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Discussion

Land tenure

The discussions on land tenure centered on how to reconcile customary systems with national development objectives. Gender issues—such as women's uncertain rights to land—the question of access to land by youth, and the importance of credit were problems mentioned frequently in the discussion.

There was general agreement that customary tenure systems needed to be considered in any revision to national land tenure codes. However, it was also agreed that customary systems were not, by themselves, appropriate for rapidly changing situations

Comments

"Countries need a proper rural land tenure code to give a framework for cohabitation by farmers, pastoralists, and settlers. There should be a master plan for the onchocerciasis-free areas, some areas should be completely protected from cutting trees, and some should be identified as grazing land."

"Land tenure is a troublesome issue all over the world, not just in our countries. If you look at land tenure only from its internal dynamic or only from an income generation perspective, then you are missing the point. The dynamic nature of land tenure systems must be viewed from the perspective of the overall economy. In Africa, the formal urban economy is not well integrated with the rural economy. We must see how rural markets fit into the national economy before discussing tenure systems. We need to look at several issues at once. Social conflicts around land tenure are inevitable. Tradition constantly evolves. Look at the traditional chiefdom systems in Africa; nothing is jelled. This means that a generalized guiding principle for all situations could completely warp the issue."

"Since independence, we have focused on supporting small farmers. With the introduction of structural adjustment we have had to think more about commercial agriculture, thereby putting more pressure on the land. Large land grants have been made from the center. The people given the grants have cleared the land with bulldozers and started growing crops, pushing the local people back into the forest. These people have retaliated by burning the crops. The customary land tenure system works well and people consult each other on land use. However, if decisions are made from the cities, then there is trouble. Any change in land distribution must take into consideration the reasoning systems of the farmers."

"Land tenure needs to be tackled in the context of overall development. There needs to be the political will to solve

the problems. This is not only a state issue. Local populations must participate. Even with democracy there will be conflicts, but these are to be expected. Changing land tenure is a dynamic process, with trial and error. We need to have roots in a set of legal texts to give a frame of reference to the process. In our country, the farmers know the rural code and it has been accepted by everyone concerned."

"Land tenure is behind many of the problems being discussed here, including the environment and natural resource management. Natural resources belong to the national heritage, and all people should have equal rights to them. We still have some problems regarding women and rights to natural resources. In our country, land tenure is either through traditional rights or written law. The rural code says that land tenure commissions should be established. The government will be in charge to ensure that implementation is correct, and the commissions will have representatives from the traditional authorities, farmers, women, and young farmers. The commissions will be in charge of follow-up and ensuring that rights are complied with. Political will is the driving force behind the commissions."

"We are not sure that traditional tenure systems should be taken as the base for establishing a national tenure system because they may be too restrictive, but traditional systems must be taken into account somehow."

"We should be careful how we make changes in the tenure systems. We do not want to kill one monster only to create a worse one. People in the cities respond quickly to changes and rural people respond more slowly, placing them at a disadvantage. People in the onchocerciasis areas must be involved in changes to the tenure system."

"We must make customary tenure the starting point for changes in tenure, but there must be provision for situations where the specific location may not respond to traditional rights. Our government controls land near large dams to prevent damage to them. It cannot give back customary rights in this situation. The government should play a facilitating rather than a coercive role. It must highlight the need for old and new settlers to cooperate. There must be a process of public education to explain the potential benefits and problems. Without this, the old settlers may be unwilling to cooperate. In the end, the terms of acquisition of the land must be such as to provide incentives for developing the land over the long-term rather than mining it. The social patterns of the new and old settlers must be considered because these affect land tenure arrangements. Even so, there will always be some conflict, so locally based conflict resolution systems must be in place. We have established a system of local courts without lawyers where the choice of who sits on the courts is up to the local people. The rigidities of the traditional legal system work against conflict resolution, and while

decisions may be made, the people are not reconciled."

"Do these models apply in areas that were once settled, then abandoned, and then resettled? Should we impose our own ideas or put our heads together with those who left on how to manage these areas? We do not want to repeat experiments that have failed elsewhere or those that have succeeded elsewhere but do not apply to these areas."

"We need a national legal framework that bears in mind customary law. We cannot organize the local populations without such a framework. We have been working on land tenure for ten years and there are many complex problems regarding the access of women and youth."

Gender

As in session 2, gender issues surfaced repeatedly in the discussions on land tenure, particularly the need to change customary tenure rules to provide women with more secure access to land and other resources.

Comments

"Can women gain access to land solely through legislation? If you let a market economy run unchecked, then women will not gain access to land. Current markets, if operated freely and unfettered, will exclude women."

"Women work the land, but do not have rights to the land. They are the pillars of the society nevertheless.

Granting women access to land is not enough. They must have the wherewithal to work the land. Credit is critical."

"Women are a vulnerable group. New relationships are developing between women and the economy. We have lost too much time on utopian projects. The status of women must be handled on an ad hoc basis due to the vast differences between ethnic groups. Solidarity within a household is essential because men and women work together. One cannot clamor for land for women without including other resources. Women need literacy and access to substantial credit. Small amounts of credit are used for survival and not investment."

"Conditions for women are very diverse even within one country. In my society women inherit everything, which is very different from the practice of other groups

in my country. We must keep in mind the positive values in our society. Claiming rights for women does not mean we want to become Western. We do not want alien values. Rural women are exhausted from work and ask their husbands to take another wife because they want a coworker."

Credit

Participants pointed out that legal access to land was irrelevant if people did not have the means to acquire the land, making access to credit an important issue.

Comments

"Access to credit in rural areas is a tricky issue. Inflation is high, and realistic interest rates are too steep."

"Land reform has failed in some countries because those able to purchase the land were not necessarily those best able to farm it. Credit allocation is crucial, but traditional agricultural credit funds have not worked."

"We used to have centralized credit systems, but now we have a vacuum. There is a need for credit that can be delivered where it is needed. We need different funding mechanisms for different types of activities."

Youth

In several countries, customary tenure systems do not provide significant access to land by the younger generation, creating tensions between age groups. This issue was considered important enough by the participants to merit being added to the guiding principles.

Comments

"Half the population in our country is under twenty. Older farmers are blocking the way for younger farmers, who cannot get access to land. Schools are built, and older farmers prohibit young people from attending."

"Access to land by youth is an important problem, and many young people are against customary law. Many young people do not have access to land because the elders enjoy their customary rights and do not pass them to the youth."



Policy on Administrative Structures and the Provision of Services

The guiding principles strongly recommend adopting a policy of assisted spontaneous settlement to minimize government costs and to take advantage of the initiative of spontaneous settlers while maintaining input into the settlement process (recommendation 3). Certain migratory flows occur naturally, but state intervention can contribute to the pace of socioeconomic development and to environmental protection. It is important, therefore, to understand how state assistance can enhance and improve the impact of spontaneous migratory flow.

In addition to experiencing a wide variety of settlement types, the OCP countries have used many different institutional structures to deal with settlement areas. An important question, to which the answer may be different in each country, becomes, "Who is to be entrusted with the task of planning and development in the resettlement areas?" (recommendation 5). This session examines the different types of settlement and different administrative structures, as well as the types of services that need to be made available (recommendations 7 and 8).

Both the Senegalese and the Ghanaian contributions to this session begin by examining the country's past experience with settlement—in Senegal, the *Terres neuves*

project, and in Ghana, three spontaneous and three government-sponsored settlements. The Senegalese paper, "The Rehabilitation of Onchocerciasis-Controlled Areas," goes on to describe a planned development project in the onchocerciasis-free area surrounding the Niokolo Koba National Park. The Ghanaian paper, "Administrative Structures and Services for Sustainable Settlement," reviews the positive and negative aspects of the two different types of settlement and recommends for the future a more participatory development strategy based at the district level with an agency to coordinate line ministries and other development actors.

The paper by Hans Verhoef and Rudi Slooff of the WHO, "Health Aspects of Settlement in Onchocerciasis Control Programme Areas," considers the need for appropriate health policies for the new settlement areas. It discusses the likely short-term and long-term health risks associated with settlement and outlines the critical stages for incorporating health measures in the settlement process. Finally, the paper argues that there is a role for autonomous development agencies, such as the Volta Valley Authority (AVV) in Burkina Faso, in the development of the onchocerciasis-free areas.

The Rehabilitation of Onchocerciasis-Controlled Areas

Ministry of Environmental Protection, Senegal

As the Committee of Sponsoring Agencies (CSA) and the concerned governments consider rehabilitation programs in the onchocerciasis-controlled areas, they need to keep in mind that the local population is key to the lasting success of resettlement and development activities. Also key are the environment and the way in which people interact with it. This paper highlights that interdependence between people and the environment in the context of initiatives that have already been taken and potential initiatives targeting areas in Senegal where onchocerciasis has been controlled.

Physical and social context

Senegal has participated in the westward expansion of the Onchocerciasis Control Programme in West Africa since 1986. The part of Senegal affected by onchocerciasis covers 40,000 square kilometers stretching across the Tambacounda Region and the Bonconto District in Vélingara Department (Kolda Region, see map) and has a pop-

ulation of 418,000. The area corresponds more or less to the basins of the Gambia and Falémé rivers, a setting highly conducive to the spread of *Simulium damnosum*, the vector of the disease. This area traditionally covered by OCP activities, as well as by resettlement activities under the Senegalese national program, also extends northward into Matam Department, to control dracunculosis and schistosomiasis.

Various ethnic groups inhabit the area, including Peuhl, Bambara, Socé, Koniagui, and Bassari. This diversity is reflected in the wealth of systems for utilizing the area's resources: pastoralism, agriculture, hunting, and clearing land. Nearly all the production systems assume continued abundance of natural resources and availability of land, but that assumption has been called into question since the 1970s by the development of cotton production, which has led to a dramatic increase in cultivated land.

The area affected by onchocerciasis includes the Niokolo Koba National Park (*Parc national du Niokolo Koba*, or PNNK), which was established in 1926, expanded in 1954 and 1969, and placed on the UNESCO list of the world's biosphere reserves in 1981. The park covers 913,000 hectares and has no human settlements. To provide better protection for wildlife, a corridor was established around the park to prevent human intrusion. Nevertheless, the

Box 1 Experience of the New Lands Corporation

A useful case for reviewing the Senegalese experience in settling undeveloped and slightly developed areas is that of eastern Senegal, where new lands were settled during the 1960s in a major program implemented with support from the World Bank. The program had two basic objectives:

- To relieve the congestion in the groundnut basin by settling sparsely populated lands in the Tambacounda region
- To organize the rational agricultural development of eastern Senegal by promoting new crops and farming techniques that modern farmers would adopt.

The program succeeded in creating a synergy between the need for arable land by farmers in the groundnut basin and the imperatives of agricultural development, as seen by agronomic studies by such centers as the SEMA in Boulel and the Centre national de recherche agricole in Bambey. The program's activities were conducted primarily in a pilot area centered on the districts of Koumpentoum, Koussanar, and Makacolibantang, under the direction of the New Lands Corporation (*Société des terres neuves*, or STN, dissolved in 1985) and the Livestock Development and Agricultural Extension Corporation (*Société de développement de l'élevage et de vulgarisation agricole*). The program focused on:

- Developing the pilot area (clearing land, building dirt roads)
- Constructing infrastructure (sheds, fenced enclosures, wells)
- Carrying out extension activities (organizing migration, community activities, agricultural credit).

The results achieved in developing the land and organizing the settlers were judged to be satisfactory. But they also revealed the inherent limits of the farming model originally conceived by the program developers: the settlers tended to revert to the farming systems practiced in their home regions. Thus, in programs designed to develop new land, it is important to take sociocultural characteristics into consideration.

PNNK has seen increasingly aggressive poaching, and its management faces a chronic shortage of resources. This situation has led the government to seek solutions based on more effectively involving the surrounding population in preserving the balance between people and their environment, including the park (for a case study on preserving this balance, see box 1). The planned initiatives are in total harmony with the framework for rehabilitating the onchocerciasis-controlled areas.

Action proposals for the area around the Niokolo Koba National Park

Experience with resettlement and rehabilitation programs has shown that at least three important preconditions must be met for such programs to succeed:

- The initiative must come from the population concerned.
- Natural resources must be utilized efficiently.
- The socioeconomic climate must be favorable.

All these conditions are met in the PNNK and the surrounding area. The local population has demonstrated its willingness to participate in some form of land management and accepted the principle of preserving biodiversity. And the ongoing diversification of economic subsectors in the Tambacounda region appears to have created a new socioeconomic climate that is likely to limit activities that consume large quantities of land and natural resources. Thus, the planned pilot activities focusing on the local population in the area surrounding the PNNK can be expected to stimulate and maintain an endogenous development process. In the long term, the goal of such a process is to integrate more fully the surrounding population into the ecological system composed of the PNNK and the immediate area.

The pilot activities will focus on developing ecotourism, supporting natural resource management initiatives, and training.

Developing ecotourism

The attractiveness of the PNNK area has led to the development of tourism (hunting and excursions), a source of foreign currency for the national economy. This component of the pilot activities proposes to develop ecotourism, a new form of tourism based on the preservation of ecosystems inside the park and in the surrounding area. The villagers from the rural communities around the park who have excellent knowledge of the local environment would serve as guides. It will be necessary to train the guides to prepare them to provide proper service to visitors. The ecotourism activity will be organized around two base camps, located outside the park and linked to former guard posts inside the park, which will be rehabili-

tated as satellite camps.

A range of tourist products will be offered to visitors, including:

- Traditional park visits (automobile tours ending at the Simenti shelter)
- Hiking tours in the park and the surrounding villages to introduce tourists to ways of life in the region and to visit microprojects on natural resource management
- Mixed tours including one or more nights "in the bush" at one of the satellite camps.

The ecotourism component will require support from the CSA for several activities:

- Training the local guides and the base camp managers
- Constructing the base camps, rehabilitating the satellite camps, and installing necessary equipment (with such activities carried out whenever possible by local entrepreneurs)
- Determining and mapping the tourist routes, particularly the hiking loops (a task to be handled by the National Park Directorate, which has excellent knowledge of the area, in association with the Center for Ecological Monitoring—*Centre de suivi écologique*, or CSE—which has software for automatic mapping)
- Producing a leaflet to promote the ecotourism product among tour operators through major travel agencies.

Supporting natural resource management initiatives

Efficient utilization of natural resources requires rational management based on an appropriate balance between their consumption and their production. Ongoing social change and changes expected to occur as sparsely populated areas are resettled following the elimination of health risks will necessitate complementary measures to preserve the natural resource balance.

The natural resource management component will draw on the experience acquired in several initiatives developed by the National Park Directorate and the local population. It will focus on honey, straw (*Andropogon gyanus*), borassus palms (*Borassus aethiopicum*), plant sponges—all resources for which management techniques based on traditional practices have been fully mastered—and guinea fowl and bamboo (*Oxytheranthera abyssinica*). The component is expected to encompass the following activities:

- Improving techniques for collecting guinea fowl eggs for stock-raising purposes, with the support of university research
- Conducting bamboo production trials with cuttings and seedlings taken from bamboo in the park, with

- the support of university and forest research
- Progressing from gathering plant sponges to producing them after improving the physical environment
- Improving the production and marketing of straw, honey, and sponges, all high-value added products. Plant sponges are greatly sought after in Europe, and the straw (*Andropogon gayanus*), practically nonexistent elsewhere, is used as a fencing and roofing material.

There are other resources that could probably also be developed once an inventory is conducted to determine their potential. These include *Sterculia setigera*, which provides a gum used in pharmaceutical products; "Ven" wood (*Pterocarpus erinaceus*); and medicinal plants for which demand has intensified as the price of industrially produced medicines has increased. The inventory could be conducted jointly by the CSE and the Institute of Environmental Sciences (*Institut des sciences de l'environnement*).

Providing training and literacy education

To ensure the success of the first components, it is important to develop a training strategy for the local population. The ability to write in local languages or French would give the population increased confidence to face the new challenges stemming from the greater access to their region. The training and literacy component could include the following activities:

- Training for local guides and trackers, emphasizing French language courses, knowledge of the physical environment and wildlife, communications, and telecommunications (radiotelegraphy)
- Training for the base camp managers, focusing on inventory control, managing working capital, accounting, welcoming clients, and personnel management
- Efforts to improve the population's functional literacy, conducted in cooperation with nongovernmental organizations in the area and the Directorate of Literacy Education.

Rehabilitation outcomes

Implementation of these components is likely to have both ecological and socioeconomic ramifications.

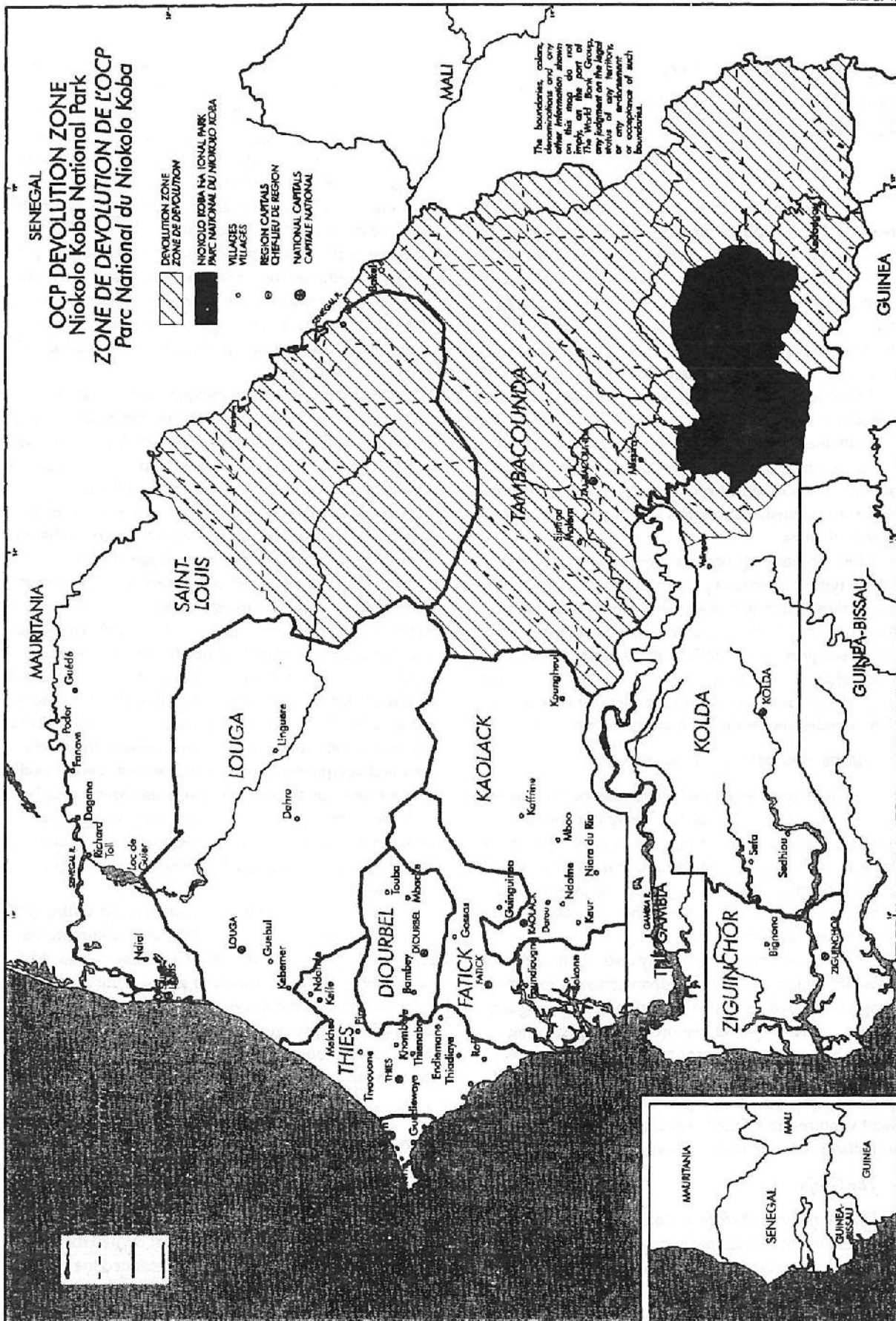
Ecological ramifications. The activities should contribute to the protection of the PNK and the surrounding area in several ways, including increasing the human presence, improving the local population's awareness of the importance of environmental protection, and creating buffer zones in which natural resources would be rationally managed for the benefit of the local population. In addition, the improved techniques for managing and utilizing resources, including those of the park, would help restore the national environment.

Socioeconomic ramifications. The activities should also provide new impetus for endogenous development, based on:

- The creation of a tourist attraction in the areas around the base camps and, as a result, the direct and indirect creation of numerous jobs
- The creation of a focal point for local development based on natural resource management
- The diversification of activities for generating new and supplemental income
- The creation of local capacity to manage tourism and natural resources.

Conclusion

Revitalizing the onchocerciasis-controlled areas is a priority for the government of Senegal. The national strategies pursued for this purpose focus on the local people and seek to exploit natural resources while strengthening the equilibrium of the ecosystems. The expected results will form the foundation for participatory, endogenous, self-sustaining development. The project conceived for the PNK and the surrounding area serves as a useful example for similar projects in other onchocerciasis-controlled areas by demonstrating the potential to create a framework conducive to rehabilitation. It is thus imperative that resources be made available for this project—to satisfy the legitimate aspirations of the population developing land long marginalized by onchocerciasis.



Administrative Structures and Services for Sustainable Settlement

Ministry of Food and Agriculture, Ghana

Settlement and resettlement schemes arise for diverse reasons. There might be a need to put inhabited land to use for new development purposes. There might be a need to reorganize agriculture to permit the introduction of more advanced technology, farm planning, crop rotation, or land consolidation. Or there might be a need to resettle people in their original homes, deserted because of a plague such as onchocerciasis. Ghana has settlement and resettlement experiences corresponding to all three situations.

Settlement schemes are of three main types: sponsored, assisted, or spontaneous. Ghana has experienced all these types of settlement. This paper discusses three sponsored settlement schemes and three assisted spontaneous schemes.

Most settlement programs succeed or fail depending on the type of structures put in place to provide services to the settlers. This paper examines the administrative structures that have been used and the kinds of services that have been provided in settlement programs in Ghana, and highlights reasons for the success or failure of these programs to provide insights for better planning of resettlement schemes for the onchocerciasis-free areas.

Sponsored settlement schemes

The three resettlement schemes described in this section are examples of "forced" or involuntary resettlement, usually initiated by state authorities as ancillary to major projects, such as dam construction. In the resettlement process, the planners work to protect the lives, culture, and productive systems of those who are resettled and to restore their lost livelihoods.

Anything compulsory is usually distasteful, and forced resettlement is more traumatic than generally expected. Long-established residential communities disintegrate; informal social networks that provide life-sustaining mutual help are rendered nonfunctional. Joblessness, landlessness, homelessness, marginalization, and food insecurity develop. Many sponsored involuntary resettlement ventures have failed because of weaknesses in administrative structures and services.

The Gonja

During the years before and after independence, the government felt that simply improving on the traditional system of agricultural production was not enough to develop and modernize the sector. Instead, large-scale

farms should be established to demonstrate the potential of mechanized farming. The government established the Gonja Development Company in 1951 to implement its proposed policy strategy. It launched the company in the thinly populated Damongo area in northern Ghana and assigned it the task of experimenting with mechanized farming and the use of fertilizers in the Gonja District to increase the area's food production.

A major part of this project was to initiate a pilot program to resettle on the underutilized lands of the Damongo Frafra farmers who were experiencing overcrowding in their own districts. It was originally planned to move some 80,000 people from the overcrowded areas near the then Zuarungu District.

The government was to provide the physical and social infrastructure services the settlement communities needed, such as housing, water, and schools. Each family was to receive about 12 hectares for cash and subsistence crop production. The company was to plan all the operations of cultivation, from clearing land to harvesting; settlers were to carry out weeding. The output was to be shared by the company and the farmers at a ratio of 2:1.

These arrangements left the settlers with little involvement in planning and implementation and almost entirely dependent on the company. The scheme failed to sustain their interest, and many returned to their home areas.

The company later revised the administrative structure to give the settlers greater say in planning and decision-making. But the company continued to meet with technical, social, and economic problems. Some of the machinery and equipment imported for the project was unsuitable for local conditions. Constant breakdowns coupled with scant supplies of parts and skilled manpower rendered management operations ineffective. Consequently, the company was liquidated in 1958, after settling only about 400 farming families.

A major social factor in the failure was the difficulty of integrating the Frafra into local Damongo communities. A second was the insistence of the Gonja that Gonja chiefs be appointed over the resettled Frafra. A third factor was the government's provision, through the company, of virtually all social amenities and all production inputs, which led the settler families to become overly dependent on the company.

The Volta River settlement scheme

The Volta River settlement scheme, another sponsored resettlement, resulted from the government's decision to construct a dam for hydroelectric power generation to meet domestic energy needs, to support bauxite exploration, and to accelerate industrialization. The dam created the largest man-made lake in the world and necessitated the resettlement of 80,000 people displaced from 739 villages.

The stated government policy was to ensure that none of the displaced people were worse off as the result of the construction of the dam, a goal given legal backing in the Volta River Development Act. The Volta River Authority (VRA) was set up and charged with developing the hydroelectric power and resettling the affected people. About 80 percent of the target people were crop farmers, and 20 percent were fishermen and livestock farmers.

It was recognized that productivity in the original farming communities had been low because farms were too small, genetic stock and livestock were poor, husbandry practices were ineffective, and agricultural credit was lacking. The government, through the resettlement authority, had to provide services needed to overcome these bottlenecks and decided to treat the VRA settlement scheme as an exercise to promote increased agricultural productivity. The strategy included large-scale farming using modern methods and machinery; the introduction of a cooperative scheme in which farmers cooperatives would have easy access to credit, machinery, and other inputs and each farmer would have a minimum of 12 hectares under mechanized farming; and the development of settlement townships. The scheme constructed 13,000 houses in 52 settlement townships, 82 school blocks, 46 new marketplaces, 146 toilets, and 62 bore holes and wells.

Despite its ambitious plan, the resettlement scheme failed. Lacking an efficient administrative structure with sufficient manpower, equipment, and financial resources, as well as the necessary support services, the scheme ultimately was unsustainable.

Kpong Hydroelectric Project resettlement program

The Kpong resettlement scheme became necessary when Ghana began to develop a second hydroelectric project, at Kpong, some 25 kilometers downstream of the Akosombo dam. The 9,000-acre head pond created by the dam submerged six main settlement areas of nearly 7,000 people. Unlike the Volta project, the Kpong hydro project included resettlement as a major component from the very beginning, resulting in different administrative structures.

The Resettlement Division of the Volta River Authority was charged with coordinating the resettlement program, and various aspects of implementation were assigned to other state agencies. Drawing on its experience with the earlier failed settlement programs, the government planned and executed the Kpong scheme, taking into account the social, cultural, and economic backgrounds and requirements of both the settlers and the host population. The scheme established six settlement townships for the 6,700 people—from five ethnic groups—affected by the flooding, taking into consideration such factors as the acceptability to the prospective settlers of land tenure

arrangements, the affinity of ethnic groups, and economic and production systems.

The scheme provided optimum support services, such as health care, water, toilets, electricity, and roads. It constructed landing stages at the water's edge in every village to minimize direct exposure to the shallow water of the lake and thus the risk of contracting waterborne diseases such as bilharzia and guinea worm. And in contrast with the Volta River resettlement scheme, which had emphasized large-scale farm holdings and mechanization, the Kpong resettlement scheme emphasized developing improved farming techniques for small farmers, maintaining traditional patterns where appropriate, with the Ministry of Agriculture providing effective extension services to help the farmers fend for themselves on a more sustainable basis.

Voluntary settlement schemes

The poor results of many sponsored, involuntary resettlement schemes have led to a tendency to favor spontaneous, voluntary resettlement supported by governments or by nongovernmental agencies.

Voluntary unassisted settlements in the forest areas

Spontaneous, voluntary, unassisted settlements developed in the forest areas of Ghana beginning in the late 1880s. In this settlement process, large numbers of farmers from Akwapim, Krobo, Shai, and Ga, for example, bought or leased virgin forestland to develop cocoa farms in the cocoa areas of the Eastern, Ashanti, and Western regions. As a result of the efforts of these settlers, Ghana became the world's leading cocoa producer. I would therefore agree with Polly Hill (1963), who described this type of settlement process as "forward-looking, provident, prudent, the opposite from hand-to-mouth." In these settlement areas, little friction developed between the host and settler families. The settlers acted as their own administrators and provided many of their own services while also taking advantage of the community services provided by the government. In addition to maintaining their new homes, the settlers built houses in their home towns, where they return during festivals.

The Tono irrigation settlement scheme

Although the southern sector of the country holds little attraction for human settlement, part of the northern savanna sector has vast fertile valleys that have been liberated from the scourge of river blindness, thanks to the Onchocerciasis Control Programme and the donor community that has supported its efforts. A number of irrigation projects have been developed to utilize these valleys. One such project, the Tono irrigation project, was started

in 1975 and completed about ten years later.

The project constructed a dam across the Tono River, and developed 2,500 of the 3,860 hectares in the project area for irrigation. These activities disrupted the lives of people in eight villages in the Kassena-Nakarri and Sandema District Council areas. The project offered the affected compounds and households assistance in regrouping and in rebuilding their villages on the periphery of the project area. By 1990, eight settlements with a total of 2,900 small-scale farmers had registered to participate in the scheme. Two hundred commercial farmers also have benefited from the project.

To manage this planned but voluntary resettlement project, the Irrigation Company of Upper Region (ICOUR) was set up as a subsidiary of the Irrigation Development Authority. ICOUR provides technical advice and inputs to farmers, including credit, irrigation water, tractor services, and agricultural marketing services. The farmers raise such crops as tomatoes, onions, millet, sorghum, groundnuts, maize, rice, and soybeans. Fish ponds have also been developed and leased to private farmers.

Fumbisi resettlement project

With the successful control of onchocerciasis in the entire northern sector of Ghana, there has been spontaneous, voluntary movement of people from the overpopulated, infertile upland areas to the more fertile river valleys—most noticeably the Fumbisi Soo triangle and the Chiana-Paga and Nangodi-Tilli areas. The government of Ghana realized that this voluntary settlement process could lead to rapid population growth and that, if care was not taken to introduce sustainable production systems, the natural resources could be mismanaged, with such long-term effects as declining productivity and environmental degradation. It saw that it needed to provide assistance to direct and ensure more sustainable settlement and production systems that take into consideration sociocultural, ecological, and economic conditions. It proposed to provide essential social and economic infrastructure, such as roads, bridges, water, health services, credit, and agricultural extension services, to attract settlers to the fertile valleys.

In 1985, the government selected a site in the Fumbisi Valley for a pilot planning project, supported by the UNDP and the FAO, to “assist” the spontaneous voluntary settlement in the area. The planners had selected the area for its high soil fertility and low population density, using TAMS Satellite Imageries.

The immediate objectives of the pilot project, as spelled out by the UNDP project document, include the following:

- To define strategies for the settlement and economic development of the project area to accommodate continuing spontaneous migration

- To prepare a timetable for the construction of infrastructure and the settlement of migrants in the target area
- To provide a database to support planning for improved human settlement in the area.


In implementing these objectives, the project produced a number of reports, including soil and water resource studies by the Soil Research Institute and Water Resources Research Institute of the Council for Scientific and Industrial Research (CSIR) and socioeconomic studies. This project was ended in 1987.

Through its public investment program, the government has provided and continues to provide physical and social amenities for improved living conditions. For example, between 1991 and 1993, it spent nearly 3.5 billion cedis (\$8.75 million) to construct roads, two bridges, and three health facilities in the Fumbisi valleys. In 1994, it planned to provide potable water in eleven villages in the pilot area at an estimated cost of 66 million cedis (\$72,000). It is also considering construction of a third bridge to open up the “overseas” area to the rest of the country.

Because of its experience, the government had no interest in creating an autonomous management structure to oversee the voluntary resettlement in the onchocerciasis areas. An autonomous management structure can be effective if it has adequate financing, personnel, technical capacity, and operational links with government technical services. But because such structures are top-down and often reluctant to hand over responsibilities to line ministries and local organizations at the appropriate time, they are not suitable for a sustainable resettlement scheme.

Instead, the government envisages a decentralized administrative structure and a participatory development strategy. The new policy of decentralization is embodied in PNDC Law 207, which establishes district assemblies. Each district assembly is responsible for the overall development of its district, for formulating programs and strategies for the effective mobilization and utilization of the district’s human, physical, financial, and other resources, for promoting and supporting productive activities and social development in the district, and for removing obstacles to initiative and development. Each assembly is also responsible for the development, improvement, and management of human settlements and the environment in the district.

With as many as twenty-six districts in the onchocerciasis-free area of Ghana, a strong coordinating agency is needed to perform liaison with all line ministries and governmental and nongovernmental development agencies right from the planning stages. The National Onchocerciasis Secretariat, under the Ministry of Finance and Economic Planning, has served as coordinator of the pilot



Fumbisi project, which has involved a wide range of ministries (Food and Agriculture, Health, Education, Roads and Highways, Social Welfare and Community Development) and the district assemblies in planning and implementation. In support of the National Onchocerciasis Secretariat, district and village onchocerciasis committees have been set up as grass-roots planning units. These committees were established to ensure that the project benefits from the people's superior knowledge of local

conditions, including land tenure arrangements and other cultural and customary practices, and from their help in averting the ethnic conflicts and litigation that can hamper sustainable land settlement.

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Health Aspects of Settlement in Onchocerciasis Control Programme Areas

Hans Verhoef and Rudi Slooff, World Health Organization

One of the primary justifications for the Onchocerciasis Control Programme in West Africa has been the considerable potential for development of fertile river valleys—once freed of onchocerciasis—for human settlement. Due to the extraordinary success of the program, an estimated 25 million hectares of tillable land are being opened up, and rapid migration to this land is already occurring (McMillan, Painter, and Scudder 1993).

These changes undoubtedly will have profound effects on the environment and on the health of the settlers. The movement from upland areas to the more productive lowland valleys, for example, can be expected to contribute to improved nutrition in the long term. But human migration and habitation of lowland valleys also are known to create major health risks. In addition to the humanitarian concerns we have about the effect of development on health, it is also important to consider the effect of health on development. People debilitated by disease produce less, with obvious consequences for their economic status. Moreover, health initiatives needed to maintain health at an acceptable level use funds that could otherwise go to supporting socioeconomic development.

This paper considers the need and the possibilities for incorporating health policies and strategies into the broader context of development of the newly opened OCP areas. We are unable to address here the many health problems that may be related to new settlement in the OCP area. However, we would like to share some lessons learned in the work of the WHO/FAO/UNEP/UNCHS Panel of Experts on Environmental Management for Vector Control and to raise issues that we expect to be relevant to safeguarding health in the settlement of the OCP areas.

The size and nature of the health risks

For most health professionals, 25 million hectares of newly opened land is a meaningless statistic. But compared with the 52 million hectares cultivated in West Africa in 1982 (FAO 1987), it is a significant area. In assessing the health risks associated with agricultural development, however, surface area has limited value. For example, our recent estimates indicate that rice fields flooded for various periods cover only 0.44 percent of the cultivated land in West Africa, yet expose at least 7.2 percent of the rural population to the associated risks of vector-borne diseases—in particular, malaria and schistosomiasis. Knowing what population is at risk helps ministries of health better determine the priority to give to different health problems.

We therefore make a tentative and preliminary attempt to estimate the population that could eventually be exposed to health risks in the newly opened OCP areas (see annex A). We estimate that 25 million additional hectares of land would lead to a 15 percent increase in the area available for agriculture in the OCP countries (or an 8 percent increase in the available area in West Africa) and that the number of people on this land may eventually reach 13 percent of the rural population of the OCP countries (or 6 percent of the rural West African population). The relatively fertile land in the OCP area will likely sustain a higher population density than land elsewhere in rural West Africa, however, and these estimates should therefore be considered conservative.

In the short term, during the *settlement phase*, the health risks will be determined largely by human migration [Table A]. Population movement and subsequent settlement in rural areas are usually accompanied by the introduction of new diseases and an intensification of communicable diseases and health problems related to physical stress (fatigue, malnutrition) and psychological stress (problems of adjustment). The morbidity and mortality from vector-borne diseases will be determined by the enhanced risks of transmission and, in the case of malaria, by the spread of drug-resistant strains of parasites.

Health services will need strengthening to deal with this new situation. Particular attention should be given to safeguarding the health of vulnerable groups during the settlement phase, and to groups whose mobility forms a health risk to themselves or to others. Identifying these groups requires detailed information about mobility patterns, particularly for women and children (who often arrive in a second wave of migration), temporary workers involved in the construction of physical infrastructure, migratory agricultural people and laborers, and people with less access to health care.

In the longer term, during the *post-settlement phase*, new settlers from upland areas will face the higher risks of vector-borne diseases associated with the ecological conditions of river valleys. The water that collects in valley bottoms creates a natural breeding site for many vectors, but health risks are also influenced by development of water resources, patterns of land use, agricultural practices, and patterns of human behavior. Vector-borne disease risks include malaria, schistosomiasis, African trypanosomiasis, guinea worm, yellow fever, and, of course, a new outbreak of onchocerciasis.

Considerations for health policy development

When should health measures be introduced?

McMillan, Painter, and Scudder (1993) identified five stages in the settlement process: planning; initial infra-

structure development, recruitment, and installation; adaptation; economic and social development; and handing over and incorporation. The planning phase is by far the most important stage for incorporating health safeguards into development strategies. Many long-term disease risks can be reduced if health is seen as part of integrated development policies and strategies and if the safeguarding of health is taken up in the planning of development projects that will be carried out during the settlement phase.

The provision of infrastructure in new settlements can be critical in safeguarding health. The initial capital investments required can be large, but they can sometimes be justified if they result in long-term health benefits. These benefits may therefore not be visible when projects are evaluated, however. Economic analyses carried out during planning should consider health benefits that last beyond the settlement phase.

How much government involvement is desirable?

The Land Settlement Review, commissioned by the World Bank to assist governments in formulating operational policy guidelines in the OCP area, recommended assisted spontaneous settlement as a less expensive alternative to sponsored settlement and a more effective alternative to completely spontaneous settlement (McMillan, Painter, and Scudder 1993). With this level of government involvement, settlers make many of the major decisions, but government agencies provide essential services (crop and livestock extension services, health facilities, credit, schools, nonformal education) and infrastructure (roads, bridges, wells).

The magnitude and the nature of the health effects of development are usually difficult to forecast. In particular, communicable diseases, because of the multitude of ecological, cultural, socioeconomic, and medical factors that determine their epidemiology, commonly show great variability in geographical distribution of cases and in the occurrence of epidemics. We can safely assume, however, that settlement in the OCP areas will have considerable health effects, and that extra expenditures must be made for disease control. Settlers usually have limited ability to contribute to health care during the first few years of the settlement process. A large share of the extra expenditure during this period must therefore be borne by governments and the external agencies that support them.

We recommend that governments allocate a predetermined percentage of capital expenditure for development to the implementation of health policies. How these funds are spent should depend on the relative cost-effectiveness of different interventions. These investments should not all end up in the health sector, however; depending on the type of development proposed, investments should

also be made in preventive environmental management measures—for example, to control irrigation-associated schistosomiasis.

The health sector is not a productive sector. Governments should therefore seek to recover the recurrent costs of maintaining the disease burden at levels that would have existed without the settlement. But cost recovery may not be possible until after the settlement phase, and then at a level dictated by settlers' ability to contribute to their own health care. In addition, programs and projects could be required to compensate for the health risks that they create by reinvesting part of their revenue in health care.

Important questions concern the percentage of capital funds that should be allocated for health and the best investment strategies for using these funds. These questions touch on several issues that health professionals often raise about the use of economic analyses, which we briefly reiterate here.

First, investment priorities should depend on an economic analysis of the costs and benefits of interventions, rather than on the scale of the disease burden. Disease eradication programs, for example, would never be sustained until completely successful if the investments depended on the number of cases occurring.

Second, the value of cost-benefit analysis is limited by the methodological and ethical difficulties of estimating health benefits. It is difficult to determine when the benefits of a project should be estimated. In addition, many health professionals consider it unethical and impractical to express health benefits in monetary terms.

Third, some measures taken for other purposes may also have unintended health benefits that can be easily overlooked in a cost-benefit analysis.

Fourth, in assessing the effectiveness of certain measures, it is impossible to distinguish between illness that is prevented and illness that is cured. Prevention is always preferable because it avoids the risk of severe morbidity and death, it reduces the rate of disease transmission, and it reduces the use of medicines and therefore the selection pressure on drug-resistant strains of parasites.

Finally, inadequate capital investments in disease mitigation measures may lead to a need for additional recurrent expenditures to maintain health at an acceptable level that governments and local institutions must cover indefinitely and without support from external agencies.

How can governments promote the use of health safeguards in development?

The health sector must meet a number of responsibilities to cope with the health risks associated with the settlement phase. Of primary importance is developing a system for disease surveillance (which should include surveillance of drug-resistance). The data generated by such

systems together with data on population distribution provide a basis for decisions on actions to be taken—for example, redistributing health facilities. Possibilities for using aerial photography or remote sensing to assist the health sector in this task should be explored.

Health measures can be incorporated into projects and policy planning through the use of *health impact assessment studies*. These studies forecast the positive and negative health effects of projects and recommend measures to mitigate possible negative effects. Because preventive health measures often contribute to environmental conservation efforts, and vice versa, health impact assessments ideally should be carried out as part of environmental assessments.

Despite the potential value of health impact assessment studies, their use is still limited. Administrative structures normally do not exist for their use in small projects, nor would this use be economically realistic. Such studies are limited by the technical difficulties of forecasting morbidity and mortality, particularly for vector-borne diseases. The use of these studies and the implementation of their recommendations are also limited by institutional and administrative deficiencies and by a lack of trained scientific and technical staff.

In considering health measures, governments should not consider only the mitigation of negative health impacts. Sometimes the value of projects can be significantly enhanced, and their cost-benefit ratio improved, by incorporating public health and safety components or by simultaneously carrying out projects that improve the local health status. The settlement process should thus be seen as providing health opportunities—that is, governments should invest in projects that, when implemented together, have synergistic effects on health (box 1).

Governments should give high priority to formulating legislation specifying which projects need screening for further health impact and health opportunity assessment. Much settlement-related development, however, will be small-scale, without formal government involvement. Although health impact assessment is not feasible for individual projects, it can be applied to groups of similar projects in order to develop appropriate guidelines and standards for incorporating health safeguards in such projects. Community participation in disease control can be fostered by transforming such guidelines into model bylaws that groups could be advised to adopt as part of their constitution or internal rules. For example, washing in irrigation canals or neglecting timely weeding for the control of snails, the intermediate hosts of schistosomiasis, could be made punishable by a fine. Village councils could also be advised to adopt such rules (Tiffen 1991).

Vector-borne diseases associated with agricultural development constitute the main long-term health risks of

settlement. A rational disease control strategy for new settlements would therefore develop guidelines and standards appropriate for conditions in agro-ecosystems that expose large agricultural populations to high risk of disease. This would require regional studies to characterize and classify agro-ecosystems and to identify and test disease interventions. A multidisciplinary research consortium recently developed a proposal for such studies in flooded rice systems in West Africa (PEEM Secretariat 1993).

How should government be organized?

Incorporating health measures into the planning, implementation, and operation of development projects requires close consultations with the health sector to assess possible health effects and opportunities of the projects, to obtain technical advice on mitigation measures, and to monitor the health status of the beneficiaries and temporary laborers involved in the projects. To enable the health sector to respond appropriately and in a timely manner, it must be involved in project planning from the earliest stages and be able to share resources with other sectors. The collaboration required between sectors calls for formalized contacts to manage conflicts that may arise in the settlement process.

Experience has shown that the most successful model for achieving such collaboration is the establishment of autonomous or semiautonomous agencies with regional development as one of their goals. In the OCP area, this collaboration could be achieved through the full participation of the health sector in an autonomous and integrated river basin settlement authority, such as the *Autorité d'aménagement des vallées des Voltas* (Volta Valley Authority, or AVV) in Burkina Faso. This authority should have the executive power and the capacity to commission and to appraise health impact and health opportunity assessment studies and the means to implement their recommendations. And its functions should include funding and directing a program to develop appropriate health guidelines and standards for development projects.

Despite the successes achieved with such autonomous bodies, the Institute for Development Anthropology (IDA), which prepared the *Land Settlement Review*, rejected them as generally inappropriate for West Africa (McMillan, Painter, and Scudder 1993). The IDA criticized such organizations on several counts: for planning and implementing settlement with little involvement of other institutions, for resisting handing over managerial functions to line ministries and local organizations, and for being costly. Moreover, because of the agencies' tendency to be centralized and hierarchical, the IDA considered them unsuitable for the participatory and diversified assisted spontaneous settlement advocated in the *Land Settlement Review*. As an alternative, the IDA proposed

Box 1 Environmental impact, health impact and health opportunity assessment: An example

Consider the imaginary example of an irrigated rice scheme being planned along a river in West Africa. Environmental assessment and health impact assessment studies will be carried out as part of the preparation of the project. What would be the advantages of appraising an environmental assessment of such a project together with a health impact assessment? How would the recommendations of a health opportunity assessment differ from those of a health impact assessment?

Irrigation without proper drainage can eventually lead to lower crop yields because of soil salinization. Suppose that the environmental assessment study, based on a review of the preliminary plans for the irrigation system, identifies soil salinization as an environmental risk and recommends improvements to the planned drainage system to prevent this problem.

Irrigation in West Africa is often associated with schistosomiasis and possibly with malaria. Irrigation-associated schistosomiasis is related primarily to transmission in the irrigation and drainage system (PEEM Secretariat 1993). The vast majority of the malaria mosquitoes breed in the irrigated fields; mosquito breeding in the irrigation system is generally insignificant. Suppose, therefore, that the health impact assessment study predicts that the project would increase the risk of malaria and schistosomiasis.

As a preventive measure against malaria, the health impact assessment study could propose a project design that would allow for alternate wetting and drying of fields. Studies in China and India have shown that, compared with permanent flooding as traditionally practiced, this water management practice can drastically reduce mosquito breeding while possibly saving water and maintaining rice yields. The health impact assessment study could also propose improvements to the planned drainage system and recommend a pump irrigation system rather than a gravity irrigation system (the resulting capability to lift water would permit flooding of fields as long as there is water in the river).

Improving the design of the drainage system may not be considered cost-effective when the environmental and health benefits are appraised separately. Rather than evaluating the recommendations of the environmental and health impact assessment studies separately, it is better to first consolidate them and then submit the results for economic analysis. Analyzing the benefits of the recommended measures for environmental conservation and health together increases the chances that the measures will be included in the final project design.

The same health impact assessment study may also recommend health education, selective mollusciciding, and the provision of safe drinking water supply systems to reduce the transmission of schistosomiasis resulting from irrigation. Health impact assessment is concerned with measures only insofar as they mitigate negative health effects caused by a project. In our example, an economic analysis will compare the costs of the provision of drinking water with the benefit of reducing the transmission of schistosomiasis. A health opportunity assessment also takes into consideration that recommended measures may have other health effects or that they may have socioeconomic effects that do not fall within the immediate objectives of the project. In our example, the provision of drinking water supplies would have a greater chance of being incorporated in the project if, for example, in addition to reducing the transmission of schistosomiasis, it was shown to contribute to the control of diarrhea or guinea worm disease or to local economic activity and growth.

that a range of government agencies work together with heterogeneous communities and nongovernmental organizations.

Although most of these concerns about a structure based on an autonomous agency are valid, the Land Settlement Review does not indicate how intersectoral collaboration would be adequately fostered under the alternative arrangements it proposes. Problems of inadequate management will not be solved by having no management at

all. Nor will the health problems of settlement be adequately addressed through the participation of local institutions, as proposed by the Land Settlement Review.

Thus, despite their apparent disadvantages, authorities such as the AVV should not be rejected out of hand. Instead, their role should be redefined to complement the arrangements proposed by the Land Settlement Review. Experimentation is needed to find a suitable formula, and this can draw on the lessons learned through the experi-

ence of the AVV.

We recommend that nongovernmental organizations and local interest groups be allowed greater representation in these authorities, and that the authorities be given a greater say about their goals and operation so that they can better respond to the needs of local institutions. Some decentralization of authorities at various levels may be advantageous, as the reorganization of the AVV in 1982

showed (McMillan, Painter, and Scudder 1993). Finally, mechanisms should be provided to ensure that authorities can function more flexibly and that they hand over their responsibilities after a specified period of operation. The goal of such authorities, after all, should be a finite one—to assist local populations in the settlement process and in overcoming the potentially negative effects of settlement.

ANNEX A: Rural population density in West Africa before and after the Onchocerciasis Control Programme

In 1991, about 168 million hectares of land were available for agriculture in the OCP countries (table A). The additional 25 million hectares opened up by the OCP will increase this area by 15 percent, to 193 million hectares.

In the hypothetical case that the agricultural population of the OCP countries (55,881,000 people) is evenly redistributed over these 193 million hectares of land, the population density would be 29 people per hectare of available land, and the newly available 25 million hectares would sustain 7.25 million people, equivalent to 13 percent of the population of the OCP countries, or 6 percent of the rural West African population in 1991 (132 million).

Table A Estimated rural population density in West Africa in 1991 and after the Onchocerciasis Control Programme

Country	Total land area (thousands of hectares) ^a	Nonagricultural land (thousands of hectares) ^b	Land available for agriculture (thousands of hectares) ^c	Agricultural population ^d (thousands)	Rural population density (people/km ²) ^e
OCP countries					
Benin	11,062	5,330	5,732	2,882	50.3
Burkina Faso	27,380	7,277	20,103	7,782	38.7
Côte d'Ivoire	31,800	8,031	23,769	6,805	28.6
Ghana	22,754	7,024	15,730	7,677	48.8
Guinea	24,586	3,186	21,400	4,357	20.4
Guinea-Bissau	2,812	322	2,490	772	31.0
Mali	122,019	82,996	39,023	7,635	19.6
Niger	126,670	112,245	14,425	6,935	48.1
Senegal	19,253	3,303	15,950	5,891	36.9
Sierra Leone	7,162	2,272	4,890	2,622	53.6
Togo	5,439	1,390	4,049	2,523	62.3
Subtotal	400,937	233,376	167,561	55,881	33.3
After the OCP			192,561	55,881	29.0
Other countries					
Gambia	1,000	580	420	713	169.8
Liberia	9,675	1,882	7,793	1,846	23.7
Mauritania	102,522	58,647	43,875	1,333	3.0
Nigeria	91,077	7,142	83,935	72,217	86.0
Subtotal	204,274	68,251	136,023	76,109	56.0
Total	605,211	301,627	303,584	131,990	43.5

^a Excluding area under inland bodies of water (major rivers, lakes).

^b Includes areas that have been built on, roads, settlements, barren land (desert).

^c Includes arable land (land under temporary crops, temporary meadows for mowing or pasture, land under market and kitchen gardens, and land fallow for less than five years), land under permanent crops (cocoa, rubber, coffee, shrubs, fruit and nut trees, vines), permanent meadows and pastures (used five years or more for herbaceous forage crops, either cultivated or wild), forest and woodland (whether productive or not, including forestland that has been cleared but will be reforested in the foreseeable future). Calculated by subtracting nonagricultural land from total land area.

^d All persons depending for their livelihood on agriculture—that is, all those actively engaged in agriculture and their nonworking dependents.

^e Agricultural population per square kilometer of land available for agriculture.

Source: FAO 1993.

ANNEX B

Project phase	Major activities	Crucial decisions	Recommended actions	Remarks
Identification	Identification of possible projects	Whether site under consideration will be further investigated	Preliminary screening: check with health sector on whether health problems are likely; decide whether an environmental assessment (including health impact assessment) will be done as part of the prefeasibility study.	Screening: rapid, broad assessment to identify health risks, based on immediately available information.
	Formulation of terms of reference (TORs)	Commissioning of prefeasibility study; decisions by consulting firms on inputs of specialists in these studies based on the TORs; whether site under consideration will be further investigated	Terms of reference should specify, among others, that account should be taken of: <ul style="list-style-type: none"> ■ Health conditions in project area ■ Health conditions in irrigation schemes elsewhere in the region ■ Necessary upgrading of water supplies for domestic use and livestock ■ Financial arrangements, e.g., whether health safeguards should be funded from central ministry revenues or provided through contributions of labor by the beneficiaries, or both. 	Routine mechanism for intersectoral planning should be established in advance. If TORs do not mention health aspects, these may never be properly investigated.
Preparation	Prefeasibility study	Procedures for planning, implementation, and operation of the project	Ensure that health sector at all levels of responsibility is prepared to respond adequately and in a timely manner in the planning process.	Prefeasibility studies: outline options, identify gaps in knowledge.
		Whether to initiate feasibility study	Forecast vector-borne disease implications; prepare preliminary recommendations for mitigating measures, and set terms of reference for health part of feasibility studies.	A health impact assessment that is part of prefeasibility studies is usually not carried out by experts (nor should it be).
	Commissioning of feasibility studies		This is probably the last point at which it is politically feasible to stop a large project.	
	Data collection and analysis		Collect local health data.	Data to be collected include local climatic, demographic, agricultural, and health data.
Feasibility studies and design			Carry out scoping and bounding (as much as possible quantitatively); prepare detailed recommendations on strategies to mitigate adverse health impacts and on means for implementation of these strategies.	Feasibility study: full study of the preferred option.
			At a minimum, a health impact assessment should include: <ul style="list-style-type: none"> ■ An approximate quantification of health impact ■ A costing of environmental or other measures for minimizing health risks ■ A cost-effective and appropriate design, and recommendations on operation and maintenance systems ■ Recommendations on health resources and activities ■ A schedule of the expected influx of the workforce into the project area ■ Recommendations on the phasing of the project ■ A description of health monitoring systems, institutional organization, and legal requirements for the project ■ Recommendations on institutional arrangements. 	Scoping: a qualitative or quantitative prediction of the health impact of the project. Bounding: a prediction of when and where health risks will occur. The terms of reference of the feasibility study should allow flexibility so that additional health issues identified after the prefeasibility stage can be studied. Feasibility studies are commonly done by independent experts, and the prefeasibility study is critically reexamined. Thus, although prefeasibility and feasibility studies cover the same ground, the feasibility studies are more thorough and, because of the involvement of experts, more authoritative.

ANNEX B continued ...

Project phase	Major activities	Crucial decisions	Recommended actions	Remarks
Appraisal	Appraisal of the feasibility study	Project selection	Review the economic analysis; check whether recommendations of environmental or health impact assessment are consistent with health policies; consolidate the recommendations of environmental and health impact assessments if they have been carried out independently; check whether the ministry of health will have resources available for implementation; review institutional arrangements; review whether feasibility study is in reasonable accord with wishes and abilities of beneficiaries.	Appraisal: review of feasibility study by all ministries and agencies concerned and at appropriate levels of responsibility, as well as by external support agencies. Ensure that provincial and district offices of the Ministry of Health and representatives of local interest groups are properly consulted.
	Financial negotiations	Adjustment, approval, and clearances	Allocate funds; prepare memorandums of understanding as recommended; start planning of health and education measures.	
Implementation	Detailed design and construction	Decisions on layout of water courses serving the farms and on placement of foot-bridges, washing facilities, and so on	Consult beneficiaries in final design stages; monitor and report on compliance with agreed measures, standards, and norms; monitor the effectiveness of health measures during construction phase, particularly for temporary laborers.	
	Implementation and monitoring		Check whether recommended management practices are feasible; monitor unforeseen health effects and consult with other parties to mitigate unforeseen effects.	
Integration and handing over project	Integration and handing over project to normal administration		Review and report on adequacy of arrangements and resources; arrange for local coordination, exchange of information, health education, and monitoring when operations are passed on to local authorities.	
Evaluation	External support agencies and government review results to see whether they match plans		Measure changes in health status and capacity of local health services; check cash flows needed for proper maintenance of the system.	
	Follow-up analysis and action		Review operational plans; introduce or amend legislation if necessary.	
Operation	Maintenance and monitoring		Maintain the system; monitor health status and farmers' practices; provide health education; enforce guidelines and standards.	

Note: The use of environmental assessment (including health impact assessment) is relatively new. Although environmental and health impact assessments should remain flexible processes, designed to suit projects of different sizes and circumstances, it should be kept in mind that procedures may vary considerably depending on the agencies involved, and that terminologies are not yet standardized.

Source: Verhoef and Clarke 1993.

Notes

This is a working paper presented on behalf of the WHO/FAO/UNEP/UNCHS Panel of Experts on Environmental Management for Vector Control (PEEM). The views expressed in this paper do not necessarily reflect those of the UN agencies involved in PEEM.

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Discussion

Administrative structures for settlement

One of the central recommendations (Recommendation 3) of the guiding principles concerns support for assisted spontaneous settlement rather than government-sponsored settlement, which requires large investments, or completely spontaneous settlement, which often leads to environmental degradation. The participants endorsed this recommendation fully, and the discussion centered on the appropriate administrative structures for organizing assistance for the settlers.

Comments

"It will be difficult to have a comprehensive recommendation on what type of settlement to support. Cultural, social, and economic intricacies need to be kept in mind. The wisest course of action would be to associate spontaneous settlement with some sort of organization or inducement. Give settlers as much information as possible so that they can make their own choices."

"The basic question concerns the cost of government efforts regarding settlement. The most inexpensive solutions must be chosen, given the financial condition of the country. Who will pay for settlement? We talk about involving the people and NGOs, but do these groups have savings? Structures existed before onchocerciasis forced people out. Do we use these structures or establish new ones?"

"The choice of the participants seems to be assisted spontaneous settlement. Settlers are clearly motivated on their own. Designating a specific ministry as the one that should be in charge is perhaps not correct. Each country will have to choose the best one. In any case, the state should not do the brunt of the work. NGOs and farmers should be fully involved."

"The responsibility for overall planning should not be placed in one ministry. The move now is to decentralized planning."

"Spontaneous and yet assisted settlement is more flexible. It leaves room for local communities, NGOs, and even central governments to participate."

Health issues

In response to the paper by WHO, there were several comments on the ongoing need for health services in the OCP area.

Comments

"A number of problems can challenge the results of the OCP. Remember that onchocerciasis became a prime obstacle to settlement at least partly due to winning a battle earlier against sleeping sickness. Existing settlement patterns are also due to other factors, including yellow fever and the effects of colonialism. All major onchocerciasis breeding sites had experienced sleeping sickness epidemics, including major epidemics in Niger, Benin, and Togo and on the White Volta in Ghana. With the influx of settlers and growth in population, the conditions exist for the spread of other epidemics. Do we have the tools to combat the resurgence of these diseases? To preserve the results of the OCP, it is necessary to have an overall approach. For example, what procedures for natural resource management are being promoted by the ministry of agriculture that will reduce the risk of disease? The ministry of health needs tools to identify and track diseases."

"We cannot bask in the glory of having eradicated onchocerciasis. Other diseases—guinea worm, schistosomiasis—are thwarting development. We must work together to fight these diseases."

"Health is the most productive of all sectors. We must integrate health care considerations at the planning stages."





Policy on Settler Participation in the Settlement Process and Selection of Settlement Areas

Sustainable settlement requires participation of the settlers in all aspects of the settlement process—from site selection to provision of services. This session examines settler participation in the settlement process and its relation to the sustainability of settlements.

Successful settlement must involve mechanisms for the peaceful resolution of conflicts in the best interest of society as a whole, taking into account local realities. It is important to consider the social composition of the groups involved in settlement processes, the goals and objectives that they may share, and those on which they may differ. These groups include the people who already live there and those who have lived there in the past. They also include those who wish to move there, those who use local resources (charcoal makers, fishers, hunters, pastoralists), and even those that could serve as an important source of private investment capital (urban elites, foreign tourists, purchasers of indigenous products).

Successful settlement also requires active participation by the representatives of the administration who are responsible for supporting the process through planning and implementing infrastructure investments and providing public services and who bear the responsibility for protecting environmental assets in the interest of society as a whole.

The most important groups, of course, are the host populations and the settlers, who can be either returning emigrants or new immigrants. These groups are not homogeneous but are linked and divided along such lines as age, gender, class, and power relationships. Each group has its own mechanisms for allocating resources and for resolving conflict. The challenge of sustainable settlement

in onchocerciasis-freed areas is to mobilize and harmonize those mechanisms through dialogue between these groups in which all interested parties have the right and obligation to participate.

The paper presented by UNDP, "Views of the People on the Sustainable Development of the Onchocerciasis-Freed Areas in Mali," prepared by means of participatory research methods, examines conditions in two villages (one peri-urban and the other rural) in the onchocerciasis areas of Mali. Both villages have been affected by immigration, but in very different ways. The paper presents the villagers' opinions on how the situation has changed over the past twenty years and what needs to be done to improve local conditions. This view from the village provides an interesting complement to the paper presented by Mali's Ministry of Rural Development and the Environment, "Settlement and Development of Onchocerciasis-Freed Areas in Mali," which gives an overview of the conditions in the onchocerciasis zone in Mali and outlines the government's plan for development in the area.

The paper by Dr. McMillan reexamines and updates the information in the Land Settlement Review with regard to the differential effects of settlement on men and women. She finds that women experience specific disadvantages related to loss of access to land and other natural resources. She also finds that women's perceptions of their well-being in the settlement areas relative to their well-being before moving is closely linked to the general economic conditions of their settlement area. In other words, if the local economy is strong and they are participating in it, women are less concerned about their loss of access to land and other rights.

Views of the People on the Sustainable Development of Onchocerciasis-Freed Areas in Mali

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The Onchocerciasis Control Programme has been one of those rare initiatives that truly contribute to human development. The millions of people whom it has spared suffering and blindness or restored to human dignity through treatment are well aware of the opportunities created by the OCP, attesting to them in these terms:

If we can peacefully talk about development today, it is because the simuliid has been overcome. Previously, civil servants did not want to be posted to Tienfala, and we ourselves were only a broken-down people.

This paper discusses the findings of a study initiated by the UNDP to encourage the incorporation of the views of these people in the development of policies for sustainable settlement of the OCP areas. Moreover, given the seriousness of the economic crisis that Africa faces, the most realistic and sustainable solutions must be expected to come from the people themselves. The time has come for decentralization in Africa.

The study was conducted in January 1994 in Mali in two areas that, several years ago, shared the characteristic of being hyperendemic: the village of Tienfala, located about 30 kilometers from Bamako, the capital of Mali, and the village of Tiengola, located in the arrondissement of Dioila about 220 kilometers from Bamako.

Apart from their common feature, the two survey areas present different characteristics yielding two different sets of problems: those of a rural area where land is still avail-

able and a development agency is operating, and those of an urban peripheral area where arable land is scarce and few development initiatives are reported (box 1).

In each village, those conducting the survey let themselves be guided by the people in the exploration and analysis of their situation. Complementary techniques were used, including community mapping, site visits, observation, and nondirective discussion.

The community mapping technique proved particularly instructive. In Tienfala, the villagers designated one of their spokesmen to draw a map of the area. He drew in pencil the contours of the location and the principal landmarks: the extension of Mandingue Mountain to the north, the Niger River to the south; the Bamako-Koulikoro road, the railroad, the houses, and the fields to the west; the protected forest; the market; the school; the dispensary; the eight photovoltaic lights; the former rice processing factory; and the old building of a cattle-fattening project.

In Tiengola, about twenty villagers participated in making a map of their area showing farmlands to the north and south, pasturelands to the east, forests to the west and southwest, two rivers—one to the east and another to the west—and a main road.

The dynamics that prevailed while these maps were being drawn allowed different people to express themselves, to make corrections, and to describe the characteristics of their sites and the status of the natural resources. After this exercise, the villagers accompanied the surveyors to the sites so that they could establish together what constituted their environments.

Subsequent observation and in-depth talks with groups of men, women, and young people and within households chosen according to occupation and socioeconomic status of the head of household¹ made it possible to define how people live and to interpret the local situation.

The data collected through these exercises are organized in this report around the concerns on the agenda of the ministerial conference.

Settlement and the environment

Soils, pasturelands, forests, and watercourses create the physical conditions for settlement and resettlement. The history of Tienfala, for example, begins around 1886 with the arrival of Dienfa, who was hunting for game on the future site of the village. The abundance of natural resources encouraged him to settle there. The word Dienfala, Dienfa's

¹It is difficult to determine income levels in rural settings. Nonetheless, information on the size of fields and of production facilities made it possible to distinguish between villagers who were well off, those who were less well off, and those who were poor.

Box 1 Key features of the survey villages

Tiengola	Tienfala
Initial OCP area	Extension area
Rural setting	Urban periphery setting
High rural migration rate	Low migration rate
ODR intervention area	Non-ODR intervention area
Land available	Land scarce

Note: Office de développement rural (ODR) is a development agency.

home, was distorted into Tienfala. Tiengola also owes its existence to a Bambara farmer, Tienkôba, who discovered good farmland there around 1770. Tienkôbala, Tienkôba's home, was distorted into Tiengola.

The host populations in these villages remember a time when game, fish, millet, maize, sorghum, and groundnuts were abundant. The ecological awareness embodied in these memories, shared with settlers, could play an important role in environmental education and in sustainable development of the OCP areas. It is also important to know the rules governing access to these resources and the degree of control that the villagers exercise over the resources.

Access to land

The host populations feel that the lands belong to them. Under customary law, outsiders can be granted a tract of arable land in exchange for a symbolic payment: one rooster and ten kola nuts.

Tienfala. In Tienfala, the host population of Djingoni and Tienfala-village affirm that "we have always farmed. The land belongs to us, and we made it over to the inhabitants of Tienfala-gare."

Tienfala-gare was created for the construction of the railroad in 1926. While recognizing the status of the inhabitants of Tienfala-village as holders of the traditional property rights, the inhabitants of Tienfala-gare express regrets about the land situation:

"We no longer have lands, because those who traditionally hold the property rights sold them to the rich citizens, civil servants, and economic agents, who have planted trees there and thus violated the rules of the game. Because until recently the person to whom the land was lent did not have the right to plant trees [synonymous with putting down roots and thus with appropriation] without notifying the holders of the property rights. But the affluent classes of the town went beyond this rule. Better still, they hold the property titles and have developed large areas of fertile land along the river. We took action, but in vain. They are rich, we are poor. And we lack financial and technical support."

Tienfala's proximity to the capital and the power of the affluent citizens in the land tenure game have helped confine farmers to meager tracts, limiting their ability to create new fields and rotate crops, and thus to increase productivity. The possibilities for expanding fields are also limited by the Mandingues Mountains north of the village. As a result of these constraints, farmers' tracts in Tienfala rarely exceed 3 hectares: "We have been farming the same tracts for over thirty years because there are no possibilities of extension or even of letting them lie fallow."

The young people of Tienfala-gare deplore the land situation. According to them, it is due to the illiteracy of their parents, who did not know what was at stake. With-

out precautions, they made over tracts that were transformed without their knowledge into titled property. The young people propose that restrictions on the use of the forest be lifted from the part in the interior that is already cleared.

The main crops in Tienfala are millet, rice, and maize for personal consumption. "You have to eat yourself before you can sell anything," the peasants say. Fruit trees (mangos and guavas) are the rare sources of income available to them.

The local traditional farming system relies on family labor and uses the hoe as the main tool of production. The head of household organizes and coordinates all the work in the communal field. After the harvest, he stores the millet and manages it by regularly giving the women the amounts they need. The women grow rice and tend market gardens. They farm in the lowlands of the village on tracts obtained and managed with the help of their husband and other relatives. The children help the adults in growing millet, beans, and sorghum. When he can find one, a farmer recruits a hired laborer, who gives him three days of work out of seven and works four days for himself.

Tiengola. Unlike in Tienfala, in Tiengola land is still available: "We have very good land, easy to work. To obtain a tract we request one from the village chief, and we farm as much area as our resources allow." The accessibility of land and the acceptance by the host population encouraged many seasonal workers from Bélé Dougou, Kolokani, and Ségou to settle and work for pay in the cotton fields.

Until 1968, when the *Compagnie malienne pour le développement des textiles* (CMDT) began activities in Tiengola, the farmers produced millet, maize, beans, rice, and groundnuts for personal consumption. But the lack of equipment and technical advisers impeded the development of food crops: "We have a vast fertile plain for rice growing. But we are faced with inadequate production facilities and an early retreat of the waters." Cotton growing, a source of income for both the farmers and the state, was promoted through CMDT extension services, which provided farm equipment on credit (plows, seeders, oxen, carts) and inputs (fertilizer, herbicides, pesticides).

Farmers pay for the inputs after they sell their cotton, and they can repay loans for farm equipment over three years. The farmers claim that they always paid their debt, until 1980, when their situation began to deteriorate for several reasons:

- The CMDT's rule that cotton fields must not exceed 2 hectares
- The poor quality of locally manufactured carts
- The inadequacy of the inputs and seeds furnished (2 kilograms of seed per hectare per year)
- The irregular collection of the crop, which could

remain stored for several months before removal, causing delays in farmers' receipt of payment.

The farmers' resulting financial difficulties have forced some to sell their millet or oxen to pay their debts.

Pasturelands

Tienfala. Most inhabitants of Tienfala raise stock as a secondary activity, hiring Peuhl pastoralists to tend cattle at CFAF 100 (before devaluation) per animal per month. Cattle are raised primarily for personal consumption, but also for use in farming. Women raise sheep, goats, and fowl, also for personal consumption, but, in addition, they may sell them if money is needed.

The affluent citizens also raise livestock, but semi-intensively: "Their cattle wander into our fields. This situation has caused conflicts, particularly serious in 1991, which were ultimately put down by the authorities," the villagers reported.

Pastureland generally has been abundant in Tienfala, and the stock well fed. But pastureland is beginning to become more scarce.

Tiengola. In Tiengola, it is the Peuhl pastoralists who own the animals, and there is greater availability of pastureland than in Tienfala. Because of the accessibility of pastureland, the pastoralists have come from Nara and Macina to settle in the area. Conflicts traditionally arise between farmers and pastoralists. But in Tiengola, in addition to the damage that the animals can cause to the fields, the host population complains that the pastoralists illegally cut down trees to feed their animals with branches when grass becomes scarce. The president of the Tiengola village association described the community's perception of the situation in these terms:

"We have informed the authorities in Diofla of the unlawful practices of the Peuhl pastoralists with respect to cutting down trees and shrubs, but in vain. We believe that the culprits have the resources to corrupt the government. But we are determined to defend our heritage ourselves."

Forests

Tienfala. The history of Tienfala tells the story of an area rich in game and in trees. But increasing pressure on deteriorating land has induced the villagers to transform much of the forest into farmland.

One forest in Tienfala has been protected since 1939. But its status is constantly violated—only on the edges does it look like a forest. Its interior has been largely cleared by firewood dealers and by women who also derive some income from selling wood.

Tiengola. In the 1970s, big game was abundant in Tiengola. But at present, except for warthogs, hunting gamers little more than small animals, such as hare and partridge. Nonetheless, the forest is better preserved than in the

urban peripheral area of Tienfala, despite the illegal cutting by the pastoralists.

"So far, we can find everything we need in our forest: the karité and the neré are part of our food; the n'golobé and the kolo-kolo are used in traditional medicine and are used for firewood; the chô and the yala are used to make roofs for huts."

In Tiengola, the people have become aware of the consequences of degradation of the environment and have made provisions to protect it: the women gather only deadwood, cutting wood is forbidden, and brush fires are started only after obtaining the advice of the forest service.

Watercourses

Tienfala is bounded on the south by the Niger River, and Tiengola is bounded by two rivers. These watercourses play an important role in the life of the people. Women grow irrigated rice in both Tienfala and Tiengola. And all members of the family engage in activities related to fishing: the men catch the fish, the women process and market the fish, and children help their parents. Beginning at the age of ten, boys accompany their fathers fishing and girls help their mothers with the fish processing.

Despite these economic activities, the rivers are under-exploited because of the lack of irrigation equipment and reliable methods of supplying potable water. "We are on the edge of the water and we are thirsty," say the inhabitants of Tienfala. The water comes from the hill and the river, but we do not have the means to control it."

Like the fields and the pasturelands, the Niger River is becoming less and less generous. The fishermen in Tienfala still manage to make catches, however, part of which trickles down to the fish dealers and consumers in Bamako.

A growing number of fishermen from the Bozo and Sonomo ethnic groups have been coming to Tienfala from Koulikoro and the region of Mopti. Their settlement in the village has caused some conflicts, as the president of the Tienfala fishermen's association explains:

"I settled here with my family ten years ago, from our native village. At that time, the population was welcoming. But in 1992, it became hostile because it considered that our community was becoming too large and we were depleting the river water with our catches. They asked us to go away. When we refused, they destroyed our equipment. Were it not for the intervention of the Governor of Koulikoro, the conflict would have had more serious consequences. They are wrong to accuse us. The fish are becoming scarce not because of our catches, but because of the reservoirs and the releases of water from the Sélingué dam, which disturb the normal rate of flow of the river."

Development experiences and initiatives

All of these economic activities in Tienfala and Tiengola—fishing, cattle raising, rice and cotton production—have been targeted by development projects and

programs. The outcome of these efforts should be taken into account in developing strategies for sustainable development in the OCP areas.

State initiatives

The people freely share their opinion of these development projects and programs when given latitude to do so. The community maps that they draw show the results—or the remains—of these initiatives.

The inhabitants of Tienfala, for example, mention with regret the time when the rice processing plant of the Office du Niger was still in operation. They complain that the former rice processing plant could have been made useful to the village if the responsible authorities had consulted with them. They also mention a cattle-fattening project, which created about forty jobs for the young people of Tienfala in 1976 but was discontinued in 1986 for reasons unknown to the village.

The condition of infrastructure in the village also reveals the limitations of the development initiatives of the past thirty years. Tienfala has two tubewells, one of which is in poor condition. The women must deal with serious water shortages during the dry season, when the river water, which is polluted, sells for CFAF 250 per barrel (200 liters). The village school, built in 1959, is in poor condition, underequipped, and overcrowded. The pharmacy and the veterinary center have almost no drugs.

Local initiatives

The limitations of the state initiatives have led to an understandable desire among the villagers to organize themselves more. One of the community leaders in Tienfala commented that "the state has nothing and the individual can do nothing all alone. The group remains the only weapon against adversity and poverty."

It is in this context that the community movement now prominent in Africa has emerged. This movement has especially engaged women and young people, who are particularly aware of their vulnerability and feel a need to work together. Local organizations and associations are endeavoring both to remove constraints to local development and to protect communities' interests by exerting pressure on administrative and political authorities. These local organizations can play an important role in the sustainable development of the OCP areas, as a channel for participation in decisionmaking and for mobilization of local resources.

In Tiengola, for example, members of the village association, created some ten years ago, cite among its accomplishments the construction of a fertilizer storehouse and of a house for the agricultural extension agent and the purchase of a scale, 180 sacks, and a moped for the use of the village association. The association meets its operating

expenses by collecting 2 kilograms of cotton at the end of the harvest from each farm manager and by levying a lump sum tax on the pay of the cotton collectors that it appoints.

The members of the association believe that the village could make further progress if they had oxen, better carts, an irrigation dam to develop rice and fruit production and market gardening, and a motorized irrigation pump. But they reported that they needed technical and financial support to pursue these goals successfully.

The members of the Tienfala village association similarly aspire to improve the local production potential by developing irrigated areas and market gardens. The association has also contemplated reactivating facilities left by state-sponsored development projects (the rice storehouse, and the building for the cattle-fattening project). Other development activities that the inhabitants of Tienfala have considered include reforestation, creating tourist sites, and building community health centers.

Conclusions and recommendations

The following analysis of the perceptions and views of the people of Tienfala and Tiengola is, as it should be, interspersed with their testimonies—expressions of their gratitude for the OCP, of the hope afforded them by the valleys freed of onchocerciasis, and of their determination to develop through their own initiative. Their views suggest components of strategies that could further the participatory and sustainable development of the OCP areas.

Health and the economy

The people of Tienfala analyze the relation between health and the economy in these terms: "No wealth is of any use as long as you do not have the supreme wealth of good health," and "poverty has many causes among us; onchocerciasis is but one of them."

Consolidating and perpetuating the results of the OCP will require that African decisionmakers and their partners in the development community have, like the people of Tienfala and Tiengola, a clear perception and an acute awareness of the relation between health, the economy, and development.

Cooperation and sustainable development

Mobilizing and investing \$340 million in the OCP's activities in the past twenty years (perhaps \$580 million by the end of the century), the international community has shown exemplary generosity and solidarity. It would be unfortunate for this achievement to be tarnished by the attitude reflected in the following statement, which has been shared by some participants who seem to underestimate the difficulties that African governments face:

"Up to now, the West African governments themselves have played only a small role. Those efficient international

WHO teams with their highly trained staffs, their whirring helicopters and fleets of jeeps, their microscopes and wall charts, their seminars and research papers arrived, fought the disease and raised the funds." (Wigg 1993, pp. 35-36)

Better than an invitation to African decisionmakers to assume their responsibilities in the sustainable settlement of the OCP areas, the ministerial conference should provide an opportunity to show that a health program well-coordinated with other appropriate activities can lay the foundations for sustainable human development.

Settlement and sustainable development

The people recognize that onchocerciasis is one of the reasons why some villages have moved away or have diminished in population, as occurred between 1950 and 1968 in Tiengola. But they also mention poverty, the drought, the lack of potable water, and the famines caused by invasions of grasshoppers. The abandoned areas represent, of course, lost opportunities both for farming and for human development.

Nonetheless, just as onchocerciasis is one cause of poverty, so is its eradication one factor in development. Therefore, eradication of onchocerciasis (without forgetting that other deadly diseases persist where onchocerciasis is receding) must be accompanied by appropriate solutions to economic constraints, as a 1985 USAID mission concluded:

"The program seems to be one of the most successful multiple-donor programs in the short history of development assistance. In 90 percent of the area, the transmission of onchocerciasis was interrupted, [but], unfortunately, to date the success of the program has not automatically led to an increase in income or economic growth. Supplementary investments are necessary to exploit the freed areas. New activities should be developed." (USAID 1986, cited in Hunting Technical Services Limited and Organisation et environnement 1988, p. 2)

The testimony of the inhabitants of Tiengola shows that in the absence of such initiatives the villagers migrate to the cities.

"Now our young people are going toward the urban centers after the harvests to look for money because the cotton work is becoming increasingly difficult. Some of them are going as far as Guinea and Côte d'Ivoire. This exodus is even affecting the young women, who are going to seek their trousseaux."

The real pockets of poverty today are in the towns, where the most active members of the rural communities, including those in the reclaimed valleys, are coming to swell the numbers of the unemployed. *The assumptions about settling the reclaimed valleys must be rethought in the light of the economic crisis and strategies for the survival of communities.*

Government authorities in Mali may encourage the

settlement of farmland as a solution to the persisting economic crisis, which poses a risk of social unrest. The Institute for Development Anthropology (IDA) study of settlement in the OCP areas in Mali confirms that Mali's government would like to establish special incentives to settle in these areas for young graduates or mid-level civil servants who have lost their jobs following economic restructuring programs (McMillan, Painter, and Scudder 1993). *Migration to the OCP areas needs to be considered in the context of a strategy that can alleviate this economic crisis while ensuring the protection of the environment. Otherwise, it is unlikely that African governments, burdened with debt and facing unprecedented budgetary constraints, can take measures to achieve sustainable settlement.*

Access to productive resources

The reclaimed valleys are being resettled in ways that accord with traditional practices. For example, the rules of access to land are proving effective because they are recognized by both host populations and settlers. *This capacity of the people to manage themselves must be taken into account and supported as part of the effort to promote participatory and sustainable development of the OCP areas.*

Women's needs for their productive activities are recognized in the communities. In Tienfala, for example, men request a tract of lowlands for their wives so that the women can grow rice. In addition to working their own tract, women perform work that is essential to the household, such as working in the family field and carrying out domestic tasks, including fetching water and wood. But these vital resources are becoming increasingly difficult to obtain because of the degradation of the environment. The traditional wells quickly run dry, and the modern, expensive installations often are defective.

Improving the status of women in the OCP areas will require policies that take into account their working conditions in the field and their many time-consuming household chores. Despite the urgent need for action, it must not be forgotten that any guidelines not developed in collaboration with women and with their communities are doomed to failure.

In Tienfala, the nature of the location and the needs of large landholders limit the opportunities for agricultural development. *The government must be vigilant against well-off citizens using the resources available to them (equipment, financing, political influence) to appropriate vast areas of land and thus limit the potential for communities—whether host populations or settler—to improve their productivity and living conditions.*

Community participation

Unlike the host populations who have learned to expect everything from the government (though they are beginning to question this attitude), the settlers have