Kolondieba	11.3
	Yorosso	20.1
	Yanfolila	14.2
	Kadiolo	18.3
	Koutiala	38.5
	Sikasso	24.4
	Koulikoro region	12.5
	Sikasso region	18.7
	Segou region	20.7
	Mopti region	16.2
	Whole ORZ	17.4
	Whole Country	6.2

Country and date	Administrative Unit	Density (inhab./Sq. km)
Niger 1988	*Cantons*:	
	Kounari	15.8
	Say	49.4
	Tamou	7.2
	Torodi	12.1
	Tera	18.7
	Dargol	29.5
	Diagourou	21.6
	Kirtachi	14.9
	Namaro	25.1
	N'Dounga	47.7
	Arrond. de Say	12.3
	Arrond. de Tera	24.7
	Arrond. de Kollo	23.0
	Whole ORZ	17.3
	Whole Country	5.2

Sources: National reports.

Table 13
Changes in Migration Structure (census area × place of birth) between 1976 and 1987 (ORZ in Mali)

Census Area	Place of Birth							
	1976				1987			
	Same region	Other regions	Abroad	Total	Same region	Other regions	Abroad	Total
Koulikoro	93.6	4.9	1.5	100	92.0	6.1	1.9	100
Sikasso	90.9	5.2	3.9	100	89.8	7.5	2.7	100
Segou	91.7	6.9	1.4	100	91.6	7.1	1.3	100
Mopti	95.3	3.4	1.3	100	93.7	5.3	1.0	100

Sources: GPC Mali 1976 and 1987.

Table 14
Distribution of the Population (%) According to Migration Status (life expectancy) and Mean Annual Growth Rate 1977-1988 (ORZ in Niger, 1988)

Canton and "Arrondissement"	Migratory Status				Annual growth rate 1977-1988 (%)
	Non-migrants	Internal migrants	External migrants	Total	
Kounari	92.8	2.8	4.4	100.0	5.8
Say	80.8	5.2	14.0	100.0	5.1
Tamou	70.8	5.7	23.5	100.0	14.8
Torodi	81.9	9.7	8.4	100.0	7.2
Total Say Arrond.	80.0	7.4	12.6	100.0	7.8
Tera	97.1	0.5	2.3	100.0	2.8
Dargol	96.8	0.3	2.9	100.0	4.6
Diagourou	98.7	0.0	1.3	100.0	-1.4
Total Tera Arrond.	97.2	0.3	2.5	100.0	2.9
Kirtachi	80.5	1.3	18.2	100.0	6.1
Namaro	91.7	3.3	5.0	100.0	3.0
N'Dounga	90.2	1.0	8.8	100.0	2.8
Total Arrond. de Kollo	88.2	2.2	9.6	100.0	3.7
Total ORZ	88.9	3.5	7.6	100.0	4.7

Source: DSCN, GPC Niger 1988.

The highest immigration rate occurs along the Mohoun (former Volta Noire) because of the cotton boom. The valleys concerned are in the Solenzo zone and those near the population sites administered by the *Autorité des Vallées des Voltas* (AVV), notably Upper Nakambe (former Volta Blanche) and Nazinon (former Volta Rouge).

In the Bougouriba Region, a tributary of the Mouhoun, the return of the migrants (who had abandoned their lands) is more problematic. In the Lobi region, for example, in 1984, there had not yet been an extension of the farmlands towards the rivers. Due to the low population density and a dispersed habitat, the rate of river blindness exceeded 5%. In the Dagara region to the north of the confluence of the Bougouriba and Mouhoun rivers the annual growth rate of new lands recovered is approximately 8% near the Mouhoun, but only 3% near the Bougouriba; the old villages have been reoccupied but no new villages are being built.

Considered individually the provinces of the ORZ in Burkina Faso present specific aspects regarding spatial mobility. Whereas the west, and especially the Province of Houet, draws migrants, notably from the central plateau, Mali and Côte d'Ivoire, other provinces have remained somewhat unattractive to migrants. This is the case of the province of Ganzourgou where non-natives in 1985 registered 12.7% of immigrants compared with 14.7% of emigrants. In comparison, a 1985 study of these migrations of non-natives in the western provinces revealed that immigrants are a major component of the population of Houet: 32.6% (of whom 27.4% come from the province of Yatenga in the central plateau), compared with 7.3% of emigrants, which places this province in the second position among the most attractive provinces after Sissili. After Houet comes Kossi (24.2% of immigrants compared with 6% of emigrants) and the cotton capital of Mouhoun (24.1% of immigrants compared with 10% of emigrants). This special attraction exerted by the western provinces is probably due to the substantial progress made in controlling onchocerciasis and the initiatives for the development of these areas.

Therefore, spatial mobility in the ORZ in Burkina Faso is more intense than anywhere else. These areas have experienced a substantial mixing of populations of diverse origins. This situation presents certain advantages but it also presents disadvantages. When migrants are harmoniously integrated these zones become real development "fronts" in which competition between producers stimulates production. This is generally the case in the cotton-producing areas of the provinces of Mouhoun, Houet, Kossi and Bougouriba where immigrants, most of whom come from the Mossi plateau (where cash crops are not always the tradition because of climatic conditions), have become excellent cotton producers. However, this implies a certain re-adaptation of the farming methods (for example, itinerant farming on burnt fields which consumes a lot of land is often practised on the central plateau) and of attitudes towards the environment. D. McMillan *et al.* (1993) have observed that "the migrants who settle in the ORZ know that in order to prosper in the long term they must be able to integrate in the wider economic and social system. They must have good relations with the local farmers, the livestock farmers who hold the traditional grazing rights in the region, the chiefs, etc. A complex network of interactions is established between the migrants (crop or livestock farmers) and their hosts who allow them access to the land".

However, these mutually profitable relations vary according to the zone and can even give rise to conflict. "Success in the development of the ORZ's is almost always linked to the increase in the stock of crop and livestock farmers and to the strengthening of relations between the two groups" (McMillan *et al.,* 1993). In fact, these relations have not always been very friendly. For example, the province of Kossi, the third cotton producing province in the country after the Houet and Mohoun provinces, also has, from the livestock point of view, a high rate of transhumance because of the border situation with Mali. Conflicts between crop and livestock farmers are also frequent. This is also the case in the region of Niangoloko where cohabitation between Karamogo livestock farmers and crop farmers from the region is almost impossible, with disputes sometimes degenerating into armed conflicts.

These observations have led the authors to write that "to elaborate more efficient development programmes decision-makers must be aware of the relations between the different groups as well as the factors which either foster or prevent the harmonious integration of their respective interests".

3) Border Continuities and Discontinuities of the Population

By definition the AREA presents a geo-epidemiological continuity (see Map 2). It is interesting to explore whether there are any notable continuities or discontinuities in population dynamics in this international oncho-freed rural zone. In other words, do the different situations in each of the countries, regions and borders which separate them generate specific types of population dynamics? We have partially answered this question by distinguishing in each of the countries the zones which are presented as immigration areas (the southern ORZ's) or which remain emigration areas (the northern ORZ's) in spite of an intensification of immigration in many cases. However, it is important to identify the trans-border spatial continuities and discontinuities of the population dynamics between these two types of zones in as much detail as possible. So, what about the poles formed on the one hand by the south-western region of Burkina Faso and the regions affected by onchocerciasis in the border regions of Côte d'Ivoire, Mali and on the other hand by south-eastern Burkina Faso with Benin, Niger and Togo?

The differences in the size of the administrative units chosen for each country have proven to be more an obstacle to this type of analysis than the disparities between the inter-censal periods considered.

However, when studying Map 10 one cannot help observing that in western Burkina Faso, in the province of Houet the highest population growth rate occurred between 1985 and 1991, in contrast to the southern border region of Burkina Faso "La Comoe", and its neighbours of northern Côte d'Ivoire which experienced a growth rate of over 4% per year between 1975 and 1988. In the border regions of Mali the differences are less marked

since the provinces have a growth rate of 2 to 3% per year, revealing a reticulated area which in a certain way unite the Malian provinces of Diolla, Koutiala and Yorosso, to the Kossi province of Burkina Faso.

It would be even more hazardous to launch into this type of analysis for the regional pole around the oncho zone of south-eastern Burkina Faso because of the disparities between inter-censal intervals and the sizes of the administrative units in Burkina Faso, Benin and Togo (Map 11).

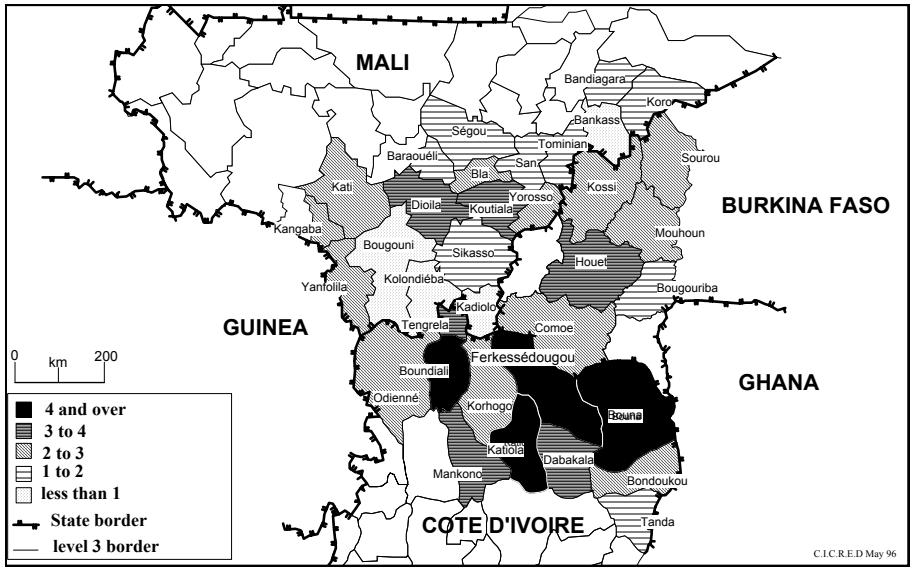
With these examples we would like to insist on the benefits of conducting a geo-referenced analysis of census data at the level of the smallest population units, if possible the localities or the census units, so as to appraise the territorial or reticular nature of the population dynamics these rural areas are experiencing. For this purpose the right type of census data need to be available, stored and accessible, which is far from being the case in Africa.

III – THE POPULATION OF THE ORZ'S IN GUINEA AND SENEGAL

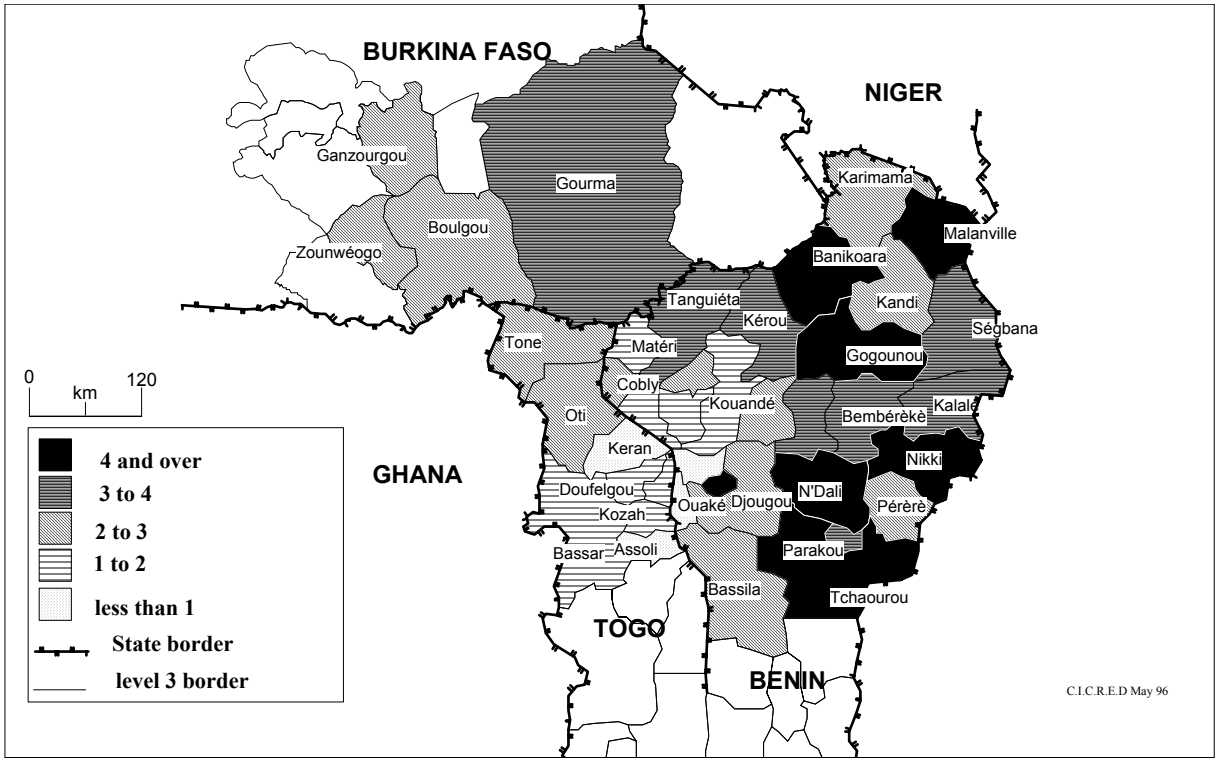
The ORZ's of Guinea and Senegal present a third category of population dynamics which is quite different from the others. It is in fact characterized by high emigration of men and women and low population growth, in absolute terms in the case of Guinea, and in the case of Senegal as compared to the ORZ's of the other countries (Table 15). Since these countries were included in the OCP in 1986 the data available do not allow a retroactive evaluation of the impact of onchocerciasis control on the population dynamics. However, even when the disease rate is high, as in the case of Guinea, no link has been established between the disease and the population density or growth in these regions.

The slow pace of demographic growth and development of these regions is due to strong economic enclavement. Although the areas possess great agricultural potential their production (cereals and rice) is still essentially destined for local markets. Population densities are stronger along the main roads linking the ORZ to the other border countries but no densification or extension of the population has been observed along these roads as in other countries. In the absence of demographic growth there is no concentration of population and there are many population units of less than 500 inhabitants. These rural areas remain underprivileged in terms of investments in social and economic infrastructures because of the absence of an economy of scale. There are no clearly defined population axes or poles.

The emigration these regions experience mainly benefits the capital, then neighbouring regions, judging from the low population growth in these regions, but it also affects neighbouring countries, notably Mali and Côte d'Ivoire.



Map 10: Mean Annual Population Growth Rate (%) by Province in the Border Areas of Burkina Faso (1985-1991), Mali (1976-1987) and Côte d'Ivoire (1975-1988)



Map 11: Mean Annual Population Growth Rate (%) by Province in the Border Areas of Burkina Faso (1985-1991), Benin (1989-1992) and Togo (1970-1981)

Table 15
Mean Annual Inter-Censal Population Growth Rate and Density in the Enclaved Zones

Countries and period	Administrative unit	Mean annual population growth rates (%)	Density (inhab./sq. km) (date)
Guinea 1983-1990	*Prefectures*[23]:		(1990)
	- Kankan	+2.5	14.9
	- Kerouane	-1.3	8.2
	- Dabola	-0.1	13.7
	- Mandiana	+0.8	11.1
	Whole ORZ	0.8	9.1
	Whole country	2.5	30.0
Senegal 1976-1988	*Departments*[24]:		(1988)
	- Kedougou (Saraya)	1.4	
	- Bakel (Kidira)	2.4	
	- Velingara (Bonconto)	2.4	
	- Tambuconda (Missirah)	3.1	
	Whole ORZ	2.0	5.1
	Whole country	2.7	6.9

Sources : National reports

1) Low Population Growth in the Rural Areas

In Guinea

In 1983, the spatial distribution of the population in the ORZ of Upper-Guinea showed that almost 50% of the population was living in areas of high endemicity, 14% in areas of medium endemicity and 36% in areas of low endemicity. Fourty three percent of the inhabitants of this region, i.e. 396 000 people, were infected with onchocerciasis in 1984. The population growth in the ORZ was quite moderate with an annual growth rate between 1983 and 1990 of 0.8%, which is very low compared with the national average estimated at 2.5%. Between prefectures the rate varies between -1.3% in Kerouane and +2.5% in Kankan. Some prefectures (Dabola, Dinguiraye and Kerouane) registered a reduction in the number of inhabitants from 1983 to 1990. Only the Prefecture of Kankan registered a considerable growth of its population (2.5% per year). This difference is due to the demographic weight and to specific changes in the two central sub-prefectures of the Prefecture of Kankan which have growth rates of more than 4%.

[23] The most significant prefectures have been listed.
[24] One "arrondissement" per *department* has been listed.

The area with high endemicity, as might be expected, experienced the lowest growth rate: 0.6% compared with approximately 1% for the least affected areas.

In Senegal

The study of population changes shows that the "arrondissements" of the ORZ had differing growth rates between 1976 and 1988. In fact, these rates varied between -4% ("arrondissement" of Salemata) and +3.1% ("arrondissement" of Missirah). Between these two extremes are the "arrondissements" of Bonconto (2.4%), Kidira (2.4%) and Bandafassi (2.0%) which have experienced substantial growth, and the "arrondissement" of Fongolimbi which has experience slow growth. The high population growth of Missirah is due to high immigration linked to the development of banana cultivation along the basin of the Gambia river. However, the depopulation of Salemata seems to be due to its low level of development compared with neighbouring "arrondissements" (Bandafassi and Missirah).

All of the "arrondissements" of the zone outside the ORZ experienced positive growth rates between 1976 and 1988: the rates varied between 2.0% ("arrondissement" of Diawara) and 5.9% ("arrondissement" of Koupentoum). It is, in fact, in this zone that the "arrondissements" with the highest growth rates are to be found: Koupentoum (5.9%) and Koussanar (4.3%). This gives a different perspective to the fact that the ORZ's draw more migrants than neighbouring regions. In spite of this the results show that the ORZ in Senegal experienced substantial population growth between 1976 and 1988 since, apart from three exceptions, its "arrondissements" experienced growth rates of 2% and more.

2) High Migration Causes Problems in Consolidating the Population

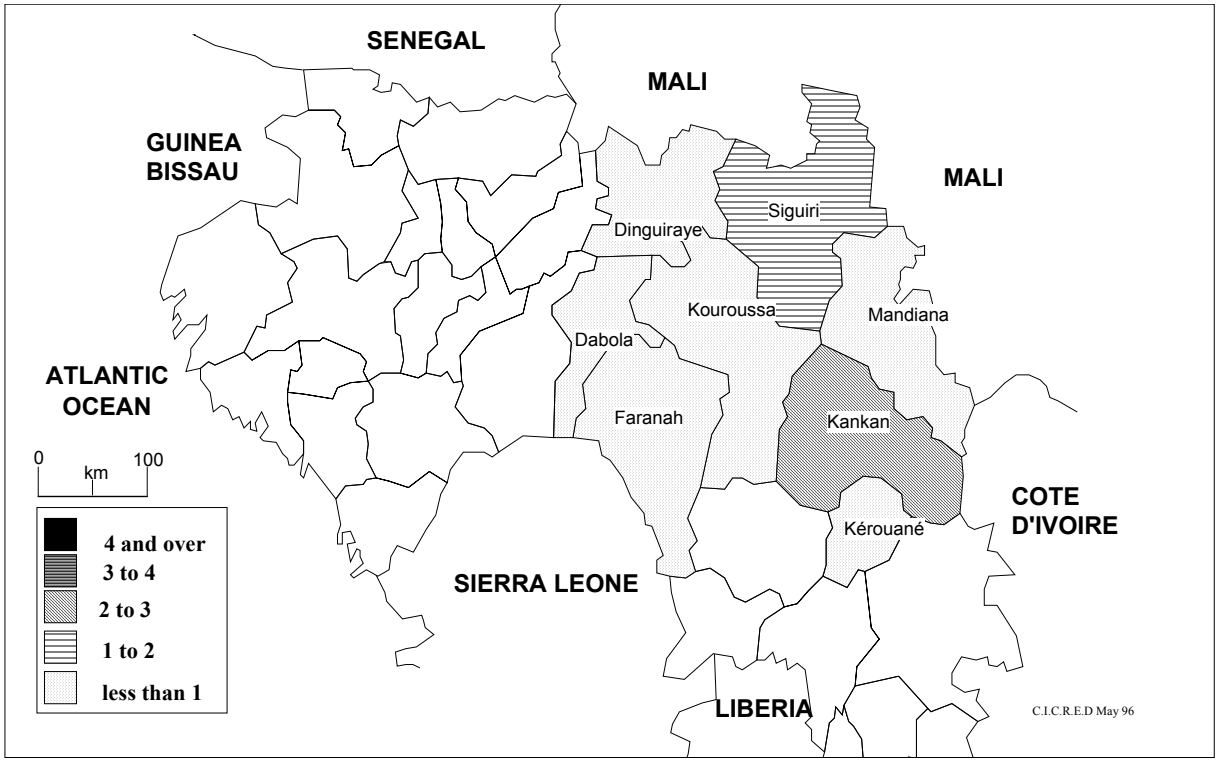
Although overall population densities have increased in these ORZ's this increase has not affected all administrative units.

Table 16
Population Density in the ORZ's in Guinea and Senegal

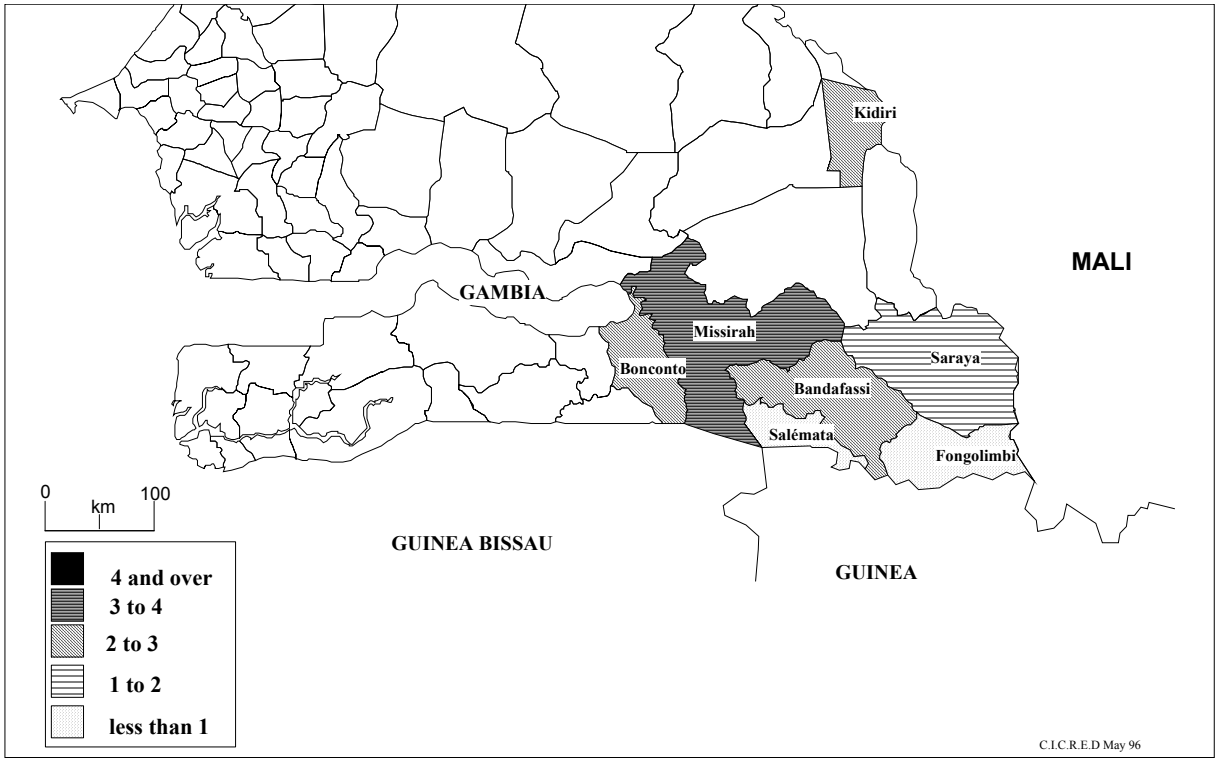
Country and Date	Administrative unit	Density (inhab./sq. km)
Guinea 1990	*Prefectures*:	
	Dabola	13.7
	Dinguiraye	7.8
	Faranah	8.4
	Kankan	14.9
	Kerouane	8.2
	Kouroussa	8.0
	Mandiana	11.1
	Siguiri	11.3
	Whole ORZ	9.1

Country and Date	Administrative unit	Density (inhab./sq. km)
Senegal 1988	"*Arrondissements*":	
	Bandafassi + Kedougou	5.2
	Bonconto	14.6
	Fongolimbi	5.3
	Kidira	4.4
	Missirah	3.9
	Salemata	6.4
	Saraya	2.4
	Whole ORZ	5.1

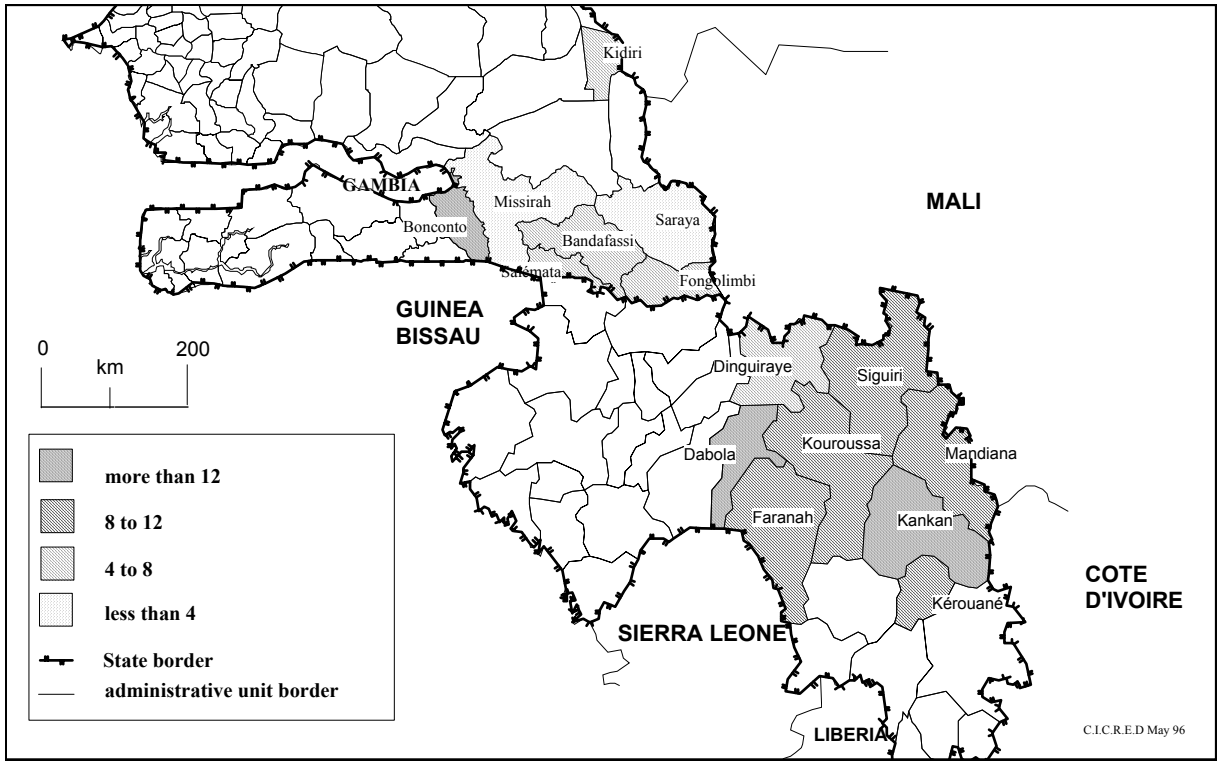
Sources: GPHC 1988 (Senegal) and Agricultural Census 1990 (Guinea).



Map 12: Guinea. Mean Annual Population Growth Rate (%) per Prefecture, between 1983 and 1990



Map 13: Senegal. Mean Annual Population Growth Rate (%) by "Arrondissement", between 1976 and 1988



Map 14: Population Density in the ORZ's in Guinea and Senegal

In Guinea

In the ORZ (Upper Guinea), the population of the prefectures increased slowly between 1983 and 1990. The highest increase was in the Prefecture of Kankan (5 points) whereas the Prefecture of Kerouane experienced a slight decrease (-2 points). The average increase in density in the region was registered at 1.3 points. Obviously, the zone least affected by onchocerciasis experienced a very high increase in density (2.1 points). Contrary to the situation in Senegal and other countries, the ORZ in Guinea is a place of departure. Upper Guinea has in fact always been a region of departure, both during the colonial period and under the first Republic. The migration matrix comparing the prefecture of birth with the prefecture of residence at the time of the census makes it possible to evaluate the "rates" of immigration and emigration. Table 17 gives the levels of these two indicators for the prefectures of the ORZ.

Table 17
Emigration and Immigration Indicators by Prefecture
(ORZ in Guinea, 1990)

Prefecture	Immigrants as % of resident population	Emigrants as % of native population	% of the surface in a hyper- or meso-endemic zone
Dabola	11.3	19.5	61
Dinguiraye	3.5	12.5	87
Faranah	13.5	14.5	24
Kankan	12.4	21.6	70
Kerouane	32.7	12.1	62
Kouroussa	4.8	20.5	92
Mandiana	7.3	5.8	19
Siguiri	4.6	12.6	84
Whole ORZ	10.5	15.3	65

Source: Guinean National Report.

Except for Kerouane and Mandiana no prefecture of Upper Guinea has a higher rate of immigrants than emigrants. Therefore, Upper Guinea is clearly a region of emigration. The prefectures highly integrated in the zones of strong or average endemicity (Kouroussa, Dinguiraye and Siguiri) have immigration rates which are much lower than the average (less than 5% compared with a regional average which is higher than 10%). Inversely, there is a positive correlation between the level of endemicity in proportion to the surface area of the hyper- or meso-endemic zone, and the rate of emigration (r = 0.496). When, based on the migration matrix "place of birth/place of residence", one only studies the prefectures of Upper Guinea and only takes into account numbers equal to or higher than 1 000, the following results are obtained:

- concerning emigrations, Conakry exerts a strong attraction on almost all of the prefectures, emigrations are essentially oriented towards Guinean

forest lands (Kissidougou, Gueckedou and N'Zerekore) and exchanges between prefectures from the same region are predominant;

- concerning immigrations, the focus is on the prefecture of Kerouane, a gold and diamond mining region, and on the Prefecture of Kankan, where commercial activities are predominant; immigrations coming from prefectures in Guinean forest lands (mainly from Kissidougou and Beyla) and immigrations from outside the country always into Kankan and Kerouane are also noteworthy. The pattern of immigrations towards rural areas in Upper Guinea is identical to those affecting the whole of the region mentioned above.

The results of the survey on migration (1993) provides information on more recent migratory exchanges between Upper Guinea and other natural regions. However, we do not have information at a lower level of analysis than that of the natural region (Tables 18 and 19).

Table 18
Distribution (%) of the Population Born in Each Natural Region According to the Current Natural Region of Residence (Guinea, 1993)

Natural region of birth	Natural region of residence					
	Lower Guinea	Central Guinea	Upper Guinea	Guinea Forest region	Conakry	Total
Lower Guinea	84.36	1.22	0.78	0.97	12.67	100.00
Central Guinea	4.28	84.21	1.96	2.02	7.53	100.00
Upper Guinea	0.79	0.40	88.07	7.57	3.17	100.00
Guinea Forest lands	1.11	0.45	2.71	94.15	1.58	100.00
Conakry	5.69	1.53	2.08	1.95	88.75	100.00
Countries in the Group*	11.90	29.76	23.85	15.85	18.63	100.00
Other countries	15.18	19.91	15.00	27.58	22.33	100.00

Source: Guinean National Report.
** Nigeria, Niger, Côte d'Ivoire, Mali, Burkina, Senegal, Mauritania.*

Table 19
Distribution (%) of the Population Residing in Each Natural Region According to the Current Natural Region of Birth (Guinea, 1993)

Natural region of birth	Natural region of residence				
	Lower Guinea	Central Guinea	Upper Guinea	Guinea Forest Lands	Conakry
Lower Guinea	88.80	1.33	0.80	0.91	17.35
Central Guinea	4.64	94.08	2.07	1.95	10.60
Upper Guinea	0.83	0.44	91.18	7.11	4.37
Guinea Forest Lands	1.16	0.48	2.75	86.98	2.14
Conakry	3.09	0.86	1.10	0.94	62.62
Countries in the Group*	0.66	1.69	1.29	0.78	1.34
Other countries	0.83	1.12	0.80	1.34	1.59
Total	100.00	100.00	100.00	100.00	100.00

Source: Guinean National Report.
** Nigeria, Niger, Côte d'Ivoire, Mali, Burkina Faso, Senegal, Mauritania.*

Out of 1 298 866 people born in Upper Guinea, 88.1% lived in the countryside (Table 18), the others resided in the other natural regions and mainly in Guinean Forest Lands (7.6%) and in Conakry (3.2%).

Among the 1 051 274 people living in Upper Guinea at the time of the survey, 91.2% (Table 19) were born in this region and the others were born in other natural regions or in other countries (2.1% come from Central Guinea, 2.8% from Guinean Forest lands, and 1.3% from neighbouring countries).

In Senegal

Between 1976 and 1988, all the rural communities in Senegal registered high population densities except for Fongolimbi which experienced low growth and Salemata which experienced a reduction of its population. The rural communities of Medina-gounass, Bonconto and Netehoulon have experienced the most significant increases: the differences in densities during this period were 9.9, 6.5 and 3.8 inhab./sq. km respectively.

In the ORZ in Senegal, the proportion of villages of less than 500 inhabitants is still very high: almost 92%. The proportion of the population living in villages of less than 500 inhabitants tends to fall slightly in the whole ORZ. It is substantially less in those "arrondissements" where the population growth is highest (for example, in Missirah it ranges between 75.9% and

69.1%), and above all, it increases in those "arrondissements" where growth is lowest (for example in the "arrondissement" of Salemata, from 77% to 84%); however, it is surprising that in the neighbouring "arrondissement" of Bandafassi this same proportion ranges from 71% to 58% although the proportion of villages with more than 500 inhabitants has hardly changed. Are human settlements and a concentration of population growth in the major villages happening at the same time?

Table 20
Proportion (%) of Natives by "Arrondissement" in 1976 and 1988 (ORZ in Senegal)

"Arrondissement"	Proportion of natives	
	1976	1988
Bandafassi	97.3	90.8
Bonconto	80.2	77.5
Fongolimbi	90.6	94.0
Kedougou commune	42.0	49.3
Kidira	83.8	88.6
Missirah	85.2	83.8
Salemata	96.8	95.5
Saraya	97.6	92.5
Whole ORZ	85.7	83.9

Sources: GPC 1976, GPHC 1988.

The great majority of the population of the ORZ in Senegal is native (85.7% in 1976 and 83.9% in 1988). Although the situation is not very different from that observed in regions outside the ORZ (82.9% and 78.2%) the capacity to retain natives seems higher in the ORZ. The data by "arrondissement" (Table 20) confirms the general trend. The "arrondissements" can be classified into two groups:

- those where the proportion of natives dropped between 1976 and 1988: Bandafassi (-6.5 points), Bonconto (-2.7 points), Saraya (-5.1 points), Missirah (-1.4 points) and Salemata (-1.3 points);
- those where the proportion of natives increased between 1976 and 1988: Kedougou (+7.3 points), Kidira (+4.8 points) and Fongolimbi (+3.4 points).

Without claiming to provide a definite explanation to this situation it may be presumed that the reduction in the proportion of natives is due to the immigration of non-natives or to an emigration of natives. In such a case both answers provide possible explanations. However, the data do not give any indication either way.

Not only does the ORZ in Senegal have a positive migration balance but it also exerts more of an attraction than the rest of the country

(Table 21). In fact, 85.6% of the immigrants of the zone come from either another region in the country (52.1%) or from abroad (33.5%).

Table 21
Migration Balances and Proportion of Non-Native Migrants According to "Arrondissement" (Senegal, 1988)

"Arrondissement"	Immigrants (%)	Emigrants (%)	Migration balance
Bandafassi	7.5	16.9	+ 81
Bonconto	33.2	2.1	+ 7 460
Fongolimbi	2.9	14.1	- 697
Kedougou commune	22.2	14.4	+ 3 731
Kidira	8.6	4.3	+ 1 560
Missirah	18.9	18.1	+ 2 600
Salemata	2.2	17.6	- 1 211
Saraya	4.5	12.5	- 173
Whole ORZ	100.0	100.0	+ 13 351
Zone outside ORZ	-	-	+ 1 249

Source: GPHC 1988.

The Kedougou area receives the greatest number of migrations from the other "arrondissements" in the ORZ except for people originating from the "arrondissements" of Missirah, Kidira, Salemata (58.5% of which settle in the "arrondissement" of Missirah). As shown in Table 21 the four entities that have the most significant migration balances are, in order of size, the "arrondissements" of Bonconto (7 460), of Kedougou municipality (3 731), of Missirah (2 600) and of Kidira (1 560).

International non-native immigrants are greater in number irrespective of their destinations within the ORZ except for the municipality of Kedougou where immigrants coming from other regions of the country are predominant (Tambacounda excluded).

With regard to recent migrations the results are not much different from those mentioned above. In fact, the "arrondissements" of Salemata and Fongolimbi were the principal areas of emigration, experiencing negative migration balances. On the contrary, the "arrondissements" of Missirah, Kidira and Boconto exerted the greatest attraction in 1988.

The analysis of the age structure of non-native immigrants and emigrants in 1988 (Tables 22 and 23) shows that most of them are young adults: in the ORZ, approximately 40% of migrants, whether they were in-

migrants or out-migrants, were aged between 15 and 34; 24% were under 15; 25% were aged between 35 and 54.

Table 22
Distribution (%) of Non-Natives in Each "Arrondissement" of Destination According to Age Group (Senegal, 1988)

"Arrondissement" of destination	< 15 years	15-34 years	35-54 years	55 years and +	Total
Bandafassi	25.2	39.6	23.5	11.7	100
Bonconto	15.8	37.1	27.7	19.4	100
Fongolimbi	32.9	35.1	20.1	11.9	100
Kedougou comm.	26.0	38.2	27.4	8.4	100
Kidira	27.9	41.7	22.2	8.2	100
Missirah	24.0	40.8	24.2	11.0	100
Salemata	18.4	30.8	27.7	24.1	100
Saraya	31.6	40.4	21.7	6.3	100
Whole ORZ	23.3	38.3	25.4	13.0	100
Zone outside ORZ	25.0	40.9	20.1	14.0	100

Source: GPHC 1988.

Table 23
Distribution (%) of Non-Native Emigrants for Each "Arrondissement" of Origin According to Age Group (Senegal, 1988)

"Arrondissement" of birth	< 15 years	15-34 years	35-54 years	55 and +	Total
Bandafassi	21.2	41.3	29.3	8.2	100
Bonconto	38.7	46.6	13.7	1.0	100
Fongolimbi	17.6	40.8	32.5	9.1	100
Kedougou comm.	41.3	37.5	17.0	4.2	100
Kidira	27.3	38.9	20.8	13.0	100
Missirah	21.2	45.1	25.2	8.5	100
Salemata	20.5	47.5	25.0	7.0	100
Saraya	22.9	37.9	28.4	10.8	100
Whole ORZ	24.3	42.0	25.7	8.0	100
Zone outside ORZ	31.0	37.9	20.3	10.8	100

Source: GPHC 1988.

The above analyses highlight the extent of population growth within the AREA, the volume of exchange within the ORZ's and between the ORZ's and other regions. In relation to these phenomena three groups of countries stand out:

- In the group composed of Benin, Togo, Ghana and Côte d'Ivoire, the population growth, although not homogeneous, is relatively high. These ORZ's are emigration areas despite the presence of a few centres that attract people either due to the presence of natural resources (gold and diamond mines in Tortiya in Côte d'Ivoire) or the installation of industrial plants (like the sugar plants of Côte d'Ivoire). It should be noted that in the "Northern" ORZ's population densification occurs mainly along the main communication routes.

- The second group includes Burkina Faso, Mali and Niger. The ORZ's of these countries have experienced higher demographic growth than the regions outside the ORZ. These are immigration areas which offer more agricultural potential than the rest of the country. The growth rates are sometimes higher than 3%. In these ORZ's during the last few years several hundred square kilometres of land have been colonized in oncho-freed valleys (in Burkina Faso and Mali, for example). These settlements which started in the mid 1980's intensified because of other events (drought, State intervention, political or economic crises).

- The third group includes Guinea and Senegal. Concerning population growth, the situation is not the same in both countries. Whereas the ORZ of Senegal is an immigration zone, that of Guinea, on the contrary, is an emigration zone. But apart from their situations which means they are closer to the second and the first groups of countries respectively, the ORZ's of Senegal and Guinea present special characteristics. Upper Guinea has experienced a lower growth rate than all of the ORZ's, whereas in Senegal the ORZ has experienced a rate close to that of the other countries.

Globally, the population dynamics of the AREA lead to the following conclusion: whereas certain ORZ's have experienced sustained rural emigration others have experienced major immigration streams. However, in both cases, inter-censal population growth has remained intense (approximately 3% a year) which raises a crucial question: what repercussions will the population dynamics eventually have on the development of rural areas and on the organization of agricultural exploitations?

CHAPTER 4

POPULATION, MOBILITY AND ECONOMIC DEVELOPMENT OF THE AREA

Chapter 3 dealt with the population dynamics of the AREA through population growth, spatial mobility and population densification of the zones. In Chapter 4, we will study the existence of links between the different elements of population dynamics and the economic activities in the AREA. We will attempt to do this by starting with a description of the economic environment of the AREA before examining the situation by groups of countries.

The economy of the AREA involves four main components: agriculture, livestock farming, mining and industry. Agriculture, however, is the principal activity.

I. – THE ECONOMIC ENVIRONMENT

1) Agriculture: Predominance of Food and Cotton Crops

Everywhere in the AREA agriculture is the main activity. Agriculture varies extremely according to soil type, vegetation, climate, etc. In fact, it depends on ecological and pedological conditions.

Agriculture in the AREA concerns mainly food crops (corn, rice, millet, sorghum, fonio, groundnut, yam, cassava) which are grown in all of the countries concerned. In addition to food crops cotton is the main industrial crop to be found in certain countries of the zone. Agriculture concerns 80% of the active population in the zone. In most cases, it has remained traditional (rudimentary farm implements) and is managed by state-run organizations in Burkina Faso and Mali. Cotton benefits from the management structure of major investment organizations in the countries where it is cultivated: Compagnie Ivoirienne des Textiles (CIDT) in Côte d'Ivoire, Compagnie Malienne pour le Développement du Textile (CMDT) in Mali, Société Togolaise du Coton (SOTOCO) in Togo, etc.

Table 24
Changes in Production of Certain Crops in the ORZ's of Burkina Faso, Côte d'Ivoire and Guinea, 1989-1992

Countries	Crops	Production (in tons)			
		1989	1990	1991	1992
Burkina Faso	Cotton	5 706	820	948	-
	Sorghum	51 409	1 560	2 116	-
	Millet	38 881	929	975	-
Côte d'Ivoire	Cotton	290 593	-	-	-
	Sugar cane	145 478	-	-	-
Guinea	Rice	101 512	102 585	117 573	121 726
	Fonio	23 249	25 341	27 648	30 108
	Groundnut	24 143	29 988	36107	40 200
	Corn	24 167	25 567	24 329	25 325
	Cassava	155 972	173 572	194 490	215 825

Sources : National reports.

2) Fishing: A Marginal Activity

In the ORZ's fishing is an activity of secondary importance. This seasonal activity is conducted on a small scale and involves essentially river fishing. Until recently it employed several thousands of people and its main role was to provide the population with a protein diet. However, fishing populations are currently settling in the valleys of the ORZ.

3) Livestock Farming: Extensive Livestock Farming Involving Herd Movements

Livestock farming is the second principal activity in the AREA. In fact, after crop cultivation, livestock farming employs the highest proportion of the active population. It concerns mainly cattle and sheep (Table 25). As the vegetation is becoming increasingly sparse and because of irregular rainfall, livestock farming is becoming more and more difficult, forcing livestock farmers to move their herds. Goats and foul kept by households are limited in number but are found everywhere in the ORZ. Although pigs are widespread they are not bred by all households because the consumption of pork is prohibited in Moslem societies.

Table 25
Changes in the Number of Heads of Livestock in the ORZ in Guinea, 1990-1993

Species	1990	1991	1992	1993
Cattle	40 240	574 237	610 414	648 870
Sheep	142 034	147 290	152 740	158 391
Goats	113 306	116 478	119 739	123 092
Pigs	22	25	30	35

Source: SNSA, Statistical Yearbook, 1993.

4) Mining Resources and Industry: A Largely Unexploited Potential

In the AREA, there is mining potential in Côte d'Ivoire, Guinea and Senegal. Especially in Guinea, the mining sector is the second productive sector providing smallholders with complementary sources of income. Seventy percent of farmers pan for gold in Upper Guinea, the area affected by onchocerciasis. The industrial exploitation of gold in this region provides the State with thousands of dollars in revenue and 2 000 jobs.

The gold deposits of Sabadola (Senegal), the iron mines of Goto (Senegal), the marble deposits of Bandafassi (Senegal) and the gold and diamond mines of Tortiya (Côte d'Ivoire) all represent an economic potential in the AREA. Some of these deposits, as will be shown later, constitute centres of attraction for people.

The AREA also has potential for tourism, especially national parks and natural and artificial lakes.

In general, there is little industry. Apart from the large sugar plants of Côte d'Ivoire in most cases there are small local production units, such as cotton ginning and fruit juice factories, etc.

II. – POPULATION, MOBILITY AND ECONOMIC ACTIVITIES

1) The Northern ORZ's

In the previous chapter it was stated that the Northern ORZ's experience high mobility which, however, varies according to the ORZ. This diversity of situations entails a variety of activity structures.

In Benin: Feminization of Agriculture in the Department of Emigration

The departments which make up the ORZ of the country are very different from the other departments because of the migration trends of their

populations. However, the situation varies from one department to another (Tables 5 and 6). In fact, in Atacora, external migration is predominant, especially between rural areas and foreign countries. Thus, 62% of the immigrants counted in 1979 in the different sub-prefectures (except for two) of the department came from abroad and most of them were returnees. In fact, in this department of emigration, the rate of women's participation in economic activities has increased the most: between 1979 and 1992 women's activities doubled, registering the highest progression compared with all the other departments in the country (Table 26).

Table 26
Changes in the Activity Rate of the Population According to Sex in the Two Departments of the ORZ in Benin and in the Whole of Benin between 1979 and 1992

Sex	Atacora		Borgou		Whole of Benin	
	1979	1992	1979	1992	1979	1992
Men	87.8	89.8	85.8	90.4	76.6	82.3
Women	21.3	45.2	26.6	32.2	37.2	54.7
Total	52.9	66.7	56.0	61.3	56.3	67.7

Sources: GPHC 1979; GPHC 1992.

Table 27
Distribution (%) of the Active Population According to Sex in the Different Sectors of Activity (ORZ in Benin, 1992)

Sex	Agriculture		Trade		Other activities	
	Atacora	Borgou	Atacora	Borgou	Atacora	Borgou
Men	72.3	88.6	7.2	17.2	72.3	78.4
Women	27.7	11.4	92.8	82.8	27.7	21.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: GPHC 1992.

Borgou, the second department of the ORZ, can be qualified as an immigration area. As mentioned earlier, the rural areas attract people from the rest of the country and from neighbouring countries. It is mainly the sub-prefectures near the border with Nigeria that receive returning immigrants. The sub-prefectures of the centre of Borgou, which have a low population density, receive immigrant farmers from Niger.

However, women are oriented towards commercial activities, especially in the sub-prefectures of N'Dali, Perere and others close to Nigeria.

In the sub-prefectures in the south of Borgou, which, like the ones mentioned earlier, have an average growth rate of 3.5% per year, the population is concentrating around the town of Parakou and the activities principally concerned with agriculture are being diversified.

As an area of emigration and immigration, the ORZ in Benin is more agricultural than the rest of the country. Agriculture is dominated by men; relatively few women are employed in this sector since they are mainly employed in the commercial sector, although to varying degrees depending on the sub-prefecture.

In Côte d'Ivoire: Greater Female Participation in Agriculture Due to the Expansion of Cotton Production

The ORZ in Côte d'Ivoire, like the other Northern ORZ's, is an area of immigration. Its inhabitants move to the south of the country, so much so that the sex ratio is less than 100 (95.1) in the rural areas. At the level of the departments this index is higher or equal to 100 in only three departments out of eleven: Ferkessedougou (100.3), Katiola (105.3) and Mankono (102.5). These departments receive immigrants to their rural areas, resulting in a lower proportion of natives among the residents. There are 76.6%, 68.7% and 72.6% of natives respectively, compared with 86.5% for all departments of the ORZ (Table 7).

Although they may be superior in number, women are less active than men (34.8% compared with 53.4% in 1988). Situations vary according to living environments.

In urban areas the activity rate is 27.2%, with 265 active men for 100 active women. This ratio, which has almost tripled, indicates the presence of male immigration. That women start working at a younger age may be due to the fact that girls receive less schooling than boys.

In rural areas, activity is more intense: 47.7% of the women are active. The active rural population which is almost exclusively employed in agriculture (90.5%) is much more balanced with regard to sex ratio: 138 men for 100 women. The fact that there are more and more young people and women in agriculture suggests that the departure of adults results in a transfer of responsibility in production units to women and young people.

At the level of the departments, Bouna presents data showing high return mobility in rural areas and at the same time high emigration at younger ages: in fact, this department, with a growth rate of 4.1% per year in rural areas, has a high proportion of natives (91%), whereas the deficit in men in the 15-39 age group increased between the two censuses (the sex ratio decreased from 81 to 72) (Tables 7 and 8). This represents a new

mobility trend in the Kompienga valley (in Burkina Faso), the return or the installation of former migrants from the plantation zones as farmers, whereas the younger population continues to move to the south. This movement towards the south is probably more circular now than in the past because of the end of the colonization fronts in the south-west of Côte d'Ivoire and because of problems of integration in cities.

It should be noted that the Department of Odienne, classified as an area of emigration, presents data that confirm the increasing incidence of young people due to lack of schooling and the emigration of adults: more than 27% of the active farmers are under 15 years of age.

Table 28
Distribution (%) of the Active Population by Major Age Groups and Living Environment (ORZ in Côte d'Ivoire, 1988)

Age groups	Urban	Rural
Under 15 years	6.6	22.0
15-39 years	65.6	48.9
40-59 years	23.4	22.9
60 years and over	4.4	6.2
Total	100.0	100.0

Source: GPHC 1988.

In Ghana

Contrary to what is happening elsewhere in the Northern ORZ's, the activity rates in the three regions of the ORZ in Ghana are higher than the national average. The data available does not allow us to establish a relation between internal mobility in the three regions and the economic potential of this zone.

Table 29
Activity Rate of People Aged 15 or More by Region and by Sex (ORZ in Ghana, 1984)

Region	Activity rate		
	Men	Women	Total
Northern	98.7	99.2	98.9
Upper West	99.1	99.6	99.3
Upper East	98.7	99.3	99.0
Whole of Ghana	96.8	97.5	97.2

Source: GPC 1984.

In Togo: Increased Interest in Commercial Activities

The cantons of the ORZ tend to be areas of emigration towards regions on the border with Ghana or regions located further south in Togo. These two regions of Northern Togo are both centres of high mobility, diverse and different in nature, depending on socio-economic changes. In the Savannah Region migrations have for a long time turned towards the rural areas of Northern Ghana; part of these migrations was diverted towards Côte d'Ivoire and Lome during the Ghanaian crisis in the 1980's. What is the situation today with the recovery of the Ghanaian economy and the continued opening up of other enclaved regions of Togo such as Moyen-Mono in the south? It seems that the development of Dapaong has not resulted in the development of agriculture: this town which has become a major commercial cross-roads between Burkina Faso, Niger and the coast of the Benin Gulf, has turned to the north for its food supplies, towards valleys protected from onchocerciasis in the south-western part of Burkina Faso. Migration from Kara has always been directed southwards, at least in the case of the Kabye Region (66% of the Kabye live outside the region); however, data from the 1981 census describe the installation of other populations in the Savannah Region, such as those originating from the Prefecture of Keran.

2) The Southern ORZ's

Contrary to the Northern ORZ's which are essentially areas of emigration, the Southern ORZ's are converging points for internal migrations within the countries. In fact, the southern parts of Burkina Faso, Mali and Niger have the richest lands in their respective national territories. These lands are greatly developed by crop and livestock farmers coming from the poorest areas whereas certain people, especially the native populations, emigrate towards the coastal regions.

In Burkina Faso: The Active Population is Becoming Younger

Data on Burkina Faso reveals very different and sometimes contradictory situations. In fact, it should be noted that this country, where the OCP was initially launched, has several valleys (Mouhoun, Nakambe, Nazinon, etc.) and a rather rich past in terms of migration. It has also benefited from programmes for the development of its valleys.

The very high mobility within the ORZ in Burkina Faso has resulted in a younger active population dominated by persons under the age of 25 (a proportion which sometimes exceeds 45%). The situation is almost identical in the various provinces. Although the presence of young people in the active population may ensure a reliable production force for the future, in a context dominated by agriculture, however, emigration has weakened the family structure by transferring more responsibility to the young and women.

The results of the 1991 demographic survey indicated a higher number of women everywhere in the ORZ provinces (sex ratios vary between 87.7 in Ganzourgou and 95.5 in Sourou, compared with the national average of 92.5).

Compared with other provinces, these sex ratios are not exceptional, however, when considered from the perspective of the active population, but present particular aspects. In fact, the age structures in the provinces of Burkina Faso reveal an increase in the proportion of women between 20 and 45, therefore fully active. This proportion is even higher in the provinces outside the ORZ. This may provide an explanation for the fact that these age groups correspond to high male emigration, higher in the rest of the country than in the ORZ.

The higher emigration of active males in the zones outside the ORZ indicates that the ORZ exerts an attraction on the rest of the country even if it is the point of departure for other emigrants.

The first observation concerning activity within the ORZ is that it is essentially agricultural. According to the results of the demographic survey conducted in 1991, it seems that such activities are conducted by family units. This characterizes the rural environment as being split up into a great number of family exploitations made up of several household members, usually managed by a man. The proportion of heads of households according to status of occupancy shows that in all provinces the active population is made up of 94.5% of men compared with 76.6 of women (it should be pointed out that for the whole country only 9.71% of the heads of households are women).

Table 30
Rough Activity Rate by Province and by Sex
(ORZ in Burkina Faso, 1991)

Province	Rates of activity (%)	
	Men	Women
Bougouriba	54.9	55.3
Boulgou	55.6	53.6
Comoe	51.8	47.2
Ganzourgou	57.8	57.4
Gourma	54.0	37.6
Houet	84.4	40.6
Kossi	58.6	53.3
Mouhoun	52.2	45.8
Sourou	59.2	57.6
Zoundweogo	58.5	52.1

Source: Demographic Survey - 1991.

The activity rates (Table 30) by province indicate that participation in economic activity is often higher among men than women, irrespective of their place of residence. However, the age structure of the active population in rural areas indicated a higher proportion of women of active age (20-45 years) in active rural populations in 1991.

In Mali: Cotton Producing Areas are Regions of Immigration

Like all the Southern ORZ's, the ORZ in Mali has experienced an annual growth rate higher than the national average, which was 1.7% between 1976 and 1987. It also has high mobility with several components: immigration from the poorest regions in the north, emigration towards coastal countries, especially Côte d'Ivoire, pastoral movements, seasonal migrations, etc. These different migrations (apart from emigrations) are attracted to the rich lands in the ORZ which benefits from large rural development programmes, the largest of which is managed by the CMDT (Compagnie Malienne pour le Développement du Textile). It is therefore not surprising that the proportion of migrants in the four regions concerned by onchocerciasis has risen from 7.1% in 1976 to 8.2% in 1987 (Table 13).

In this area, high population growth rates have been observed, sometimes reaching 3.0% (the Dioïla circle in the Koulikoro Region) or even 3.8% (the Kangaba circle in the same region).

In the case of the Sikasso Region, the data reveal that the influx of immigrants is a recent and sudden phenomenon. In fact, in the six-month period from October 1984 to March 1985, more than 15 000 new arrivals were reported.

The main activity in the ORZ is agriculture. In fact, except for the Segou circle, where the proportion of the active population employed in agriculture is 67%, in all the other circles the proportion exceeds 80%. Here as elsewhere, the highest proportion of people employed in agriculture is under the age of 15: over 20% of the farming population is in this age group compared with 40% for the 15-39 age group.

In Niger: Agriculture Employs Mainly Men

Population growth due to migration almost totally from outside the zone seems to be directly linked to the eradication of onchocerciasis, although there is uncertainty due to the fact that the date of settlement of the people is not known. This is the case of the Say "arrondissement" where 14% of the population resided outside the zone before the census. In any case, it should be noted that the redistribution of the population is due to immigration rather than to an internal redistribution. In fact, among the immigrants less than 30% are returning migrants.

In spite of this high global population increase, mobility remains high, as revealed by the sex ratio of the 15-39 age group which is lower than one

in all cantons. This mobility is lower than for the whole country (referring to the DHS of 1992 the sex ratio is 72 due to migration towards coastal countries). However, it should be stressed that in the Canton of Dargol, which represents the highest concentration of the population in the area (27% in 1977 and 1988) and has remained at this level with an average annual growth rate of 4.6%, in 1988 there was a substantial deficit of men aged 15-39 and a sex ratio of 79. At Torodi where immigration is high there is no deficit (97), but since Torondi is a commercial centre, is it possible to say that there is no mobility?

Finally, there is a need for greater reflection on the reasons for these installations, due to the importance of the role of outside investors (large retailers, civil servants) who invest in large-scale exploitations.

Table 31
Proportion of Employed Active Population According to Activity and Sex (ORZ in Niger, 1988)

Activity	Men		Women		Sex Ratio
	Numbers	%	Numbers	%	
Agriculture/Fisheries	103 495	90.8	1 448	17.1	7 147.4
Travelling salesman	1 240	1.1	1 682	19.9	73.7
Other activities	8 565	7.5	795	9.4	1 077.4
Unknown	719	0.6	4 539	53.6	15.8
Total	114 019	100.0	8 464	100.0	1 347.1

Source: DSCN, GPC 1988.

Concerning these exploitations, it should be noted that the ORZ in Niger through its natural potential is typically an agro-pastoral area. With 85.7% of the active working population, agriculture is the main activity in the ORZ. It employs essentially men (91% of working men) since only 17% of women of working age are active (Table 31). The ORZ in Niger differs in this regard from the Burkina Faso ORZ, for example, where women are quite well represented in agriculture.

This activity is coupled with traditional and extensive livestock farming. The livestock farmers, who used to be nomads, have become sedentary and practise semi-transhumant livestock farming. Fishing is traditionally practised in all ORZ's in ponds and in the tributaries of the River Niger. Production is quite high during low water periods.

In fact, the natural resources of this area are under-exploited: extensive agriculture limited to food crops and extensive traditional livestock farming. The question is whether State intervention through development projects would not enable a greater number of people to benefit from the ORZ.

3) The Case of the ORZ's in Guinea and Senegal

As emigration areas, the ORZ's of Guinea and Senegal are different. In fact, in Guinea, the balanced sex ratio would seem to indicate family migrations, whereas in Senegal the deficit of young male adults would seem to indicate the presence of reversible or temporary migrations. To each of these types of mobility correspond differences in the participation of men and women in agriculture but also, in both cases, a paradoxical increase in household size.

In Guinea

An analysis of non-natives in Guinea indicates that, apart from Kerouane (a gold and diamond producing region), the prefectures of Upper Guinea have turned out to be areas of emigration.

However, Kourane registered a population deficit between 1983 and 1990 and so did Dabola and Dinguiraye; whereas the population in Mandiana remained stable and Kankan received immigrants in a proportion exceeding 12% of its population (Table 17). This diversity in situations is the result of continued emigration and immigration; but the data available do not allow for a precise evaluation of the extent of these movements.

It can only be said that in 1993 the proportion of people born in Upper Guinea who left the region was substantially smaller than in 1983 (12% compared with 15%) and the proportion of immigrants in relation to the resident population remained relatively stable compared with 1983 (9% against 10%).

The high endemicity of the ORZ in Guinea has undoubtedly had an impact on the economic activity of the region.

In fact, the activity rate of people aged 10 years or more varies between 77.5% in Dabola and 54.6% in Kouroussa. Although these two prefectures are located mostly in the hyper-endemic zone, 61% of the territory of Dabola and 92% of that of Kouroussa are affected by onchocerciasis. Therefore, it is hardly surprising to note that the farming population is moving towards prefectures with lower endemicity which, as a result, register the highest activity rates (Table 32) compared with the areas with high agricultural potential but with high endemicity.

Overall, a greater presence of men in agriculture has been noted; however, in some prefectures such as Dinguiraye there are more women (94 men for 100 women) because men are mainly employed in traditional mining activities, as in Kerouane and Siguiri, or because they migrate leaving the women behind.

Table 32
Activity Rate in Agricultural Population by Prefecture
(ORZ in Guinea, 1991)

Prefectures	Total agricultural population	Active agricultural population	Activity rate (%)
Dabola	126 591	71 379	56.4
Dinguiraye	112 260	61 622	54.9
Faranah	77 518	54 898	70.8
Kankan	146 849	86 985	59.2
Kerouane	53 766	29 643	55.1
Kouroussa	113 293	62 843	55.5
Mandiana	121 148	72 025	59.5
Siguiri	120 984	72 585	60.0
Whole ORZ	872 409	511 980	58.7

Source: EAP 1991-1992.

In Senegal

The proportion of natives (83.9% in 1988) in the ORZ seems to point to immigration towards this zone. However, in the whole ORZ there is a high deficit in men due to emigration: the sex ratio varies between 84 in the rural community of Fongolimbi, and 99 in Kedougou-commune. When restricted to the 25-29 age group this index ranges from 76 in the "arrondissement" of Missirah to 53 in Salemata, and 62 in Bandafassi.

Table 33
Proportion (%) of Active Agricultural Population by Each Sex
Among the Total Working Population of Each "Arrondissement"
(ORZ in Senegal, 1988)

"Arrondissement"	Women	Men	Total	Sex-ratio
Bandafassi	22.2	73.5	95.7	3.3
Bonconto	29.4	63.4	92.8	2.2
Fongolimbi	23.2	71.6	94.8	3.1
Kedougou-commune	6.8	37.2	44.0	5.5
Kidira	7.1	81.4	88.6	11.5
Missirah	31.7	64.8	96.5	2.0
Salemata	54.2	44.9	99.1	0.8
Saraya	47.7	48.3	96.0	1.0
Whole ORZ	31.6	61.3	92.9	1.9
Zone outside ORZ	18.6	62.5	81.2	3.4

Source: GPHC 1988.

One may wonder in the presence of such a discrepancy what is the involvement of women in agriculture; especially since the sex ratio in agriculture remains very high: 190 men for 100 women, with peaks as high as 1 150 in Kidira (Table 33). One may also wonder whether temporary migration of young single men might account for the households sizes remaining the same, sometimes including as many as 10 people, as in the case of the Kidira "Arrondissement". To answer this, we would like to stress that agriculture plays a preponderant role in the economy of the ORZ (in 1988, 92.9% of the active population is employed in agriculture compared with 81.2% in the zone outside the ORZ) and that women play a relatively important role in agriculture. In fact, the proportion of women actively employed in agriculture is higher in the ORZ (31.6%) than outside the ORZ (18.6%). On the other hand, the proportion of active men in this sector remains substantially the same: 61.3% for the ORZ and 62.5% elsewhere, Sometimes the proportion of active women employed in agriculture is higher than that of men, as in the case of the rural communities of Dakately (54.9% compared with 44.6%) and Slemata (53.8% compared with 45.1%).

Lastly, given the proportion of immigrants and the very high sex ratio in agriculture outside the ORZ (340), if these immigrants do not come from the ORZ it would be interesting to know their involvement in agriculture in their region of origin.

The proportion of the active population according to professional status indicates that almost all of the active agricultural population (99.1%) is composed of independent workers and family helpers (Table 34).

Table 34
Proportion (%) of Active Agricultural Population According to Professional Status and "Arrondissement" (ORZ in Senegal, 1988)

"Arrondissement"	Independent	Family helper	Other	Total
Bandafassi	39.9	59.2	0.9	100
Bonconto	50.7	49.2	0.1	100
Fongolimbi	48.5	51.0	0.5	100
Kedougou-commune	60.3	35.9	3.8	100
Kidira	42.0	55.7	2.3	100
Missirah	58.4	39.6	2.0	100
Salemata	21.3	78.2	0.5	100
Saraya	17.2	82.5	0.3	100
Whole ORZ	41.4	57.7	0.9	100
Zone outside the ORZ	49.1	48.8	2.1	100

Source: GPHC 1988.

As a consequence, the unit engaged in agricultural production and commercialization is the household. This would account for the lack of agricultural businesses able to transform the ORZ into a development centre.

The situation is the same in rural communities, where the active agricultural population is essentially made up of independent workers and family helpers.

The enclavement of these two regions and their out-migration contrast with the dense occupation of the valleys in Mali, Burkina Faso and Niger.

In these valleys, as in the Northern ORZ (Côte d'Ivoire, Benin, Togo), areas with communication routes have experienced a densification of the population. They have, on the other hand, enabled an extension of the population and an intensification of the exploitation of the land without necessarily occupying it. Whatever the case, different types of settlements are underway and everywhere there is competition for land. Moreover, external mobility which affects all forms of installation raises the issue of the settling and exploitation of lands.

Development and population are two elements which are often linked but which sometimes remain distinct. All depends on the farming methods used, either by the local village people or by the immigrants whose attitudes towards land occupation differ greatly from local customs. The installation mode, whether state organized or spontaneous, is also important. One may also witness the extension of the rural space without a correlative population of this space.

III. – DENSIFICATION OF DOMESTIC UNITS AND TRANSFORMATION OF ECONOMIC ACTIVITIES

In rural areas in general, and especially in the ORZ's which are essentially agricultural areas, the household size is an element that may positively or negatively affect agricultural development insofar as in most of the study countries agriculture is not mechanized. In such a context the importance of family labour is in close correlation with the land surfaces cultivated. That is why the household size and how this factor evolves may be considered as indicators of the transformation of the production system.

What implications does the growth of domestic units have on the transformation of economic activities, especially the agrarian system?

Population growth, when expressed in the growth of households, should, together with other factors, bring about a transformation in the activity cycle or even of the activities themselves. In certain areas the increase in household size may be accompanied by emigration which provokes a profound change in the age and sex structure of the household. Available census data are insufficient for a detailed analysis of this aspect. However, it is interesting to note that the countries differ from one another at this level.

Table 35
Average Household Size in the Administrative Subdivisions of Some of the ORZ's

Country and date	Administrative Unit	Size
Senegal 1988	"*Arrondissements*":	
	Bandafassi	7.9
	Bonconto	9.5
	Fongolimbi	8.1
	Kedougou	7.1
	Kidira	9.3
	Missirah	10.1
	Salemata	7.2
	Saraya	9.4
	Whole ORZ	8.6
Guinea 1983	*Prefectures*:	
	Dabola	5.5
	Dinguiraye	6.2
	Faranah	5.4
	Kankan	7.5
	Kerouane	6.4
	Kouroussa	8.8
	Mandiana	10.3
	Siguiri	10.5
	Whole ORZ	7.4
Benin 1992	*Departments*:	
	Atacora	7.3
	Borgou	8.2

Country and date	Administrative unit	Size
Côte d'Ivoire 1988 (Rural)	*Departments*:	
	Bondoukou	3.8
	Bouna	6.7
	Boundiali	6.0
	Dabakala	5.0
	Ferkessedougou	6.9
	Katiola	5.0
	Korhogo	4.7
	Mankono	5.7
	Odienne	8.4
	Tanda	4.7
	Tengrela	6.6
	Whole ORZ	5.3
Mali 1987	*Circles*:	
	Dioïla	5.8
	Kangaba	6.8
	Kati	6.5
	Sikasso	5.5
	Bougouni	6.2
	Katiola	6.5
	Kolondieba	6.2
	Koutiala	6.1
	Yanfolila	6.3
	Yorosso	6.5
	Segou	5.7
	Baraoueli	5.9
	Bla	5.8
	San	5.0
	Tominian	4.6
	Bandiagara	4.6
	Bankass	5.7
	Koro	5.4
	Whole ORZ	5.8

Sources: Censuses.

In Benin

In the ORZ in Benin the household size is increasing, both in the Province of Atacora as well as the Province of Borgou: from 1979 to 1992 it increased from 6.0 to 7.3 people and 6.8 to 8.2 respectively (Table 35). There has been an increase in the active population in the farming sector, the least developed in Atacora; this increase is essentially due to female activity. The sub-prefectures of Bourgou have proved to be areas of rural immigration and dispersed dwellings; households are large, the heads of households are relatively young, the activity is essentially agricultural but for the groups who are on the frontier with Nigeria it may also include trade.

In Ghana

In Ghana immigration of families and high population growth result in particularly large households in the Northern Region: 9.1 people, This situation contrasts with the two other regions where households are smaller by as many as two persons. In the Northern Region, high population growth does not prevent a slight imbalance in the sex ratio which seems to be a new phenomenon (for example in Gushiegu it dropped from 104 in 1970 to 96 in 1984). Could this be attributed to the crisis period between 1970 and 1980? At this level it would be interesting to know which populations emigrate. Are they only the native populations or certain young men from the immigrant families? Inversely, in the far eastern part of the Upper East Region, immigration compensates for emigrations and the balance in the sex ratio is restored as the population grows (for example in Chiana-Paga the ratio increased from 85 to 96 men for 100 women between 1970 and 1984).

In Guinea

On the whole, the ORZ in Guinea has experienced relatively little growth but households are large varying between 6 and 12 people engaged in agriculture. In this case it isn't population growth that has produced larger households but a structural situation linked to the social organization of local populations.

However, it has been noted that the household size is slightly larger in the areas where agriculture is more developed.

In Mali

The four regions that constitute the ORZ in Mali include more than two-thirds of the total population of the country on less than a third of the country's total area. This leads to population densities which are much higher than the national average (12.5, 18.7, 20.7 and 16.2 inhab./sq. km) (Table 12), for Koulikoro, Sikasso, Segou and Mopti respectively. Differences between regions only become apparent when the situation in each circle is examined. The Sikasso Region has the highest density

because it includes several circles with high population densities. This densification of Sikasso is accompanied by an increase in the household size and high population growth (2.8% average annual growth for the Koutiala Circle).

In the case of Mali, we believe that population densification has brought about renewed activity and occupation of the land.

In Côte d'Ivoire

The ORZ in Côte d'Ivoire has remained sparsely populated (8.2 to 11.0 inhab./sq. km between 1975 and 1988). The unequal distribution of the population opposes densely populated departments (from 20 to 30 inhab./sq. km) to departments which are "empty" (less than 10 inhab./sq. km) (Table 4). In the case of Côte d'Ivoire the denser areas are not the ones that have registered the highest growth rates during the period or the largest households, but those with an extremely active agricultural sector already prior to the OCP. On the other hand, the data seem to indicate that the departments that have experienced high growth rates also have large households. Could the increase in the household size be due to immigration? In which case this would concern isolated migrants entering existing households.

IV. – NEW MOBILITIES AND CHANGES IN AGRARIAN SYSTEMS: THE EXAMPLE OF BURKINA FASO

We have seen that the highest population growth rate in rural areas occurs around agro-industrial developments in the cotton producing areas and in the river valleys but that it does not mean that there is no immigration towards coastal regions. There is an intensification of mobility. In other terms, the peopling of rural areas is accompanied by new forms of mobility. These patterns need to be studied in order to understand the changes in the agrarian systems and how they are likely to change in the future. We will, once again, focus on this question by taking the example of the valleys in eastern and western Burkina Faso which were affected by onchocerciasis thirty years ago (Marchal and Quesnel, 1997).

1) Population and Agricultural Colonization of the Valleys in Burkina Faso

We are able to propose a general pattern of the peopling of the valleys which corresponds to chronological stages as well as to three different types:

- the first type corresponds to the occupation from former positions held by the interfluvial population until the hollows of the valleys were gradually filled up;
- the second type corresponds to a sometimes exceptional occupation of a more or less supervised agricultural colonization; in every case this type of peopling is accompanied by the use of new techniques and methods in producing new commercialized products (rice growing, horticulture and fishing);
- lastly, occupation after immigration over medium or long distances by crop farmers as well as herdsmen or fishermen, all of whom have settled spontaneously in areas new to them.

These three types of centripetal settlement, from the centre out towards peripheral areas, can be found everywhere. The most recent settlements are the ones located furthest from the old population centres.

This form of settlement is characterized by a north-south orientation which is favourable to the circulation of goods and people between the old population centres in the north and the coastal regions of the Gulfs of Guinea and Benin.

2) Inversion of Migration

Since 1973, irrespective of the migration rates observed, the population dynamics at national levels have brought about population growth in the "valleys" strengthened by the inversion of population movements between coastal countries and the countries in the Sudano-Sahelian region.

In Burkina Faso, between 1960 and 1973, the average population growth rate was less than 1% in the regions of Koupela and Bissa country, which correspond today to the Boulgou Province and the southern parts of Kouritenga and Ganzourgou Provinces (Quesnel and Vaugelade, 1975). However, compared with the 1985 census, the 1991 national survey reported for these provinces a growth rate of over 3% per year, with peaks as high as 4% in Boulgou Province. This corresponds to an immigration stream which can be very concretely observed in the field. In Natiabouani, in 1985, two hamlets were counted; today there are 17.

The low growth rate between 1960 and 1973 was mainly due to relatively old population structures and labour migrations towards Ghana, which turned out to be irreversible, as well as to more recent departures towards Côte d'Ivoire, a high proportion of which (76%) were still occurring at the time of the survey in 1973. In fact, in the region concerned, as well as in the whole of Moaga country, seasonal migrations at the time of forced recruitment and then after the independence of Upper Volta were replaced by either pluri-annual temporary migrations or definitive migrations. It is also true that an increasing proportion of young people were able to settle as sharecroppers and later as land owners in the pioneer settlements in the

central western and south-western parts of Côte d'Ivoire (Boutillier *et al.*, 1977).

The provinces in Burkina Faso which experienced large emigration streams towards Ghana in the 1960's and towards Côte d'Ivoire in the 1970's received people who settled inside and around the perimeters created by the AVV. These immigrants, which were still few in numbers in the 1970's compared with the number of departures from the Moaga "plateau" towards Côte d'Ivoire spontaneously started to come in greater numbers in the mid 1980's. From this period onwards, in addition to the farmers from the northern parts of Burkina Faso and Mali (former members of the Office du Niger), migrants started to return from Côte d'Ivoire: Mossi migrants who joined their families settled in the blocs developed by the AVV, and migrants from the Bissa country.

From the 1980's, and especially the 1990's, with the crisis of the plantation economy in "Basse Côte" (coffee, cocoa) and the political instability in Côte d'Ivoire return migrations to Burkina Faso increased. These return migrations were mainly directed towards economic development centres such as the capital, Ouagadougou, where return migrants were able to invest their savings, if they had any, and where they were able to use their skills or abilities to survive, or to the perimeters of agricultural developments where they were able to benefit from State help to settle and had access especially to existing social and production infrastructures. In the order of things, it is trade (even informal) that attracts return migrants from coastal countries. On the contrary and at the same time it has been noted that the people who stay in the coastal countries have either "succeeded" as planters or salaried employees, or have failed, or do not have (momentarily) the means to return to Burkina Faso to settle.

A consequence of return migrations is that the departures which are currently taking place are being redirected and redefined. More generally, young men continue to go to Ouagadougou, Abidjan and Lome, but these migrations are over short periods of time or seasonal as in the old days (before the 1950's). People migrate to earn the capital needed for their household production units, to set up their own farms or to engage in cash-crops, which are costly in fertiliser and water inputs.

The desire to settle as farmers needs to be given special consideration since the land is not in the place of origin. This is a new element compared to the situation of other rural areas in West Africa where the young people who stay or return to their places of origin engage less and less frequently in agricultural production. Instead, they seek opportunities to settle in urban areas and less on their parents' farms and commute between the town and the countryside (Lebris and Quesnel, 1991).

In fact, as already mentioned, the development of the valleys as well as other rural areas is structured by an increasingly complex mobility of different categories of the population. It is therefore important to gain a better

understanding of the involvement of the younger generations in each of the rural areas in order to be able to forecast future developments.

3) Mobility and Participation of Young People in the Development of Rural Areas

Mobility to and from the valleys involves four major elements: the seasonal installation of fishermen from Mali and herdsmen from Niger; the return from Côte d'Ivoire of people who settle as farmers; the resumption of seasonal migrations; and ties with relatives settled in several areas.

The fishermen of Mali and north-western Burkina Faso are attracted by the resources provided by the large dams and the possibilities for the immediate commercialization of the fish. For the time being the young men commute between the valleys and their places of origin. However, some young couples settle with their families and try to do some market gardening between fishing seasons. Herdsmen from Niger pass through the valleys on their way to Togo and Benin but increasing numbers are settling between the valleys and Northern Togo/Northern Benin where they carry out their transhumance. When this is the case they start to cultivate plots of land belonging to the native populations.

Migrations between Burkina Faso and coastal states need to be studied in a new light. The annual commuting currently observed should not be looked at in the same way as the seasonal migrations of the past. They are in relation with the carrying capacity of the "valleys" which should be considered as "medium term" settlement areas between the areas of departure (the poor areas of Moaga country) and the areas in the Gulf of Guinea.

Increasing complexity in the mobility of people is developing between several centres of activity. Migration networks are becoming denser depending on the political and economic situations in neighbouring countries. To be settled in a "valley" does not mean breaking with the type of mobility involving commuting. The multiple effects of this form of seasonal or short-term mobility must be reconsidered. This seasonal absence appears to be less negative in terms of organization and production insofar as, in the same way as in the past, it interferes very little with the agricultural year which remains determined by the rainy season (winter season) although it can be prolonged into the out-of-season period (vegetable gardening). In fact, it would be interesting to know who are the people mobilized in each period of the agricultural year and to study in detail production organization, particularly the seasonal mobilization of labour required by stable production systems. In any case, even if the men are absent over a short period, this distribution of the active population should be taken into account in planning agricultural development activities. Another factor that needs to be taken into account is the installation of the younger "migrants", whether they be fishermen, crop or livestock farmers, which should be organized either

partially or totally around vegetable gardening. Land around dams, more than any other land, is the most sought after and deserves the attention of public authorities in terms of accessibility and land tenure.

Globally, the diversity of populations, and above all the diversity of their activities, raise many institutional questions. The State, considered as a major organizer of the population and development, should, in the medium term, identify the most efficient land management method to ensure sustainable agricultural development.

CONCLUSION

GLOBAL OBSERVATION

With its variety of natural resources the AREA presents striking characteristics in terms of its population. Rapid demographic growth and intense mobility seem to indicate that it is currently undergoing structuring of its population. Although the configuration of this population varies between the "Northern" ORZ's and the "Southern" ORZ's or the ORZ's that are economically enclaved, in all cases this structuring results from the same factors which are the following:

- rapid population growth (at an average rate of more than 2% per year) except for the ORZ in Guinea;
- a redistribution of this population growth towards coastal regions (the special case of the Northern ORZ's) or towards the fertile lands of the ORZ's themselves (especially the Southern ORZ's).

Insofar as these patterns are likely to persist their impact on the social and economic development of the ORZ's deserves further study.

The Special Case of the Northern ORZ's

The trend towards an expansion of population settlements and the transfer of the population (especially young men) from the ORZ's to coastal regions will probably result, at least in terms of agricultural development, in a reduction of human production capacities with a consequent increase in the proportion of women and children in the active agricultural population.

Specific Cases of the Southern ORZ's

In contrast with the Northern ORZ's the trend towards a densification of the population of the Southern ORZ's should, at least in theory, be favourable to an intensification of agriculture insofar as it creates a strain on the land. In fact, the low level of urban demand in these countries combined with the instability of farm prices does not favour intensification. Moreover, given the spontaneous settlement of the populations along the roads people tend to exploit agricultural, pastoral and fishing resources in an unsustainable manner. Therefore, the land rush and problems of access to

land drive young migrants to exploit available resources to their limits rather than seeking to develop occupied land in a sustainable fashion.

Specific Cases of the ORZ's in Senegal and Guinea

In these two ORZ's the low population growth contributes to high population dispersion, a major obstacle to the creation of development centres.

In short, in spite of the huge natural and agricultural resources available in the AREA the conditions for the development of agriculture and increased productivity are unfavourable. This means that in most ORZ's the phase of extensive agriculture has not yet been reached. Their rapid development would therefore require the formulation of a regional development plan focused on food as well as cash crops. Moreover, given the natural potential for livestock breeding in the AREA special attention should be given to this sector. Lastly, the emergence of mining and industrial activities in certain parts of the AREA may contribute to bringing about an indispensable synergy between agriculture and industry and thus favour the development of a true regional economy and the stabilization of the population.

However, the repopulation of the ORZ's after the eradication of onchocerciasis has already raised major health and environmental problems. A multidisciplinary study to assess the amplitude, characteristics, and current and future consequences of such a repopulation is needed, especially since the data used here do not provide any information on the origin and the characteristics of the new arrivals. What do they expect? What are their problems? What are their activities?

PROJECTIONS FOR THE DEVELOPMENT OF THE ORZ'S

After this description of the geophysical context, the human resources and the economic potential of the ORZ's, the question of which types of development could be proposed for these zones springs to mind. From our point of view, such a development model should be based on the population of the ORZ's and should propose development programmes for the ORZ's to promote the long-term settlement of people on their lands. The long-term settlement of people in the oncho-freed zones in West Africa is dependent on the formulation of economic and social development strategies around agriculture. In fact, although cultivating the land is a means of production it is also an excellent activity for the long-term settlement of the population. However, for these strategies to be successful, the need to integrate the

ORZ's within an economically feasible regional entity[25] must be taken into account as well as the differences between the ORZ's and the risks that such differences will increase in the wake of the success of the proposed strategies. From this point of view the elaboration of these strategies implies taking several elements into account:

Paying Special Attention to Land Tenure Regimes to Preserve Production Potential

Guaranteeing security of the right to use land and water seems to be a precondition for the successful development of agriculture in the ORZ's. What must be defined, at the level of each ORZ, are clear rules regulating access to land in conformity with customary land rights that allow the native populations, migrants and livestock farmers to invest in the sustainable development of the land in order to ensure their subsistence without fear of losing this right one day. This type of management is all the more essential since in many cases within the AREA as immigrants improve their standard of living serious ethnic conflicts have emerged presenting a threat to the future of agricultural programmes.

The Household as a Cornerstone for the Development of the ORZ's

In West Africa the family has a very strong position in the social structure. Moreover, as we have pointed out before, many households in the ORZ's can be considered as production and consumer units even if these two aspects may not always combine[26]. However, the organization of production within the households depends on cultural models, and many of these households have at their disposal different sources of income, some derived directly from farming, others from livestock, trade, craft activities, paid labour, etc. Diversifying economic activities to reduce risks due to the climate or the political or economic situation seems to be the approach adopted by most agricultural households both among the native and migrant population. As the women and children will increasingly be called upon to contribute to diversifying the household's sources of income it is important when formulating rural development strategies to facilitate their access to land and credit, especially as they are becoming increasingly more involved in agricultural production. The diversification of household income sources will ensure sustainable agricultural production in the ORZ's. In fact, by ensuring economic opportunities and social welfare for all the members of the household, the ORZ's will become more attractive, the social and economic costs of departures will increase, and a contribution will be made to promoting the long-term settlement of people on their lands. Moreover,

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[25] In the absence of strong domestic markets, development prospects for the ORZ's will be greatly limited.

[26] Although all the members of a household consume, how many actually participate in production?

when women are given the opportunity to gain monetary income their status improves and they are encouraged to develop viable domestic economies. In this respect it is important to take into consideration certain domestic chores[27] which take up a lot of their time and which often divert them from innovations to improve agricultural productivity. This could be achieved by supplying villages of a certain size with fresh water, small mills, primary health care, basic education, etc.

Intensifying Agricultural Production

Apart from the few cases of intensive agricultural production that can be found in the AREA, the prevailing production system is based on the principle of the extensive land occupation. This system is, of course, highly dependent on labour and incorporates few commercial inputs. Moreover, it presents the disadvantage of low yields per unit of cultivated area since an increase in production depends more on extending the cultivated areas than on any real transition towards intensive production. This is especially the case in food producing areas. The objective should therefore be to promote appropriate intensive production systems which increase yields per unit of labour rather than per unit of cultivated area whilst paying special attention to the different categories of people employed in agriculture and the tasks they are employed in. Efforts should therefore be focused on the most dynamic cotton producing areas which are the only areas not prone to drought, and on areas where irrigated agriculture is being developed.

Developing Roads

The economic and social development of the ORZ's depends on the construction of roads, bridges and dams, which will open up certain areas, on encouraging the spontaneous settlement of immigrants in other areas and, in every case, on changing the long-term economic prospects of the ORZ's. In order to ensure real economic development of the AREA inter-regional exchanges must be developed. The construction and maintenance of roads and bridges will greatly influence the development of such exchanges.

Promoting Regional Development Centres

Regional development centres are intended to play a role as commercial crossroads. As such, in the majority of cases, they provide market places which are periodically active and intensify commercial transactions. An important function of the regional markets is to provide outlets for the agricultural production of the region. It is through such transactions that farmers obtain the greatest part of their income. Regional

[27] For example, fetching water in the river backwater, grinding flour for meals, collecting firewood, etc.

markets are the driving force behind, and the product of, local production and consumption as well as the focal point for the development of relations between the region and the rest of the world. They therefore contribute to opening up the ORZ's to the rest of the country and to the world.

* * *

This report on the population dynamics of the AREA should be considered as a first phase of research. Since its scope is limited because of the lack of data it requires complementary in-depth analysis if it is to help ensure the proper management of the thousands of hectares of arable land freed from onchocerciasis and to give thousands of men and women a chance of improving their standard of living.

Lastly, in addition to issues which are important for decision-makers there are issues concerning research which are also crucial. In fact, among other things, this research has highlighted a number of problems concerning the conservation of census data, the need to further exploit such data and to match population census data with agricultural census data for a more realistic analysis of the population dynamics of the AREA. Such an approach would integrate socio-demographic, agro-economic, ecological and institutional aspects, to mention but a few, with the aim of preserving this intellectual capital which has been gathered thanks to the network developed by CICRED.

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ANNEX

A BRIEF HISTORY OF THE OCP

The Onchocerciasis Control Programme (OCP) in West Africa resulted from a technical meeting held in July 1968 in Tunis, at which the United States Agency for International Development (USAID), the Organization for Cooperation in the Control of Great Endemics (OCCGE) and the World Health Organization (WHO) discussed possibilities for controlling onchocerciasis and recommended that a vast inter-state programme be implemented to fight river blindness. The experts who gathered in Tunis based their belief for the possible success of such a programme on research carried out by entomologists from ORSTOM (ORSTOM: in French, "Institut Français de Recherche Scientifique pour le Développement en Coopération", formerly "Office de la Recherche Scientifique et Technique Outre-mer"[28]), who had been working in Côte d'Ivoire, Burkina Faso and Mali since 1962.

Following this recommendation, the governments of the countries interested in taking concerted action to fight this disease asked bilateral and international aid organizations to provide them with the necessary support.

UNDP, the World Bank, WHO and FAO sponsored a preparatory operation to assist the governments of the seven countries concerned (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Niger and Togo) which was financed by UNDP and implemented by WHO.

The report of this preparatory operation, presented in 1973, defined the strategy for the eradication of the disease[29] to be adopted and implemented over a period of 20 years, as estimated at the time.

After obtaining the funding from the first donors and the support of the participating countries, the programme was launched in 1974. The headquarters of the programme was established in Ouagadougou, in the centre of the sub-region affected by the disease.

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[28] "Institut de Recherche sur le Développement (IRD)" since November 1998.

[29] "Contrôle de l'onchocercose dans la région du bassin de la Volta". A preparatory report presented to the governments of: Côte-d'Ivoire, Dahomey, Ghana, Haute-Volta, Mali, Niger, Togo, under the auspices of UNDP, FAO, BIRD and WHO, 90 p., WHO, Geneva, 1973 (Doc. OCP/73.1).

The meeting organized in Paris on 26 and 27 June 1974 on the initiative of the World Bank with the support of WHO may be considered as the official launching of the Onchocerciasis Control Programme in West Africa.

In addition to the four sponsoring organizations, this meeting was attended by the donors at the time[30] and representatives from participating countries. The operations proposed for the programme were examined and proposals were made for the management structure to be adopted. In Paris it was also decided to set up a joint committee for the coordination of the programme, constituted by the participating countries, donors and four United Nations organizations that had sponsored the preparatory committee. The role of the joint committee was to define the programme's global policy, determine its subsequent phases and establish corresponding yearly budgets.

As for the specific tasks assigned to the sponsoring agencies: WHO was entrusted with implementing the control programme, the World Bank with collecting the funds from the donor agencies and managing financial contributions, and FAO was placed in charge of monitoring the impact on the environment of the larvicides and of the socio-economic development of the areas after they were made inhabitable once again, the declared objective of the Programme from the outset being the eradication, within the OCP area, of onchocerciasis defined as a public health problem and as an obstacle to socio-economic development.

The area where the operations were launched covered approximately 764 000 square km and concerned ten million inhabitants. At the time, more than a million people were suffering from the disease and one-tenth were suffering from serious ocular lesions. Among these 35 000 were completely blind.

Onchocerciasis is a parasitic illness caused by a filaria, *Onchocerca volvulus* (from the Greek. *ogkos*: curve and *kerkos*: tail; *volvulus*: bulbous, in Latin) the female adults of which (macrofilaria) grow to 40 to 45 cm in length and bury themselves in nodules under the skin of the infected person. When they are fertilized, the females can, during an average life span of 12 to 14 years, produce millions of embryos (microfilaria) of approximately 0.3 mm in length which live for about two years and provoke the clinical symptoms of the disease. The microfilaria move under the skin, causing acute itching and degeneration of the skin. If they reach the intracellular fluid of the eye their death and ensuing disintegration bring about an inflammation which can lead

[30] The African Development Bank, the European Commission, the United States (USAID), France, Norway, the Netherlands and the United Kingdom signed an agreement for the funding of the onchocerciasis programme at the beginning of 1974. Belgium, Iraq and Japan signed this agreement several months later.

to serious eyesight problems and even blindness if the number of microfilaria is high, as a result of prolonged exposure and massive infection[31].

Onchocerca volvulus is transmitted when a female of the *simulium damnosum* complex - a small dark fly - after having absorbed microfilaria by stinging an infected person stings a person to feed on his or her blood which it needs for her eggs to mature. By doing so, she introduces microfilaria into the human body.

The black fly lays its eggs in batches of 200 to 300 on the surface of fast flowing rivers. The larval stage lasts between 7-10 days, the larvae feed off organic particles they filter out of the water. When fully grown, the larvae build a cocoon and transform into nymphs from which they emerge as grown adults. The females can live for several weeks and carry out several cycles of meals and egg laying.

Thanks to scientific research carried out by ORSTOM researchers, we knew at the beginning of the project that if we wanted to put a definitive stop to the cycle of disease transmission the black fly larvae had to be destroyed in all the reproductive sites.

As it was impossible to carry out the programme only at a national level - the black fly crosses political frontiers - the governments agreed to implement the programme over the whole sub-region of West Africa affected by the disease.

The studies undertaken revealed that the most infested region was the basin of the Voltas. The strategy adopted consisted of dispersing biodegradable insecticides by helicopter and plane on the breeding grounds every week to destroy the black fly in its embryonic form, i.e. before the adult females feed for the first time on blood to reproduce and therefore risk absorbing the blood of an infected human being thus becoming the vector of *onchocerca volvulus (O.V.)*.

The committee of 4 United Nations agencies sponsoring the OCP was given the task of monitoring the different aspects of the programme and was entrusted with its day-to-day management.

An independent ecological committee was rapidly set up to select the pesticides to be used, to monitor the way they were dispersed over the reproduction areas and to guarantee the innocuousness of the products used for the aquatic fauna, the plants on the riverbanks and the water of the reaches and rivers destined for human or animal consumption.

At the beginning of the 80s, however, it became obvious that the areas located around the OCP area were infested by black flies which had

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[31] E.M. Samba, "Le programme de lutte contre l'onchocercose en Afrique de l'Ouest. Un exemple de bonne gestion de la santé publique", WHO, Geneva, 1995, p. 5. Dr Ebrahim Samba was director of the OCP from 1980 to 1995, when he was appointed as WHO regional representative for Africa.

invaded the original target area. In 1986, the Programme was widened to cover regions further south of Benin, Côte d'Ivoire, Ghana, Togo (southern extension of the programme) as well as Guinea, Guinea Bissau, Senegal and Southern Mali (western extension)[32]. The area covered by the OCP increased from 764 000 square km to 1 250 000 square km and the rivers treated covered a distance of 55 000 km. With the extension of OCP activities to the south and west, the population concerned by the programme grew to approximately 30 million people, more than two million of whom were infected with onchocerciasis. Among the people infected 100 000 were blind[33].

In 1987 a new medicine called Ivermectine, a microfilaria product capable of killing the black fly embryos inside the body, was identified and incorporated in the programme. This medicine, taken orally once a year over a period of several years, is suitable for large scale treatment campaigns: Ivermectine has long-term effects on microfilaria, acts quickly, does not provoke any serious side effects and only needs to be administered once or twice a year.

Although it is an excellent remedy for preventing blindness the administering of Ivermectine is not enough to prevent the disease from spreading and insecticides have to be sprayed on the sites where the larvae are to be found. Since the *O.V.* reservoir is inside the body of an infected human being – i.e. in the subcutaneous nodules or in the lymphatic tissues in the form of macrofilaria - as long as macrofilaria treatment has not effectively cured all *O.V.* infected people living in OCP areas it is impossible to consider the disease as eradicated. Realistically, it can be considered that the infection is largely under control and that total success has indeed been achieved in the fight against river blindness thanks to the distribution of Ivermectine tablets to infected populations or at risk of being infected since this medicine destroys the microfilarias responsible for the ocular lesions causing blindness.

In fact, the aim of the use of the various insecticides in rotation to avoid that the black fly becomes resistant to chemical treatment, consists in reducing as much as possible the number of larvae and, as a consequence, the number of adult females infected, so that ideally there are no more adult females to transmit microfilaria from one human being to another: the objective of the use of insecticides is to guarantee a transmission rate below

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[32] There is some concern about reinfestations in Benin coming from Nigeria for which continued vigilance is needed. At the time when the first countries met to discuss possibilities of taking concerted action in the form of what later became the onchocerciasis control programme, Nigeria, who was invited to join the programme, declined and declared that the country would deal with the problem of the disease on its own. As it is known today, nothing of what Nigeria declared it would do has been accomplished in this area.

[33] For the historical background on this first period of activity in the field of public health and for complementary information on the fight against the disease see: *Dix années de lutte contre l'onchocercose en Afrique de l'Ouest* (de 1974 à 1984), WHO, Geneva, 1985, 137 p. (OCP/GVA/85).

100 larvae per individual per year in all OCP areas. In fact, below this level the population of adult worms declines and is virtually eradicated after 14 years of uninterrupted control.

In 1991, the programme had reached its objective of controlling onchocerciasis and was about to embark on phase IV (1992-1997). Phase V involving the consolidation of results, will be in force from 1998 to 2002. At the end of this period, it is expected that the valleys which were formerly infested in the 11 countries of the programme will be declared safe and perfectly inhabitable.

Although the means used to control river blindness have not changed (larvicides and later the systematic distribution of Ivermectine) over the years, more and more Africans have contributed to the implementation of the programme and have been trained in the very demanding and rigorous scientific and technical work required of OCP agents. This accumulated body of knowledge and expertise is readily available to be used for public health and development work.

From a medical point of view the OCP can already be considered a success: more than 30 million people are now safe from the disease, approximately 1.5 million patients have been cured and the ten million children born since the beginning of the programme no longer risk contracting the disease. According to WHO estimates, at least 500 000 cases of blindness have been prevented and it can reasonably be hoped that at the beginning of the third millennium onchocerciasis will be under control in the areas concerned by the study.

Controlling the vector of infection has in recent years made it possible to envisage the re-settlement of the valleys freed from the disease by smallholders and livestock farmers on generally well irrigated fertile lands covering a global area of more than 80 000 square km.

It should be noted, however, that the disorganized occupation of these valleys in the absence of policies guaranteeing continuity of land tenure for the smallholders settling on land not belonging to them may lead to an over-exploitation of the natural resources of these areas and to their gradual sterilization (unsustainable exploitation of natural resources).

To prevent this risk France and the World Bank organized a ministerial conference in April 1994 in Paris on the general theme of population and sustainable development of the OCP area in West Africa[34].

This meeting led to the elaboration and adoption of a series of basic principles for the formulation of policies regulating access to natural resources in the OCP valleys and their sustainable exploitation.

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[34] *Peuplement et développement durables dans la zone du programme de lutte contre l'onchocercose. Actes de la Réunion ministérielle tenue à Paris du 12 au 14 avril 1994*, World Bank Technical Report n°310F, 173 p., Washington, D.C., 1995.

The organization of the ministerial conference in Paris was timely: after 20 years of efforts to control the river blindness vector it was high time to define guidelines for the socio-economic development of land freed from the disease and to plan actions which, in addition to ensuring improved public health with the control of the disease, would lead to economic benefits resulting from the re-settling of smallholders in these fertile valleys and the resumption of the use of the pastoral lands by herders.

Even before the programme was launched in 1974 it was clear that the OCP was justified on two counts: benefits in terms of public health and subsequently benefits resulting from the development of areas declared safe and ready for crop and livestock production: in the preparatory report presented in mid-1973 in Geneva the most detailed section concerning the socio-economic advantages expected and the proposals regarding the economic development of the areas freed from onchocerciasis can be found in Chapter VI.

This section gives a general outline of development policies but also lists projects in each country. It also indicates which areas are to be colonized and where to practise an organized and systematic re-settlement policy.

The report went into great detail, including the costs and benefits, although the project had not yet been implemented in the field. However, in 1973, the World Bank and the OCP donor agencies had to be convinced of the need for the public health project as a profitable agro-economic project in the long term. Apparently the arguments and figures presented in the preparatory report were convincing because the World Bank agreed for the first time to embark upon a large public health project at the same time as the donor agencies and for a period of no less than 20 years[35].

At the time of the Paris Conference, the general trend among OCP governments was to try to transfer the responsibility of development to local populations with the intention of reducing State intervention and increasing decentralization and liberalization of decisions concerning land tenure and the management of local natural resources.

Discussions concerning land tenure revolved around the role of the State in the re-settling of rural populations in areas freed from

[35] From June-July 1975, combined FAO/BIRD operations were conducted in Benin, Burkina Faso, Ghana, Mali and Togo. The objectives of these operations were to determine the basic research required for appropriate development plans for oncho-freed zones; to coordinate and consolidate the methods of the countries concerned "in order to prepare development plans for a period of ten years which would open the way to a whole stream of specific projects in which governments and multilateral or bilateral aid agencies could commit to planning for the training of local personnel for the gathering and analysis of data, for the preparation and the implementation of the programme". See: *Développement économique des zones libérées de l'onchocercose au Dahomey, au Ghana, en Haute-Volta, au Mali et au Togo*, FAO/BIRD, WS/H3291, p.i., Rome, October 1975

onchocerciasis and the degree of intervention on the part of each of them in the sustainable development of natural resources.

The heads of State and ministers present in Paris felt that the United Nations agency best placed to help them solve this type of problem was FAO. That is why they recommended that FAO be appointed as coordinator responsible for formulating a plan of action for the development of the areas freed from onchocerciasis. The OCP authorities and co-sponsoring agencies accepted this proposal.

Therefore, following the wishes expressed by the leaders of delegation, the OCP co-sponsoring agencies recognized FAO as the principal United Nations agency in charge of formulating the plan and monitoring its implementation.

Following this recommendation, FAO started working on the first part of the plan based on two types of evaluations: available natural resources in the sub-region comprising the 11 OCP member countries and the human resources in the same development area.

This double evaluation was intended to enable a consistent approach at sub-regional and national levels for the planning and execution of clearly defined projects for sustainable rural development based on the processing of gathered data.

The approach adopted by FAO after the Paris Conference was neither original nor particularly innovative: well before 1994, upon the request of the donor agencies concerned about the absence of socio-economic research and an overall view of crop and livestock farming prospects in valleys being freed from onchocerciasis, the joint programme committee - donor agencies, member countries and four sponsoring agencies - agreed (1986) to carry out a study to evaluate the natural resources of the valleys affected by onchocerciasis in the sub-region, country by country[36].

Although the resulting report did indicate where natural resources were located and where possible development projects were to be implemented, it also presented serious shortcomings with regard to the sub-regional conditions required for a balanced economic development of each of the 11 countries of the sub-region. From this report the countries obtained little and a limited number of feasible projects proposals were the result.

As for the evaluation of human resources, it was approached - again upon the request of the donor agencies concerned about realizing as quickly as possible the development of the valleys freed from the disease (the

[36] (In French) "Rapport Hunting - Organisation et environnement" (generally referred to as the "Hunting Report"). *Etudes de développement socio-écopnomique. Zone de programme de lutte contre l'onchocercose,* September 1988, 4 volumes. Vol 1: Rapport Général; vol. 2 and 3: "Etudes nationales de développement des zones oncho et propositions de développement"; vol. 4: Bibliographie).

objective of the programme) - from the angle of the modes of settlement in the areas freed from the disease.

Thus, in 1988 and 1989 the Institute for Development Anthropology (IDA) in Binghamton (N.Y.) undertook a series of studies, country by country, on strategies for the re-settlement of the valleys[37].

The principal merit of this study was that it focused on the absolute necessity to deal with the problem of land tenure and access to resources in the valleys before attempting to plan costly economic development projects.

IDA presented its proposals for re-settlement strategies in the valleys based on three models of smallholder settlements at a meeting of national experts held in Ouagadougou in September 1990[38].

These models concerned spontaneous settlement, assisted-spontaneous settlement and the settlement of smallholders organized by the State. This last model was well-known by the participants of the meeting: development perimeters of the valleys of the Voltas (AVV - *Aménagement des Vallées de la Volta*) in Burkina Faso.

Most of the participants rejected the option involving totally spontaneous settlement, objecting that migrants continue to use their own farming systems which have led to a degradation of their original farmlands and that traditional modes of access to resources, in the case of outsiders, does not give them sufficient land tenure security and does not encourage sustainable exploitation of lands. In spite of a few reservations both objections are not unfounded.

The third strategy, involving massive State intervention, with which the participants were well acquainted, was soon rejected because it was considered too rigid, too complex to manage and too costly to introduce in the countries less affected by onchocerciasis than Burkina Faso - the country most severely hit by river blindness at the time when the AVV development perimeters were established.

There remained the model of assisted-spontaneous settlement and its variations, recommended by IDA.

Without rejecting this strategy and acknowledging the fact that immigrants often benefited from existing infrastructures (roads, water, health centres, etc.), the participants recommended nonetheless that access to new lands through the building of local infrastructures be envisaged according to the quality of the lands, other available natural resources and the demographic pressure on the most densely populated lands.

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[37] *Etude sur l'installation de populations. Expériences de peuplement et stratégies de développement dans les zones d'intervention du programme de lutte contre l'onchocercose dans l'Afrique de l'Ouest,* July 1990.

[38] Seminar on the Settlement of Populations, Ouagadougou, 25-27 September 1990.

In addition to the items on the seminar agenda, participants also recommended the setting-up of sub-regional coordination mechanisms in order to ensure cooperation between the States in the planning of operations for the development of the OCP valleys. Such coordination would help ensure that development programmes were complementary and not in competition with each other and would also provide technical arbitration for problems at a sub-regional level[39].

From then on, outside the seminar itself, FAO, through its Regional Representative in Africa who was present at the meeting, was asked by the representatives of the other United Nations agencies to take charge of coordination and technical assistance in the elaboration and implementation of sustainable development activities in the OCP areas.

The meeting in Ouagadougou in September 1990 opened the way for the ministerial Conference which later took place in Paris.

At the end of the Paris Conference (April 1994) only limited information was available on the economic, agricultural, forestry, fishery and livestock carrying capacity of the valleys freed from river blindness. Reliable information was also missing on the influx of migrants who were supposed to have repopulated several valleys, its composition, the percentage of natives in relation to immigrants, the origin of the immigrants, the nature of the agreements to be established between migrants, traditional landowners in the valleys, transhumant livestock farmers and local authorities, and the sustainability of the different types of agreements regulating access to land, a sustainability essential for a balanced and renewable exploitation of natural resources.

In addition the occupation rates of the lands recently made available again, the pressure on the lands already settled and the different carrying capacities corresponding to the agricultural and livestock potential of the valleys for sustainable development were still unknown at the time.

Apart from this, already working on the resettling of people in some of the valleys were a number of organizations such as government agencies, bilateral organizations, international agencies and NGOs.

Where were these organizations active? Which areas and how many smallholders were involved? How did they manage operations and which

[39] Extract of the final communiqué presented at the end of the Seminar: "The seminar recommends that the governments of the participating countries and the sponsoring agencies of the Programme should take this unique opportunity offered by the development of the oncho-freed zones to provide a global, and in certain respects a regional answer to questions reaching beyond the scope of the oncho zones in each of the countries. The seminar also recommended the organizing of coordination, cooperation and monitoring of development in the oncho zones to enable the exchange of expertise in development planning in the oncho-freed zones and to help countries devise programmes together to address regional problems. Ouagadougou, 27th September 1990."

development strategies had they adopted? And what were their success rates?

Populations in search of irrigated and fertile lands had, several years earlier, re-occupied the farm and pasture lands declared under control: recurring droughts north of the river basins in the '70s and problems in finding outlets for cash crops in the '80s had increased migrations towards the valleys affected by onchocerciasis with relatively small populations. These population movements towards the OCP areas would probably continue either because of population growth in the sub-region, restrictive policies regulating the immigration of farm labour by several of the member countries, or because of the continuing economic crisis.

Such a context urgently called for an evaluation of the situation and as precise a picture as possible of the demographic situation prevailing in the OCP areas, the types of installations adopted by farmers, the farming techniques used in the valleys cleared of the disease, the commercial outlets which had already been developed, the revenues of the different groups of smallholders, the associative forms they had adopted, and their ties with their regions of origin and their families, if they were immigrants.

Once this type of assessment of the situation had been made an estimation had to be made of its impact and the degree of correspondence as to the needs, objectives and priorities as expressed by the people concerned by the exploitation of the lands in a context of sustainable economic and agricultural development.

The next step involved the types of changes required in terms of farming techniques and regulating access to land to avoid, as much as possible, the inappropriate use of available natural resources which might pose a threat in the short or medium term to the sustainable exploitation of these resources.

The strategies to be proposed for settlement on the lands that the different governments may still have available for colonization would have to specify the conditions for access, the type of exploitation, the planning of infrastructures and the social services to be set up or further developed, the managerial organization required and the appropriate information concerning farming techniques to be conveyed to the population.

In fact, local settlement projects for available lands had to be developed individually and their costs had to be evaluated to help governments present them to donors while carrying out general government policies for the sustainable use of resources in the OCP areas according to the guidelines adopted at the ministerial conference in Paris.

In order to meet the recommendations made at the Paris meeting the evaluation of human resources had to start with an evaluation of the carrying capacities of the OCP countries for optimum occupation of these territories. The first phase involved a description of the structure of the different

population groups in the valleys and the labour force these groups represented, in order to calculate what the surface of an average farm should be when the plots were redistributed or allotted to smallholders.

Information concerning the socio-economic status of households was also needed; about their sources of income whether from cultivating the resettled lands or from other sources.

The reasons for migration and the reasons why people moved from one area to another within the sub-region or even outside OCP countries could also provide valuable information on the different types of population movements, their size, duration and impact on the sustainable development of the valleys. This question also affected the types of management strategies and how long OCP countries would implement them. Given the current growth rates of the groups already settled, demographic projections should give a series of answers as to whether a more or less deregulated approach should be adopted to immigration in the valleys, the allocation of land to each production unit and the rate of redistribution of lands still available.

To be able to define and justify one policy or another for settling smallholders, as indicated by the participants of the Paris Conference, it was necessary to gather information about the population dynamics in the OCP valleys: to gather and evaluate available population data for the OCP areas of each country, to evaluate the population dynamics of these areas taking into account the data gathered, to make a profile of the immigrant populations and the original local populations involved in farming and to report on local situations in order to define specific factors influencing population dynamics. This sort of comparative study of the population dynamics of OCP areas would subsequently help formulate proposals in the field of agriculture, the economy and health services corresponding to the population dynamics as evaluated by field researchers in the different countries participating in the programme.

Along with the evaluation of human resources, the assessment of the natural resources of the sub-region provided an answer to the main concern expressed by participants at the ministerial conference which was: Where are the resources and how can they best be used for the rural development of the sub-region and of the populations of each of the OCP countries?

At this stage of the development of the plan of action defined by FAO it was possible to formulate a series of integrated projects in agriculture, forestry and livestock farming as well as an overall plan for the development of the valleys combining agricultural production, the transportation and commercialization of farm produce, the necessary infrastructures, the social services, especially basic health and education services, the development centres, the population dynamics, the processing industries and mining industries, etc.

Time was essential, and rapid and concerted action in the field was needed, notably because of the population pressure already affecting the lands in the valleys, the disorganized occupation of the areas and the subsequent threat of over-exploitation of available resources, and the use of farming methods unsuited to local conditions.

At the end of 1994, FAO entrusted the Committee for International Cooperation and Research in Demography (CICRED) with the first stage of evaluating the socio-economic resources of the OCP areas: the population dynamics of the rural areas freed from onchocerciasis in West Africa.

This research started in 1995 and continued for approximately one year. The conclusions of the research raised questions concerning a number of preconceived ideas in terms of the population policies to be promoted in the valleys as well as the population movements within the sub-region, completely revising the static image that the development experience of the Volta valleys in the '80s in Burkina Faso had left in the minds of the participants of the Paris Conference, in particular following the surveys commissioned at the end of the '80s by IDA, the conclusions of which had been discussed in Paris.

IDA had carried out its research into population modes in a very conventional manner, country by country and its analyses were based on data gathered without any specific concern for the group of 11 OCP countries of the sub-region. Such an approach did not provide the type of spatio-temporal explanation a detailed analysis of the large migration flows within each of the OCP countries would have supplied. Furthermore, by not studying the movements of certain population categories outside their countries of origin, it did not reveal the extent of the cyclical migrations of these categories and their economic motives, nor did it reveal the trend towards a feminization of farming units in many of the valleys.

That is why the political and economic interventions for the permanent settling of populations in the OCP valleys had to be based on an analysis of local demographic situations in the global sub-regional context to which they belonged.

Indeed, as revealed by the study coordinated by CICRED, the mobility of the youngest adult population raises two series of problems for national decision-makers in charge of the sustainable development of the OCP valleys: the degree of involvement of these young people in agriculture and the ways in which they use the sub-regional area within which they move, operate and live.

Following these national demographic studies the people in charge of formulating strategies for access to the lands and resources of the OCP valleys will no longer be able to base their conclusions solely on those of the Paris conference.

The study carried out under the aegis of CICRED invites these decision-makers to take into account the new aspects concerning the settling of the valleys which were revealed in the study.

Decision-makers will therefore have the opportunity to stabilize the active population categories, security of land tenure and farming techniques best suited to the production environment. To do so, the people in charge of formulating resettlement policies for the valleys will have to make and maintain a more concerted effort at the sub-regional level which is the real field of action for the development of the OCP areas.

Gérard Ciparisse

LIST OF MAPS

LIST OF TABLES