

SENEGAL: ISSUES FOR SUSTAINABLE AGRICULTURE AND NATURAL RESOURCE
MANAGEMENT

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This presentation is based on a review of documents and a series of interviews with key informants and practitioners, both past and present, in Dakar and in the field. A ten-day field visit to former and present project sites in the Fleuve, Ferlo, Dior, Saloum, Tambacounda, and Kolda zones of the country enabled the study team to see first-hand the current state of Senegal's resource base.

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DNEF	<i>Direction Nationale des Eaux et Forêts</i> National Forestry Service
EROS	Earth Resources Observatory System
FAO	Food and Agriculture Organization
EC	<i>Groupe d'Action pour le Développement Communautaire</i> Action Group for Community Development
GDRN	<i>Gestion Durable des Ressources Naturelles</i> Sustainable Natural Resource Management
GIE	<i>Groupement d'Intérêt Economique</i> Economic Interest Group
GOS	Government of Senegal
GPF	<i>Groupement de Promotion Féminine</i> Women's Development Group
GPS	Global Positioning System
GTZ	<i>Deutsche Gesellschaft für Technische Zusammenarbeit</i> German Technical Cooperation
ICRD	<i>Centre de Recherche pour le Développement International</i> International Center for Research and Development
ICS	<i>Industries Chimiques du Sénégal</i> Chemical Industries of Senegal
IMF	<i>Fonds Monétaire International</i> International Monetary Fund
ISRA	<i>Institut Sénégalais de Recherche Agricole</i> Senegalese Agricultural Research Institute
KAED	Kaolack Agriculture Entreprise Development Project
MARP	<i>Méthode Accélérée de Recherche Participative (also, see RRA and PRRA)</i>
NEAP	National Environmental Action Plan
NGO	<i>Organisme Non-Gouvernemental</i> Non Governmental Organization

NPA	<i>Nouvelle Politique Agricole</i> New Agricultural Policy
NR	Natural Resources
NRM	Natural Resource Management
ONCAD	<i>Office National de Coopération et d'Assistance au Développement</i> National Office for Cooperation and Assistance for Development
PAGEN	<i>Programme Associatif de Gestion des Espaces Naturelles</i> Associative Program for the Management of Natural Areas
PAGERNA	<i>Projet d'Autopromotion de Gestion des Ressources Naturelles</i> Project for the Self-directed Management of Natural Resources
PAN/LCD	<i>Plan d'Action National pour la Lutte contre la Désertification</i> National Action Plan for the Fight against Desertification
PAPEL	<i>Projet pour l'Amélioration et la Productivité de l'Élevage</i> Project for the Improvement of Livestock Productivity
PDESO	<i>Projet de Développement de l'Élevage au Sénégal Oriental</i> Eastern Senegal Livestock Project
PRECOBA	<i>Projet de Reboisement Communautaire du Bassin Arachidier</i> Community Reforestation Project for the Peanut Basin
PREVINOBA	<i>Projet de Reboisement villageois Nord Bakel</i> Northern Bakel Village Reforestation Project
PROBOVIL	<i>Projet de Bois de Village</i> Village Woodlot Project
PROGEDE	<i>Programme de Gestion Durable et Participative des Énergies Traditionnelles et de Substitution</i> Programme for Sustainable and Participative Management of Traditional and Alternative Energy Sources
PROGONA	<i>Projet Gonakié</i> Gonakié Project
PRRA	Participatory Rapid Rural Appraisal (see MARP)
PVO	Private Voluntary Organization

RRA	Rapid Rural Appraisal (also, see MARP)
SAED	<i>Société d'Aménagement et d'Exploitation du Delta</i> Company for Land Use and Productivity of the Delta
SATEC	<i>Société d'Assistance Technique</i> Technical Assistance Company (French)
SIES	<i>Société Industrielle Engrais du Sénégal</i> Industrial Fertilizer Company of Senegal
SISCOMA	<i>Société Industrielle Sénégalaise de Commercialisation de Matériels Agricoles</i> Industrial Agricultural Equipment Sales Company
SISMAR	<i>Société Industrielle Sénégalaise de Matériel Agricole et Rural</i> Industrial Agricultural and Rural Equipment Company
SFD	<i>Structure Financière Décentralisée</i> Decentralized Financial Structure
SNTI	<i>Société Nationale de Transformation Industrielle</i>
SNRM	National Company for Industrial Processing
SRP	<i>Projet de Reboisement du Sénégal</i> Senegal Reforestation Project (USAID – see PRS)
SRDR SRP	<i>Société Régionale de Développement Rural</i> Regional Rural Development Company
SO	Strategic Objective
SOCAS	<i>Société de Commercialisation Alimentaire du Sénégal</i> Senegalese Food Marketing Company
SODEFITEX	<i>Société de Développement des Fibres Textiles</i> Textile Fiber Development Company
SODESP	<i>Société de Développement de la zone sylvo-pastorale</i> Sylvo-pastoral zone Development Community
SODEVA	<i>Société de Développement et de Vulgarisation Agricole</i> Company for Development and Agricultural Extension

SOMIVAC	<i>Société pour la mise en valeur de la Casamance</i> Company for the development of the Casamance
SONACOS	<i>Société Nationale de Commercialisation des Oléagineux au Sénégal</i> Senegalese Oil Company to Develop and Sell Oils
SZWMP	Southern Zone Water Management Project
UJAK	<i>Union des Jeunes Agriculteurs de Koili Wirdi</i> Young Farmers Association of Koili Wirdi
USAID	U. S. Agency for International Development
VAT	Value Added Tax
WFP	<i>Programme Alimentaire Mondial</i> World Food Program

Executive Summary

The prospective study builds on the analysis carried out in the retrospective study on agriculture and natural resources management in Senegal. It highlights pressing issues in the sector and makes recommendations on promising activities (“The Way Forward”).

The report first examines the future of agriculture, focusing on the following areas:

- Modernizing the agricultural system
- Intensifying production through economically viable farm sizes
- Providing secure land title
- Integrating agriculture
- Providing effective water management
- Reclaiming agricultural land
- Improving access to training
- Diversifying and developing alternative markets, both for inputs and outputs
- Involving the private sector in agricultural development
- Encouraging research and development
- Encouraging rational utilization of land
- Developing alternative rural strategies
- Improving access to rural credit

The report then examines sustainable natural resources management, acknowledging that natural resources and agriculture are intricately connected. Areas of focus are:

- Creating resource inventories for the rational management of natural resources
- Developing community resources
- Protecting local rights and the security of forest resources

The report argues that tremendous reductions in natural resources have been inadequately addressed in the past. These should now be brought center-stage and relevant policy decisions made.

The report’s third area of focus is the institutional, policy, and economic environment affecting agriculture and natural resources management. The report highlights the need for improved coordination at all levels between different partners. It analyzes and makes suggestions for improved information and information flow. It discusses the roles of the Government of Senegal, at both central and decentralized levels, with detailed recommendations for technical services, including a model structure for a single ministry dealing with agriculture, natural resources, and land use. It also highlights opportunities for non-governmental organizations and religious authorities. The report make a strong argument for allowing the private sector to play a key role in the emergence of sustainable agriculture and natural resource management in Senegal.

The report's policy recommendations highlight fiscal measures as part of public policy, but policy issues are also embedded in many of the technical recommendations. Economic issues include generating value from natural resources protection and commercializing local consumption and export.

The report then proposes potential interventions in the sector, based on a program (rather than a project) approach. The major components required to develop the SNRM sector program are:

- Identify the principal and secondary priorities for the SNRM program
- Define and structure the role of GOS in the development processes
- Define the role of specific donors and other development partners
- Define and reorient the role of the private sector
- Structure a unified approach for information sharing
- Identify specific intervention technologies for SNRM sector interventions

Finally, the report develops a framework, with objectives and targets, to facilitate dialogue on the proposed interventions.

Introduction

This report reviews development options for improving the sustainability of natural resources management in Senegal. The report has been prepared for USAID/Senegal through the Biodiversity and Sustainable Forestry (BIOFOR) Indefinite Quantity Contract (IQC), and is the second of a two-part document. The first document, the Retrospective Report, provides a review of historic natural resources and agricultural interventions in Senegal, including a description of lessons learned. The future interventions presented herein are not only intended to benefit USAID but should also be of strategic value to the Government of Senegal (GOS) and its other development partners. Indeed, our propositions revolve around a programmatic approach, calling for the cooperative involvement of a diversity of partners pursuing different but complementary interventions and consistently reinforcing a common message.

Objectives of the Prospective Study

The purpose of this prospective study is to allow USAID, the Government of Senegal (GOS), and other concerned partners to capitalize on lessons learned and to plan for future sustainable agriculture and natural resource management (SNRM) interventions. The intent is to help USAID significantly increase the sustainable management of Senegal's natural resources and to thus break and eventually reverse the alarming degradation of natural resources.

The current document is based on the SNRM experience gained during development of the retrospective report. Chapter one highlights and analyzes the principal issues related to the future of SNRM in Senegal, including suggestions for ways forward. It examines a variety of technical, socioeconomic, policy, and institutional issues. Chapter two develops approaches and methodologies for future interventions.

CHAPTER 1

Pressing Issues for Sustainable Agriculture and Natural Resource Management

Throughout the two volumes of this document, we have emphasized the intimate relationship between sustainable agriculture and natural resource management, a relationship conditioned by prevailing political and economic climates. In order to discuss potential developments in the agricultural sector and the sustainable utilization of natural resources, it is necessary to take a holistic view of all interacting components. If this is done effectively and supported by proven field intervention techniques, the agricultural sector can retake its place as one of the economic engines of Senegal’s future development.

The holistic approach requires that a plethora of pressing issues be taken into consideration. These include:

- The future of agriculture in Senegal
- The future of natural resources in Senegal
- The institutional environment
- The policy environment
- The economic environment

It is more logical to develop a holistic approach to development strategies than to try to separate agricultural activities from those of natural resource management.

These factors are only separated out to facilitate analysis. In practice, they must be treated as interdependent parts of an integrated system.

1.1 The Future of Agriculture in Senegal

Traditional agriculture is in dire straits: Extremely low farm income does not favor investment; low levels of diversification are practiced; few technical inputs are utilized, and thus the input markets are limited and ineffectual due to low demand; a lack of available land prevents expansion; and, as will be discussed later, many farmers across the country have given up rotational practices and have resorted to cultivating the same crops year after year. The problems of small-scale farmers are compounded by long-term government policies subsidizing Senegal’s urban population to the detriment of the rural community.¹ The natural decline in annual precipitation across the country is also well documented.

The net result of this combination of factors has been the inability/unwillingness of the traditional farming community to invest in natural resource management techniques, including land conservation. This has led to a vicious circle of depleted soil fertility, long-term decline in crop yields, a reduction in the earning power of farming communities, and the inability to invest.

¹ This point is discussed later in the current document. In fact few if any agricultural products and natural resources sold in Senegal’s large towns command prices that reflect either their true economic or environmental value. Charcoal, sold at a fraction of the cost of growing the wood from which it is derived, helps to explain the unsustainable rate of forest exploitation in the country. The low prices paid to farmers for their output partly explains their inability to invest in their production systems.

To compound the problem, a rural exodus of younger members of the population — who potentially constitute the most productive category of the farm labor force — is leaving a farming community composed of children and older, less educated individuals.

Given this dismal scenario, it is clear that Senegal’s traditional agriculture is reaching its breaking point. Great efforts will have to be made, first to halt and then to counter the current trends. New strategies must be adopted. Many and varied interventions have been tried and vast amounts of money and effort expended in attempts to change traditional agriculture in Senegal, but seemingly to little avail.²

1.1.1 Revitalizing the Agriculture Sector in Senegal

Failure to adopt change will only result in further declines in productivity and living standards, increases in rural exodus, and competition for the remaining and very limited natural resources (with potentially dire consequences).³

Catalysts with the greatest potential for revitalizing the agricultural sector are:

- *Modernization of the agricultural system.* This requires an enhanced political environment, extensive private sector participation in the input and output streams, and alternative, non-agriculturally dependent livelihoods for many of the rural population.
- *Intensification of production through economically viable farm sizes.* Most small farms are incapable of producing sufficiently high crop yields to provide even the basic requirements of rural households. The longer-term trend must be toward aggregating individual farms and developing more efficient farming practices.
- *Provision of secure land title.* In order for farm sizes to be increased, it will be necessary for the state to undertake a drastic revision of the land tenure system, thus providing current land users with full title to their land and the ability to invest, buy, and sell.
- *Integrated agriculture.* The place of livestock and agro-forestry within small-scale agriculture needs to be rationalized and reinforced.
- *Effective water management.* Water, in one way or another, is at the root of most of the agricultural problems in Senegal; methods are available to counter these problems and must be used across the country.
- *Agricultural land reclamation.* Salt-intruded lands, eroded lands, and exhausted soils can be rehabilitated using adapted techniques.

² See Section 2 of the Retrospective Report.

³ See “Agricultural Colonization of the Forest of Pata”, Section 3.2 of the Retrospective Report.

- *Improved access to training.* Some exceptional agricultural success stories exist in Senegal. Successful methodologies need to be identified and popularized, with a goal toward replication.
- Diversification and development of alternative markets, both for inputs and outputs.
- *Private-sector involvement in agricultural development.* Competence in the private sector must not be impeded by the state. Agricultural development requires a strong technical cadre and enhanced, sustainable incentives to encourage investment.
- *Research and development.* Continual innovations, including improved plant stocks and protection, are necessary to keep pace with the evolving agricultural situation.
- *Rational utilization of land.* Not all land currently under cultivation is suitable for agricultural production. It will be necessary to take a far more rational view of land utilization across the country.
- *Alternative rural strategies.* It is unlikely that the land can continue to support several million individuals. Alternative economic activities are therefore necessary. This will include developing a class of rural entrepreneurs employed in the agricultural services sector.
- *Improved access to rural credit (see section 1.5.1).* Such access would improve the possibility for investment in farming activities, including purchase of farm equipment, materials and inputs.

1.1.1.1 Traditional Versus “Modern” Agriculture Systems

The total cultivable land in Senegal is approximately 3.8 million hectares.⁴ Of this total, at least 79 percent is cultivated or under fallow. Due to an increasing population, per capita land under cultivation has declined from 0.5 ha in 1976 to less than 0.3 ha in 1990. A more recent study has shown that the percentage of land under cultivation continued to rise sharply between 1990 and 1995.⁵ Even these figures are considered under-estimates. A detailed study undertaken by EROS/CSE (to be published in 2000) purports to show, using remote sensing techniques, that, even as early as 1990, at least five million hectares were either being cultivated (70 percent of the total) or under fallow (30 percent). This far exceeds the amount of land classed as suitable for cultivation.

The statistical analysis is simple: With eight million people living in rural areas and 3.5 million hectares cultivated, this equates to approximately 0.4 ha per capita, with at least 30 percent of the land not considered suitable for agriculture. The vast majority of this cultivated land is under subsistence agriculture, with yields in the densest agricultural regions struggling to exceed one ton per hectare, even in a good year. As argued previously,⁶ the Senegalese agricultural system

⁴ 1991 Agriculture Sector Analysis, USAID.

⁵ 1997 Agriculture Sector Analysis Update, USAID.

⁶ Section 3.2 of the Retrospective Report of the current Ag/NRM Study.

has all the hallmarks of extensive agriculture but without the luxury of available land. Land is cultivated even when the soil quality has declined to unproductive levels.

Contrast the traditional situation and yields to those currently being realized by more “modern” type of agricultural exploitations that rely on good land husbandry, financial investment in a range of inputs, and sound water management practices, including irrigation. Together, they extend the period during which the land can be kept under production and increase the productive potential of the land substantially. Such modern exploitations are still relatively rare, but we believe that they indicate the way forward.

Nowhere in Senegal is agriculture simple; nonetheless, some excellent examples show dramatic increases in production when adapted approaches are used. If the rural future is ever to be brighter than the current, unsustainable situation, it will be necessary both to multiply proven successful practices and to introduce further innovations.⁷

We do not claim to have all the answers to the modernization and improvement of Senegalese agriculture (neither is this the role of the current document), but we hope that our suggestions will stimulate additional study and debate, and stimulate government and donor involvement in the agriculture reform process.

The Way Forward

Short- and medium-term assistance: Traditional agriculture in Senegal is failing. The state has first to come to terms with this fact and then put in place the necessary political and economic facilities to support the evolution that must come to the agricultural world. Such changes may not always be politically popular. However, continuing the current strategy will only make the inevitable changes that much harder to introduce. Donors need to help the government achieve this objective.

1.1.1.2 Small-Scale Versus Large-scale Agriculture

To succeed in modernizing agriculture and improving productivity, it will be necessary to rationalize farming by the creation of larger farming units allowing the benefits of scale. It is clear that the miniscule plots of land farmed by many households, particularly in the Peanut Basin, can never become sufficiently productive to adequately support their resident populations.

A different approach must therefore be adopted to allow the potential aggregation of farmland to create larger units. Currently, the law of “Domain National” gives farmers the right to cultivate their fields, but land title rests with the state. This means that farmers currently have no legal title to their land — even though it may have been in their family for several generations — and hence have no right to sell or incentive to invest. This must change if larger farming units are to emerge and investment in such units is to increase.⁸

In spite of the National Domain Law, a “gray” land market has developed in several areas, whereby land is being bought and sold. Such transactions occur relatively frequently in the Niayes and the Petite Côte, but how frequent and widespread the practice is across all zones of

⁷ These must be supported by coherent and appropriate government policies.

⁸ See also Section 1.2.5 for additional discussion of land tenure and land security issues.

Senegal is unknown. Nonetheless, the consequences of such actions could be serious if the informal transactions were ever rescinded. Still, they do provide the Senegalese government with a clear signal that a potential market exists.

The Way Forward

Medium-term assistance: Efficiencies of scale must be promoted since the current small size of the typical Senegalese farm cannot sustain the requirements of most households. Therefore, logic dictates that larger farm units must be favored. The only acceptable way to bring this about is to provide farmers with legal title to their land. This would enable individual households to decide whether to buy additional land or to sell out. Either way, the trend would be toward the creation of larger farming units.

1.1.1.3 Integrated Agriculture

The Serère ethnic group has developed some highly successful and productive small-scale agricultural systems, based on the integration of livestock and agro-forestry into the production system. Their methods are complementary, sustainable, and worthy of replication elsewhere in the country. They tend to cultivate parcels of land encircled by fruit trees acting both as windbreaks and as significant revenue generators. Water is usually drawn from wells within the plot, so a certain amount of irrigated agriculture is possible throughout the year to supplement rain-fed cultivation. Manure is always used to fertilize the soil, and compost is also frequently applied. Furthermore, many — probably the majority — of subsisting rural families tend to adopt a diversity of occupations to complement the low agricultural productivity. For example, some members of the family are producers; others are fishermen, storekeepers, or maids. Together, they help to ensure the economic well being of the household.

The general points of a more sustainable, integrated approach are developed in the following sections.

1.1.1.4 Effective Water Management

The major constraint to agriculture in Senegal is water. Much of the country lies within characteristically low rainfall zones in which rain-fed agriculture is only possible during three or four months each year. Even in those zones where rainfall may be more copious, water is often accompanied by other pressing problems and detrimental effects. For example, in the southern half of the country (from Thiès southward), total annual rainfall, although relatively high, is distributed such that the growing season remains relatively short (approximately four months). Furthermore, in much of western Senegal, from the Petite Côte south to the Casamance, as well as in many areas of the Senegal River valley, salt intrusion seriously reduces yields and, in severe cases, causes large tracts of land to be abandoned. In other zones favored by higher rainfall, (e.g., the Saloum and eastward towards Tambacounda) poor water penetration of denuded and compacted soils, largely caused by poor land husbandry, creates considerable surface flow during heavy rainstorms, resulting in serious and widespread hydric erosion and loss of topsoil.

Despite these different scenarios, there are techniques to solve or at least improve many of the water-related problems that afflict agriculture. In areas where the temporal distribution of rainfall

prevents an extended growing season, there are techniques available for retaining water and extending the growing season considerably. In areas suffering from salt-intrusion, appropriate management techniques and improved practices are capable not only of impeding the salt effect but also of reclaiming previously abandoned land. In areas suffering hydric erosion, techniques are available first to stop the erosion, then to reclaim farmland and finally to protect the land from future erosion. Even in the driest regions of Senegal, there are techniques for efficient water usage that can permit a considerable intensification of agricultural production, although some zones will remain unsuitable for any form of agricultural activity.

The Way Forward

Begin assistance in selected areas immediately: Water is considered a major problem afflicting agriculture in Senegal. The list of problems it creates is extensive but includes: too little rainfall, uneven rainfall distribution over time, hydric erosion, water tables with high salt loads, water tables too high/low, and excessive cost for irrigation. The battle for the future of agriculture will be conditioned by response to these water issues.

These issues are examined at in more detail in the following sections.

Poor Temporal Distribution of Rainfall

As a rule of thumb, the southern half of Senegal — basically, the zone with a reliable rainfall exceeding 400 mm annually⁹ — presents enormous agricultural potential. Despite the relative shortness of the rainy season and the impact that this has on the length of the growing season, the zone typically receives significant quantities of precipitation, although its temporal distribution is inadequate. Currently, depending on rainfall intensity and the porosity of the soil, much of the rainfall is lost either by run-off into streams and rivers or through percolation into the soil. Clearly, any means that can retard the rate of water loss could be used to prolong the agricultural season. Already, practices such as recession agriculture and water retention dykes have had considerable effect, but the potential remains for a much greater agricultural impact. Slowly, communities are becoming aware of the potential of water retention structures such as mini-dams and pond improvement (“aménagement des mares”) programs. Some sound examples and several competent groups exist that specialize in small infrastructure developments for rural communities. These groups should be nurtured and their models dispersed more widely, with the aim of prolonging the growing season by as much as possible and in as many areas as possible. It is important to note that the Senegalese government is giving attention to developments in this direction.

The Way Forward

Short to medium-term assistance: Methods that increase the amount of time that water remains available after the end of the rainy season should be carefully considered for promotion. There are drawbacks to some techniques, and each intervention should be studied on a case-by-case basis. The potential effect on agricultural production and thus rural community livelihoods, however, is considerable. Additionally, the inherent creation and support of local expertise offers appealing secondary implications for expansion of private-sector support services.

⁹ The intervention zone of USAID’s Sot2, CSP 1992-1998.

Salt-Intrusion

Literally thousands of hectares of formerly productive land — predominantly rice paddy — have been lost to salt-intrusion. This effect is particularly striking along the coastal strip, and even further inland, from Fatick in the north to southern Casamance. Other salt-related problems exist in many sites where intensive irrigation is carried out or where the water table lies at a depth of less than five meters. Hence, the Senegal River valley and irrigation schemes around the Lac de Guiers are not immune to the problem. The sources of salt are potentially threefold: 1) atypically high tides which wash over coastal farmland; 2) wind-carried spray; and, most importantly, 3) from vertical intrusion of salt-laden water from shallow water tables.

Although each type of salt-intrusion creates enormous problems for farmers, bringing a situation of physiological drought to what may actually be adequately watered plants, each can also generally be tackled by a series of fairly simple interventions. Salt-water prevention dykes (as developed by SZWMP) can minimize the problem of intrusive tides. The problem of wind-carried salt spray — as found in the region of Kaolack — can in part be tackled by the use of windbreaks composed of species tolerant to salt. These also help to reclaim saline soils and return their productivity.

High water tables are particularly troublesome, especially when the water contains a naturally high salt load. Several techniques exist to counter the water table problem. The most adaptable for small farmer situations is to plant tree species that are both tolerant to high salt content and can pump sufficient water to lower the water table. *Tamarix aphila*, an Israeli species that stands out as highly salt tolerant, has been introduced as part of the current program between ISRA, Israeli Cooperation, and AFRICARE. Once the *Tamarix* are established, *Eucalyptus spp* can be planted for their water-pumping characteristics. *Eucalyptus spp* have been tested successfully by ISRA, and the method has been adopted and put to sound use by CBNRM in the village of Pakane. An additional value of water-table lowering trees, like *Eucalyptus*, is that they characteristically have rapid growth and provide excellent timber. While improving or rehabilitating agricultural soils, the method provides an additional source of sustainable income.

The Way Forward

Short- to medium-term assistance: If the technologies outlined above were amply promoted, thousands of hectares of land could be brought back under economically productive management. Some excellent models for land reclamation and for safeguarding current land exist, and they need to be replicated as much as possible. Measures to counter salt intrusion can have significant and positive side effects, such as the additional income that can accrue from tree planting.

Hydric Erosion

Vast areas of Senegal, especially south of a line drawn from approximately Kaolack in the west to Tambacounda in the east, suffer significant hydric erosion. The effects of the erosion are many. Roads are cut, fields are abandoned, crops are frequently washed away, homes are flooded, and villages are threatened by encroaching erosion gullies. The erosion is not accidental, since the worst incidences are located in areas, such as the Saloum, where the least respect has apparently been accorded the natural resources. In the Saloum, most trees have been removed from fields, even from higher and sloping land, resulting in an inhibition of water percolation

into the soil, significant surface run-off resulting in soil loss, and the development of erosion gullies. Rectifying the situation is not impossible if a package of interventions that seek not only to close up the erosion gullies but also to tackle the root causes of the erosion are introduced. This requires physically building gully plugs using an assortment of other simple, but labor-intensive, erosion control measures, replanting trees at strategic sites, and helping to recreate the agricultural potential of the damaged land. Such activities are more appropriately implemented as community undertakings than by individual households. PAGERNA (GTZ's SNRM program in the Peanut Basin) has developed an excellent approach to this problem and the model deserves replication on a broad scale.

The Way Forward

Short- to medium-term assistance: Land badly eroded by seasonal water flow can be recuperated if a series of technologies are introduced and a few basic principles followed. The methods pioneered by PAGERNA in working with communities are worthy of replication.

Low Rainfall Zones

These zones can principally be described as those areas that receive less than 400 mm of rainfall per year and where the rainy season only lasts an average of approximately three months. Rain-fed agriculture on these lands is the most marginal and low-production in Senegal. Rationally, they cannot be considered as suitable for continued agricultural usage unless some way is found to enhance water availability. To this end, several of the most successful and/or promising irrigation schemes in the country are being carried out in some of the driest zones using basic irrigation methods or drip-watering techniques:

- The Niayes are heavily cultivated and benefit from a relatively shallow water table.
- The efficient agricultural exploitations at Sebikotane, between Rufisque and Thiès, are able to tap into the pipeline from the Lac de Guiers that supplies Dakar with water (e.g., Khassim N'Dour, considered a model farmer).
- The newly established experimental irrigation farm at Keur Momar Sarr, which draws water from the lake and is already producing exceptional yields of high-value horticultural crops. There is enormous potential to extend the model along the whole length of the revitalized fossil valley of the River Ferlo¹⁰ and perhaps elsewhere in the sub-region. Other pilot schemes are being launched in the same region.
- The irrigated orchards of Djily Mbaye near Louga are highly productive.

In contrast, there are extensive areas of land under marginal cropping regimes that are more suitable for alternative land utilization. Where agriculture is not a logical solution — for example, where the water table is deep and no other source of water is currently available — the

¹⁰ At the time of writing, this scheme is in real danger of being abandoned due to political pressure over water rights from Mauritania. For the future of intensive farming in the zone and the possibility of creating significant employment in the region, the abandonment of the idea of the fossil valley would be extremely damaging.

land should be transferred to more appropriate uses: cattle fattening, grazing, reforestation, industrial or artisan purposes, and so on. Again, the goal should be the rational utilization of land. As a worst-case scenario, the land could be abandoned, permitted to regenerate over the course of several years, and to potentially support productive agriculture in the future.

It is clear that such a dramatic transformation of land utilization cannot feasibly be accomplished in the short-term. The population of the zone is too great and the social turmoil would be too severe. Reorientation, however, will become unavoidable, and the authorities need to treat the planning for such changes as inevitable and pressing. In the meantime, certain land husbandry techniques are available to help increase marginally the productivity of these sites. Burkina Faso has put into practice many of the practices that have been shown to increase production, such as the use of *Zai* holes, *demi-lunes* and so on.

The Way Forward

Short- to medium-term assistance: Develop programs to increase productivity of marginal arid lands using adapted traditional means; develop irrigation programs in suitable sites.

Long-term assistance: Develop a program of alternative livelihoods for those rural populations currently eking out an existence on arid marginal land. Develop plans for the efficient and optimum utilization of those arid lands currently unsuitable for agriculture.

1.1.1.5 Countering Impoverished Soils

Lack of sound land husbandry and encroachment onto marginal lands has resulted in much of the agricultural land in Senegal becoming impoverished and incapable of supporting more than a fraction of its real potential. Here, land husbandry is used as a generic term, and the failure to adopt sound practices can be seen in such aspects as:

- Failure to reduce the extent of wind and or water erosion (removal of trees, absence of windbreaks and hedging, removal of herbaceous cover by burning, etc.)
- Inability to maintain soil fertility (insufficient manure application, lack of composting techniques, high price of inorganic fertilizers, removal of field trees)
- Insufficient use or lack of access to improved seed varieties
- Lack of crop rotation and exclusion of sufficient fallow
- Lack of crop diversification
- Failure to adopt suitable practices
- A general failure to develop a sufficiently integrated agricultural system, due in large part to inadequate technical assistance programs

The causes and effects of each of these components are clear and will not be discussed further here. It is also clear that, in rare cases where good land husbandry techniques have been adopted and maintained, impressive results can be obtained and standards of living raised significantly. Examples of excellent farming techniques that should be replicated widely are described below.

Model Farmers - 1¹¹

Large-Scale Agricultural Exploitation: Khassim N'Dour, Sebikotane

General: Khassim farms 17 hectares of land in the fertile plain at Sebikotane. He is considered a model large-scale farmer for several reasons: he has intensified and diversified his production to include higher value, off-season vegetable crops (green beans, melons, asparagus and cherry tomatoes) mostly destined for the export market. His aim is to develop a “productive environment” by the integration of AG/NRM techniques with agricultural production. He has an interesting production sideline from windbreaks. He is imaginative and innovative.

As an exporter he has targeted specific market sectors both by working with partners in Europe and by introducing strict quality control techniques. He is an important local employer in an unemployment hot spot. The use of irrigation means that he produces crops throughout the year and achieves exceptional yields — up to 70 t/ha (almost 50 times more than the average rain-fed agricultural systems). His innovative use of windbreaks — essential to counter the constant sea winds that blow across the zone — is an example that should be exploited elsewhere.

Agriculture: Large quantities of green beans (85 percent of total production) are produced and graded locally. The best are exported via European partners while the remainder is destined for the Dakar markets. Also produced are cherry tomatoes, melons, and asparagus for export or for the local market. The biggest expense faced is for irrigation water, so any methods that reduce water consumption without effecting the production feeds directly through to the bottom line. He formerly worked for BUD/Senegal and learned many agricultural lessons during his period with the project.

Windbreaks: The use and uses of windbreaks provides an interesting study in the direct relationship that exists between AG/NRM techniques and agricultural production. The story Khassim tells of how he came to use windbreaks bears retelling: In 1985, a Peace Corps volunteer provided 200 g of *Leucena* seeds (this is a leguminous tree that increases soil nitrogen). Seeds were grown on and multiplied and windbreaks planted. Further seed stock were collected and passed to others in the region. The widespread adoption of *Leucena* as a windbreak species bears witness to its value and many uses.

Innovations: He saw that traditional rain-fed agriculture was neither an economic or productively viable solution to the prevailing environmental conditions. He introduced various irrigation techniques enabling crop production to occur throughout the year. Given the high cost of water (70 million CFA in 1999) piped in from the Lac de Guiers, it has been logical to look for the most cost-effective means of water use and delivery. Hence, drip-fed watering systems have been adopted. He has integrated livestock into his production system, through intensive cattle and sheep rearing and by spreading manure on his fields.

He has developed several additional uses of the *Leucena* windbreaks. This is a species that, when it receives sufficient water, can grow at 3 cm per day and can be used to increase soil fertility by the addition of nitrogen (this is one advantage over *Eucalyptus*). The straight poles it produces can be sold as timber or used as livestock enclosures. Any bent poles can be used as fuel-wood or transformed to charcoal.

Green biomass is an important and nutritious additional food source for his livestock (cattle can receive up to 60 percent of their total feed from *Leucena* and sheep up to 25 percent). Green biomass can be harvested three times a year, and 5 ha produces enough for 100 head of cattle. The remaining green biomass is composted, and then added to the soil along with manure from his intensive livestock rearing activities. *Leucena* can be grown in a monoculture as a means of regenerating soil with low fertility.

¹¹ Note: ENDA is now promoting the idea of “Productive Environment,” which seeks to develop the N’Dour system of agricultural production.

Model Farmers - 2

Small-Scale Agriculture: N'Déné Diouf, N'Gane, CR of Gandiaye

- General:** Mr. Diouf farms a small (approximately 1 ha) area of land in the village of N'Gane, near Kaolack, with a parcel granted to him by CARITAS. He is considered a model farmer for several reasons: he has intensified and diversified his production to include not only traditional crops (millet, maize) but also higher value vegetables (hot peppers, bissap, aubergines), fruit trees (mango, cashew, and citrus), and a tree nursery. Furthermore, he has targeted specific market sectors, is extremely innovative, and very hard working. Recently, he has been allocated one hectare of land in the same locality and will soon begin to cultivate. Unlike many traditional farmers, he cultivates throughout the year, modifying his strategy and innovating in response to the prevailing environment.
- Agriculture:** High yields of such crops as aubergine, hot pepper and bissap are produced of exceptional quality (and are totally organic). These are sold to the local market and produce revenue of approximately 1.5 million CFA annually. He has a well with the water table at about 6 meters, which facilitates watering.
- Innovations:** He has adopted a planting system that bears considerable resemblance to *Zai* holes or depressions, an agricultural practice usually carried out in much drier regions. He spaces the *zais* at four to a square meter and adds animal manure to each hole. He only waters the *zais*, not the surrounding area, thus reducing considerably the amount of water required and preventing weed growth.
- He protects weaker plants from full sunlight by covering them with old enamel basins collected from rubbish dumps.
- He has developed an extremely innovative and valuable use for millet hulls (usually discarded by the population). The process begins with the carbonization of the hulls in a miniature “charcoal” oven, complete with a small chimney. The carbonized hulls (resembling small pieces of soot) are mixed with soil, compost and organic material and the mixture used to fill the *zai* holes at a depth of about 40-cm. Seeds are sown into this mixture. This he finds has four very positive effects. First, the soot works as a natural nematocide (nematodes are a particular problem during the cultivation of plants of the *Solanaceae* family such as tomatoes, pimentos, peppers, and aubergines). Second, the soot absorbs water, retaining moisture around the plants’ root system. Third, as the soot decays, it adds organic additional material to the soil. Fourth, the growth medium acts as a pillow on which peppers and aubergines rest — with no evidence of decay or insect attack. An additional discovery is that the smoke produced during millet hull carbonization is a natural insecticide that has effectively made his exploitation insect-free.
- Nursery:** He produces fruit trees (mangos and cashews) and introduced species for use in reclamation of salt-intruded rice paddies (for AFRICARE). He explained the process of land reclamation by using the following species in combination: *Tamarix aphila* grows rapidly (3 m per year), pumps salt, breaks the hard taan, and lowers the water table, thus allowing rainfall to leach out the salts; *Atriplex nemelaria* is a salt-tolerant bush that pumps salt and is also used to stabilize diguettes; *Glyceria sp.* is used for live hedging and windbreaks; finally, *Prosopis selengis* provides nitrogen-fixing, adding fertility to soil.

The Way Forward

Short- to medium-term assistance: There is no agricultural substitute for the adoption of good land husbandry. A program that seeks to develop the increased adoption of such practices would have a considerable impact over both the short- and medium-term.

We believe that the use of demonstration systems is the most effective way to increase adoption rates and should be promoted using, for example, demonstration plots run by local farmers (such as those established by KAED) or simply by advertising the independent success of such individuals as N'Déné Diouf. Local resources would likely have greater success than outside experts in improving adoption rates.

1.1.1.6 Training Needs

The majority of small farmers, as well as some with larger exploitations, require immediate and continual access to agricultural and natural resource management training programs.

Unfortunately, with some 13,000 rural villages, most dependent on agriculture, it will prove an extremely difficult task to service such needs. Currently, GOS is putting in place a scheme to establish a corps of 500 agricultural technicians who will be assigned to the different rural communities with the role of advising the CERP on agricultural development matters. Donors, other development partners, and private entrepreneurs have the opportunity to support this initiative by offering full cooperation with the government technicians. Many of the initiatives developed in this document would directly tie into the agricultural technician scheme. It would be preferable, however, if GOS involvement was only a stopgap measure to allow the development of a private-sector based rural consultancy service.

The Way Forward

Short- to medium-term assistance: The recent GOS proposal to develop a corps of agricultural technicians at the rural community level will, on its own, be insufficient. However, given the large number and diversity of donor, private, and NGO interventions in the field, cooperation between different players could start to bring the desired results. Assistance is required to ensure proper coordination of efforts, particularly at the rural community level.

Throughout Senegal, many different and complementary approaches are in place that seek to increase the capacities of actors across the field of rural development. Current targets are: at the CR level, to ensure that community resource management is correctly carried out; at the village level, to improve agricultural productivity and prevent unsustainable resource exploitation; and at the household level, to increase literacy and to promote entrepreneurs.

Government, conscious of the number of villages (over 13,000 across Senegal) that must be targeted, is putting in place a scheme to train young persons in rural development and agriculture and to get them back onto the land with new methods, ideas, energy, and convictions. During this process, it would be desirable for the trainees to be able to witness some of the better interventions that have been carried out around the country.

While we cannot propose to other donors how they should cooperate with GOS in this initiative, we feel sure that development organizations with excellent personnel and proven skills — such as FAO (e.g., mini-barrages), GTZ (e.g., gully plugs and integrated village development), Swiss Cooperation (e.g., agricultural productivity and training approaches), etc. — could enhance the youth training processes and thus assist in ensuring the success of the government’s innovative approach.

The Way Forward

Short- and medium-term assistance: Assist the GOS in its ambition to encourage more young people to return to the land by helping to strengthen youth training and capacity building, especially in natural resource management and agricultural techniques.

1.1.1.7 Specialization and Diversification

The overwhelming majority of the farming population continues to produce low value, staple crops (mainly millet and rice), some on virtually a subsistence basis.¹² There is little attempt to specialize or diversify into higher-value products.¹³

The reasons for these two observations are mostly traditional with the primary production objective being to ensure sufficient production of basic foods to cover household needs. However, this is generally a flawed model since the production and sale of higher-value crops could easily generate sufficient funds to purchase the staple food requirements on the open market and leave a surplus for other purchases. The role of social pressure in the production of staple foods is real, and strategies that deviate from this dominant concern would need further investigation. That said, the logic behind the need to diversify away from traditional food crops to higher-value products is inescapable. Already, examples exist across Senegal of entrepreneurs who have grasped diversification and are producing such varied high-value horticultural crops as roses, improved seed varieties (e.g. UJAK), asparagus, green beans (e.g., Khassim N’Dour and the Farm Filfili), and chicory-lettuce (market gardens on the Route de Rufisque), etc. The possibilities for Senegal are enormous, but farmers will need to be shown the financial and cultural possibilities if they are to be persuaded to adopt higher-value crops.

A great demand exists for such products domestically as well as a whole range of off-season (winter) vegetables in Europe. This demand should be exploited by those capable of producing according to the stringent requirements of those markets. Domestically, there are myriad opportunities to innovate and provide a range of traditional fruits and vegetables at prices that should encourage producers. These topics are considered in the following section.

¹² Le Sénégal Agricole: Pour une Agriculture Moderne et Compétitive, Primature, République du Sénégal (March, 2000).

¹³ Of course many farmers produce peanuts as a cash crop, but recent yields have been extremely low and the quality generally poor, resulting in relatively low farm incomes. The poor quality further threatens subsequent years’ production because the seed material also is likely to be of poor quality.

1.1.1.8 Commercialization and Market Development

In this chapter so far, we have dealt with possible avenues for revitalizing Senegalese agriculture. However, at the same time, it is necessary to ensure that an adequate market structure is in place to absorb any increase and diversification of production. Much of the current system of production and marketing is based on a supply-driven approach; hence, prices and revenues remain low. Development of a market-driven approach to diversified crop production and sustainable resource exploitation must be the way ahead.

The Way Forward

Short- to medium-term assistance: There is a pressing need to diversify Senegalese agriculture away from low-value traditional crops toward higher value, revenue-generating products. Such diversification will require considerable technical assistance and the development of suitable markets.

Markets to be targeted are the home market, the export market, and the transformation market. It is interesting to note that the home market has undergone something of a transformation, especially in the larger towns, during the past ten years. The methods of preparing dishes are changing, the diversity of vegetables being used is expanding, the population is becoming more international, and the quality of products is increasing. This market is ripe for further expansion. In rural areas too, diet has changed: Rice is much more frequently eaten, and many Senegalese consume considerably greater amounts of salad and other vegetables.

As far as the export market is concerned, Senegal currently only has a minor presence in the European market. Total export of horticultural products worldwide is only some 6,000 tons per annum.¹⁴ However, there are several examples to follow and niches to exploit if the correct agricultural system, supported by relevant enabling conditions, can be put in place. Kenya and Uganda, in particular, are responding massively to the European demand for cut flowers and off-season vegetables. Madagascar (an extremely poor, agriculture-based economy) is starting to take advantage of the fact that its farmers cannot afford chemical agricultural inputs by marketing organic foods. The demand for organic foods in the European market is increasing at least 20 percent per annum, and suppliers are having trouble meeting that demand.

Senegal has one advantage over the three previously mentioned countries: It is significantly closer to the big European population centers and thus should gain a cost advantage. However, it will be in direct competition with Morocco and the Mediterranean producers and, in order to succeed, must tightly control costs, develop a firm market approach, exploit available niches, respect contracts scrupulously, and ensure exacting quality control.

A further area of the commercial cycle that GOS should be ready to tackle is that of the de facto monopolies or duopolies that exist in several sectors of the agricultural market. Liberalizing the importation and supply of agricultural inputs would be a significant step forward. Irrigation

¹⁴ This is partially attributable to the limited air-freight capacity available for export of fresh vegetables. This limit could be renegotiated by GOS with the various air carriers. Appropriate maritime shipping channels should be further explored as well.

material stands out as one area of the market that should be promoted, both to permit increased utilization by small-scale farms and to stimulate local industry to begin developing the required materials.

The Way Forward

Short- to medium-term assistance: Help Senegalese enterprises to identify and enter new domestic, regional, and international markets for agricultural and transformed products. The European market is already open to entry, and the U.S. market has recently relaxed certain importation laws.

1.1.1.9 Transformation

Currently, few of Senegal's agricultural products are transformed in-country, resulting in a loss of significant potential revenue and the opportunity for widespread job creation. In the past, traditional farming systems have not been able to steadily meet demand for most low-value market products, such as millet, corn, and indigenous fruits. This is largely due to unpredictable environmental conditions such as drought and flood, little or no infrastructure in place to transport products to transformation plants, decrease in productive farm land, and barriers to job creation.

If all of the proposals developed so far in this text are to bear the economic fruits anticipated, jobs must be created, and local agricultural products must be transformed. This remark gains urgency if the recommendations for progressively abandoning marginal lands in drier zones are to be followed. The population must be provided with other employment opportunities. Value-added agricultural transformation offers substantial promise, but entrepreneurs are reluctant to enter the market because of unfavorable labor codes, tax systems for equipment, and transportation costs.

The Way Forward

Short- to medium-term assistance: Assist Senegal in developing higher value products by, for example, value-added transformation from locally produced crops. This will not only have an economic impact on producers but also would create jobs and have a positive impact on the nation's balance of payment.

1.1.1.10 Private-Sector Involvement in Agricultural Development

Development of the private sector appears to be the only logical way forward for agricultural development in Senegal. The GOS possesses neither the financial nor technical strength to lead agriculture into the future. Indeed, current economic logic says that it is the private sector that must take the lead since that sector possesses the necessary technical and business acumen as well as the financial power needed for investment and the development of agriculture-related industries. The main role of the GOS must be to facilitate the evolution of the sector, providing:

- Financial incentives, in terms of the taxation regime, infrastructure development, and free-market economics

- Political incentives, helping to penetrate overseas markets, encouraging domestic and export-oriented investment, and liberalizing the economy
- Social incentives, helping develop communication and social marketing campaigns, and advanced education facilities
- Relaxed labor laws, clamping down on abusive or illegal exploitation and on monopoly situations

The Way Forward

Short- to medium-term assistance: Assist GOS in developing a set of conditions favoring the agricultural sector and encouraging private-sector investment. These enabling conditions would likely include fiscal, legal, and social incentives as well as introduce legislation to inhibit the presence or future development of monopolies in the agricultural sector.

1.1.1.11 Research and Development

If agriculture in Senegal is to move forward, continual innovations will be necessary to keep pace with the evolving agricultural climate. ISRA once held a key position in this regard but, due to financial and political constraints, has lost many of its better cadres to the private sector, donors, NGOs, etc. The GOS should consider if ISRA could be resurrected, or if innovation and research could be passed to the private sector. Already in Senegal, several highly competent private training institutions have been established to target the agricultural sector. They stand out as strong possibilities for continuing research and development as important components of their teaching programs.

1.1.1.12 Social Marketing

Changes are coming to Senegalese agriculture, and with a declining resource base and a degrading climate, the pace of change can only accelerate. Change has to be managed, or turmoil will result. The size of the population directly dependent on agriculture is far too large while the current productivity is far too small. Not only should plans be made to reorient agriculture toward increased production but also to reorient a significant sector of society to more efficient and lucrative occupations. This is perhaps the greatest challenge ahead for the Senegalese government.

Entrepreneurial skills must be enhanced and promoted, especially those based in and around rural communities and regional towns. The activities being promoted by DYNA Enterprises, for example, may well provide a good basis for further expansion. Currently, Senegalese entrepreneurs are reticent to invest in new areas and businesses, and they will need careful persuasion and training in improved business practices.

Small-scale farmers are reaching a crisis point that will force them either to leave agriculture or to adopt many more environmentally respectful and sustainable practices. The process would be enhanced if a system of rural communication and training could be developed, perhaps based on rural communities.

Furthermore, if inefficient and damaging farming techniques are to be reduced and marginal land used for other, more rational occupations, there will need to be more attractive employment possibilities than are currently offered by subsistence agriculture. This change in mindset will not be easy; it must be a long-term goal facilitated by, for example, the development of poles of activity that would draw people away from the land (as Touba is doing within the Peanut Basin). It is highly unlikely that the older members of the farming community would forsake their traditional ways. However, with a better-educated and more “worldly” younger generation developing, even in rural zones, the development of alternative livelihoods in rural areas is eminently possible.

To advance these ideas, which differ radically from traditional ways, a sustained and regular social marketing campaign needs to be developed. Similar to the campaigns prepared to create awareness about AIDS prevention and family planning, these advertising campaigns should diffuse information about all aspects of the AG/NRM program. The major AG/NRM themes are the current state of Senegal’s natural resources and the dangers of continuing “traditional” practices; preventive and recuperative strategies; the rights and responsibilities of individuals; and where people can turn to get assistance in pursuing local initiatives. This social marketing campaign should be directed at all users of the natural resource base: urban and rural populations, transporters, and government officials.¹⁵

1.1.1.13 Livestock: Intensive and Extensive Systems

Traditional agriculture has been heavily integrated with livestock, with animals being fed agricultural residue, being grazed on grass/weeds in fields after harvest, and their manure used to enrich the soil and as an ingredient of compost. In a peasant-based agricultural system, the integration of livestock is a necessity. However, parallel to the integrated approach is the extensive (rangeland) livestock system dominated by the Peuls and based predominantly in the Ferlo region, with seasonal movements to the more southerly forests. Considerable discussion revolves around the extensive rangeland system and the threats to its continuation. Due attention has to be given to pasture-based experiments carried out in the Ferlo by GTZ at Viedou-Thiengaly. These showed that overgrazing inevitably results in pasture loss but, just as negatively, undergrazing or poor herd mix frequently result in declines in pasture quality. (These factors were developed in section 3.2 of the Retrospective Report.) The debate often follows along ethnic lines, a very rare occurrence in Senegal.

The future strategy of GOS appears to be moving toward promoting a more intensive-rearing program — for example, with the reincarnation of the cattle rearing and fattening programs at Doli Ranch. Provided that previous problems associated with the ranch (e.g., insufficient numbers of available calves, transport problems to the main markets, frequent bushfires destroying dry season pastures, insufficient investment, and so on) can be overcome, the initiative could prove successful. If it does, GOS hopes that a greater sedentarization of the population and more efficient marketing of livestock will replace extensive grazing. A side effect of such a change in behavior would be a reduction in land conflicts that frequently arise between herders and agriculturists.

¹⁵ To facilitate the startup of the campaign, under the CBNRM project, an advanced media (TV/radio) studio has been established which could be used to create broadcast quality messages.

Within the intensive system, it would be logical to consider: the production of forage species as a part of a crop rotation cycle; the collection and storage of hay (especially in zones where bushfires are frequent); and a greater emphasis on persuading households to carry out animal fattening programs.

The Way Forward

Short- to medium-term assistance: Assist GOS in reviewing the livestock sector and developing future strategies that not only respect the need to develop a more efficient intensive sector but also keep the ties with traditional agriculture and extensive cattle-rearing.

1.2 The Future of Natural Resources in Senegal

In separating agriculture from natural resources, the intimate relationship and interdependence of the two must not be forgotten. Sustainable agriculture cannot exist unless the resources that agriculture uses are respected; likewise, natural resources cannot survive unless the requirements of the population are met by agricultural production.

Unfortunately, the history of Senegalese respect for its natural resources and the ability of the population to obtain its requirements from agriculture both leave much to be desired. The previous government, for the most part, paid only lip service to sustainable natural resource management, and will be better remembered for allowing mass and uncontrolled exploitation. The agricultural desertification of the Saloum and the northern Peanut Basin, the unmanaged destruction of forests all the way to Tambacounda, the quiescent concession to the agricultural settlement in the forests of Kolda, and the tacit accord given to the invasion of traditional pastures all highlight the failure to protect and adequately manage the environment.

Rarely does a country get a second chance. However, this year the population called clearly for change. This call was led not only by the rural areas but by the youth of Dakar. The new government has a brief window of opportunity to make an enormous difference and to safeguard the remaining resources. Interviews with several leaders, advisers, and leading members of the development community have convinced us that the tide of change is starting to move in the right direction. Coincidentally, almost all of the points developed in section 3.1 have received support in both political and development circles. Maître Wade's government is particularly targeting agricultural development and modernization but we would also strongly suggest that providing the means for sustainable natural resource management also be included in the same package of priorities.

Which particular factors need to be considered? Leaving aside the natural resources that are directly related to agricultural production — since these have been covered in detail in the previous pages — we propose that future priority should be given to the following areas:

- Resource inventories for the rational management of natural resources: Efficient management of any resource is impossible without an adequate knowledge of what exists. Not only will sound resource inventories improve the development of management plans, they will also support initiatives to develop natural resources information systems (NRIS) and periodic “State of the Environment” reports.

- **Community resource development:** It is likely that the majority of local communities across Senegal lack natural resources of one form or the other. This lack is signposted by particular environmental indicators; on the basis of these indicators, developers must seek to put in place remedial processes.
- **Protection of local rights and the security of forest resources:** One of the positive consequences of decentralization is that communities are being handed ownership and management rights to their local resources. However, the new system remains open to abuse, and community resources need protection, at least in the short- to medium-term.
- **The resource management debate:** Certain key issues related to tremendous reductions in natural resources have been inadequately tackled in the past. These should now be brought center-stage and relevant policy decisions made.

1.2.1 Resource Inventories for the Rational Management of Natural Resources

One key aspect of the law regulating decentralization is that local communities have become responsible for the management of the natural resources located within their territories — with the exception of classified domains. This is a sound and logical move that should ultimately prevent much of the uncontrolled exploitation of resources, especially to forests and mangroves. However, it would be extremely difficult to develop a realistic management scheme in the absence of a fairly detailed knowledge of the resources that are to be managed. And, currently, it would be illogical to expect many communities to possess sufficient capacity to develop either an inventory or a sound management plan.

Nonetheless, a medium-term aim should be to help communities, even villages, to begin the development of such inventories and plans. For small communities or where forested resources are minimal, this should not prove too difficult and could be incorporated into the development process of Land Use Management Plans being developed by rural communities. Agents of the Forestry Service, located at the CR-level, are ideally placed to support these activities.

Unfortunately, in this respect, Forestry Service agents have not been sufficiently active in the past since, even in classified domains, sound knowledge of resources is generally very limited, not least because the boundaries have proven very “fluid.” Thus, as a starting point for the development of inventories and management plans, it would be logical to begin with the more extensive classified forests.

The first step must be to ensure that their boundaries are officially marked, recognized (using marking posts and records of their positions using paired GPS), and respected. Next, approximate inventories should be developed to contain such details as area, distribution of homogenous zones, main exploitable tree species, and some indication of size distribution. This will allow approximate calculations of potential sustainable off-take. Agents should then define with local communities the exact type and amount of forest utilization that can be permitted — just as has been achieved, for example, with villages around the national park of Niokolo Koba.

The CSE, with support from Canada, has been developing remote sensing methodologies for use in forest inventories. This structure would be an important resource for any inventory work.

The method described for developing inventories and management plans could also be extended to smaller parcels of land within rural communities and even around individual villages. However, for such extension of the technique, the cooperation of different development structures would be necessary. Apart from the use of sound resource inventories to develop local or restricted management plans, the information would also form a valuable part of natural resources information systems for use at national, regional, and local levels. They would also support current initiatives to develop and institutionalize periodic “State of the Environment” reports.

The Way Forward

Short- to medium-term assistance: Help communities and villages develop inventories of natural resources, especially of ligneous resources, as a step towards elaborating resource management plans and developing periodic State of the Environment reports targeted to various audiences.

1.2.2 Community Resource Development

Many local communities across Senegal lack natural resources of one type or another. This lack will usually be sign-posted by distinct environmental indicators. For example, hydric and wind erosion signal very clearly that the natural vegetation has become degraded. As a result, water fails to percolate naturally, and top soil is easily blown away. Falling crop production shows that soil fertility and adequate water management have been neglected. Frequent bushfires show that the community and/or its neighbors lack respect for the environment, and so on.

Such indicators should be used as a means of directing community resource development, either independently or in cooperation with the development community. Too frequently, these indicators are ignored (or their message not understood) and so rational development is either not undertaken or is only partially completed.

Another element that needs to be rectified in community resource development is that too many interventions occur in a vacuum away from, or in ignorance of, other similar interventions. There actually exist a number of real success stories (for example, the village-based activities of PAGERNA), but where are they listed? A national compendium of interventions, methods used, costs, results achieved, problems encountered, and so forth would prove an invaluable reference source for planning future NRM interventions.

The Way Forward

Short- to medium-term assistance: Assist in the identification and understanding of environmental indicators as a means of helping to direct community development. Assist in the development of a directory of community interventions, an inventory of techniques, and a list of successful interventions where cooperation partners can learn from the experience of others.

1.2.3 National, Regional, and Community Resource Planning

Decentralization has provided a real opportunity for the regions to emerge from the shadow of Dakar and from central government generally. However, the officials at the local level are frequently inexperienced in their new roles. CBNRM has been working at reinforcing the local structures, and the new USAID Democracy and Governance project is broadening their approach. The law of decentralization provides for local communities to have responsibility for the management and exploitation of their own resources. However, central government services must be sufficiently able to respond to excessive or corrupt exploitation of resources, both by aiding and advising local community leaders, and by developing environmental protection policies and backing them up with the necessary laws.

Considerable debate exists as to the optimum resource management systems that should be in place, but each system must take into account the area and resource to be managed. We believe that resources should, as far as possible, be managed by and for local inhabitants. Thus, at the village level, forests, grazing lands, and temporary ponds should be owned by the community while fields and other individual structures should be the property of the relevant household. However, just as at the community level it would be unthinkable for development structures to adopt a “sink or swim” approach to CR committees, so at the village level the CR and its technical assistants should be able to advise the villagers as to the best systems to adopt.

With features that span several villages — such as extensive forests or watersheds — a shared approach must be adopted to prevent one village from profiteering to the detriment of others. If inter-community disputes do arise, the CR should have the technical capacity and wisdom to intervene in a neutral and conciliatory fashion.

A shared approach must be adopted to prevent inter-community disputes or one village profiteering to the detriment of others.

Finally, with classified forests, a different approach is necessary. Several experiments have been carried out in Sahelian countries for developing co-management systems (see section 1.2.7). These seek both to ensure the security of valuable habitats and biodiversity as a national

Any co-management system should be only a stopgap while the appropriate community management system is developed and local capacity to manage independently is procured.

resource, and empower local communities to gain economically from the sound utilization of those resources.

The approach of PROGEDE is certainly worth following. However, we believe that any co-management system should be only a stopgap while the appropriate community management system is developed, and local capacity to manage independently is strengthened. Central government also has a key role to play in this regard since it must prevent the illegal exploitation of local resources by

outsiders. PROGEDE, despite being a national project manned by technicians drawn from government agencies, is witnessing and is unable to control outside exploitation. The fact that the exploiters, mostly of charcoal and timber, are frequently arriving with official documents from central government services makes a mockery of the decentralization processes. The new government has a very real and urgent responsibility to stop such abuse.

The Way Forward

Short- and medium-term assistance: Assist GOS with developing both sound local management systems and supporting policies that protect local resources from outside exploitation.

1.2.4 Protection of Local Rights and the Security of Community Resources

Under decentralization, communities are being accorded ownership and management rights over local resources. However, the new system is as open to abuse as the one it is replacing since a lack of knowledge at the local level of rights, responsibilities, and resource values leaves the system wide open to unscrupulous exploitation. Central government and the development community have a very clear role to play during the transition period. This role should include the development of a code of conduct for resource utilization, penalties for abusive exploitation, extension and training campaigns to educate local community leaders and rural populations in general of the intrinsic value of their resources, and assistance in developing sustainable exploitation plans.

Key to the agriculture and natural resources debate are the methods by which farm households cultivating marginal, non-productive land can be persuaded to change to other, more sustainable and lucrative occupations. One idea that is attracting growing support is developing local poles of artisanal excellence and diversified rural enterprise. Such poles are economically attractive since they provide alternative means of generating revenue. However, especially for artisanal products, there are potential negative impacts of such activities since most such products are based on natural resources of one kind or another. For example, statues, masks, and carved animals are widely made of Senegalese ebony (*Dalbergia metaxylon*), which grows naturally in the damper depressions, notably in the Ferlo. As demand for these and other products increases with greater development of artisanal industries, care will be required to ensure that the resources are not being unsustainably exploited.

The Way Forward

Short- to medium-term assistance: With the center of power for the management of natural resources being transferred from central government to local communities, it will be necessary to assist in the development of local skills in resource management and in understanding the real values of resources.

1.2.5 Land Tenure and Security

The rational management of natural resources is intimately tied to the question of land tenure and security, as is willingness to invest in the land. Without a strategic government decision to move rapidly toward increasing land security and providing individuals with title to their lands, sustainable management is less likely to succeed, and long-term investment in the land will rarely occur. Currently, there is a certain paradox within the land security system. Owners receive compensation for physical structures (e.g., dams, diguettes, buildings, and other forms of infrastructure) should they be required by public interest to abandon those structures.¹⁶ However,

¹⁶ This is akin to the European method of compulsory purchase of property and the American concept of eminent domain.

any investments made in enhancing soil quality or fertility (inorganic fertilizer and compost/manure applications, hedging, etc.) are not compensated because the state is the legal owner of land and the farmer only has the right to use that land (usufruct), not own it. This anomaly requires careful investigation by GOS. It is widely believed that investment in soil quality and thus increase in soil productivity will only be forthcoming if land title is accorded to current land users.

Another anomaly is that while farming is considered to constitute a real use of land (*mise en valeur*), the use of land for pastures is not. This means that traditional pastures can be taken away from herders by the CR, according farming rights to a newcomer who wishes to cultivate on that land. If the idea of rational use of land is accepted, then it must also be accepted that not all land is suitable for agriculture; some will be more suitable for grazing.

The Way Forward

Short- and medium-term assistance: Assist GOS in developing a new approach to land tenure and security, so farmers will have greater incentives to invest in the productivity of their land.

The rule of *mise en valeur* needs rapid and conclusive revisiting because it currently violates the traditional rights of the herder population. Furthermore, as land appropriation of this type becomes more common, so will land conflicts.¹⁷

A final remark in this section is that if larger, more productive farms are to exist in Senegal, farmers must be given real title to their lands so that they then have the option to invest, to purchase further land or to sell out.

1.2.6 Bushfires

The causes of bushfires in Senegal are multiple and poorly understood. It has been difficult to understand the rationale behind the fires and thus to develop anti-fire programs. The Forestry Service used to conduct strenuous anti-fire campaigns that included developing and maintaining firebreaks, rapidly responding to fire outbreaks by mobilizing villagers against the fires, carefully using *feux précoces*, and sensitization campaigns. However, due to budgetary and manpower reductions, the Forestry Service no longer has the required capacity to be an effective fire prevention/fighting force. Decentralization also places emphasis on the role of Inter-village Committees for Bushfire Control. However, their physical capacity to fight any extensive bushfires is doubtful, and perhaps their most important role should be to try to stimulate a change in rural mindset toward the deliberate setting of fires.

Paradoxically, Senegal possesses, in the guise of the Centre de Suivi Ecologique, the premier bushfire monitoring structure in West Africa. Indeed, the remote-sensing methodologies used widely to monitor fire size, distribution, and activity were developed at the CSE. Attempts to provide the Forestry Service with up-to-date fire statistics broke down in acrimony in the late 1980s since CSE's figures cast enormous doubt on the "official" figures published by the Forestry Service. In 1992, considerable hope was placed on revitalizing the cooperation between

¹⁷ Note the serious incidences that have already occurred in the western Ferlo and in the Forest of Pata.

the two structures since, at that time, CSE had installed an NOAA satellite image-receiving station and had become capable of providing exact locations of active fires. Budgetary constraints at the Forestry Service have never allowed the full exploitation of this valuable information.

There are reports that the new government wishes to re-establish the old series of firebreaks (they also provide excellent cross-country routes). There is also a growing NRM practice — planting “green” firebreaks, generally using cashew trees — that provides an additional economic spin-off. However, these activities, although valuable, are insufficient to counter the serious problems posed by bushfires. In addition, there is a need for large public relations campaigns — similar to the community clean up campaigns or AIDS awareness campaigns promoted by Youssou N’Dour — to try and convince the population of the dangers that fires pose. Moreover, the Forestry Service could make greater use of CSE data while local government could increase the penalties for setting fires.

The Way Forward

Short-term assistance: Help develop powerful anti-bushfire messages (through ads, radio, television, traditional media).

Medium-term assistance: Promote cooperation between CSE and the Forestry Service to develop an effective bush-fire monitoring scheme.

1.2.7 Degradation and Reactions to a Changing Climate

Evidence of environmental degradation is readily available, as a comparison of data for most zones over even a 10-year period will show. Of intense interest are the recent poster¹⁸ and PowerPoint demonstrations¹⁹ developed conjointly by EROS Data Center and CSE (USAID-financed). These show the evolution of several hundred sites visited and photographed in 1984 and again at least 13 years later. Very few show a positive progression of the vegetation while the majority of them show considerable decline in trees, species diversity, vegetation cover, and soil quality. A study of biodiversity changes in the region of Louga over a generation shows just how rapidly species diversity is lost.²⁰ However, the evidence that the process being witnessed is better characterized as degradation than desertification comes from numerous examples of physical habitat protection (*mise en défens*) where good recovery in vegetation and species composition has been shown (the role of habitat protection is developed below).

The major causes of environmental degradation are abusive forest exploitation for charcoal and forest clearance for agricultural purposes. These effects are followed very closely by uncontrolled bushfires, overgrazing within an economically inefficient pastoral system, and general climatic degradation. It is clear that at least one strategy that

If every project/program operating in villages could persuade the communities to place a small area under village protection, the impact across the country could be enormous.

¹⁸ Republic of Senegal - Environmental Profile (1998).

¹⁹ Natural Resource Monitoring in Senegal (1998).

²⁰ Gonzalez, Patrick (1998): Ph.D. thesis, University of California, Berkeley.

should be applied in seeking to counter environment degradation is to introduce areas of fully or partially protected habitats. Results from some interesting studies exist for Widou Tengoli (GTZ), the Tourist Forest at Bandia, and several enclosures on the Petite Côte. An interesting experience is currently underway with PAGERNA (GTZ) in the regions of Kaolack and Kolda. As part of their community development activities, they are attempting to persuade villages to voluntarily protect selected areas of their communities to enhance regeneration and replace lost resources. Even after only a single year of protection, some interesting results are being obtained. If every project/program operating in villages could persuade the communities to place a small area under village protection, the impact across the country could be enormous. In the same vein, we would like to return to the suggestions made in the previous pages concerning the rational utilization of land. Considerable land, especially in the drier north of the country is under low-production, marginal agriculture; this land should logically be under alternative, more rational usage. A voluntary *mise en défens* would be one such use, allowing the land to recuperate and eventually to provide products for sustainable exploitation.

The Way Forward

Medium-term assistance: Introduce a policy for the development of voluntary habitat protection sites in all communities where development agencies (donors and government agencies combined) are operating. This would be part of the assistance package.

1.2.8 The Energy Debate

This topic has arisen in several sections of this report. It is a topic that urgently needs tackling or else the energy deficit will catch the government unprepared in only a very few years. Past and abusive forest exploitation, failure to inaugurate a sound management policy, complicity and dishonesty along the entire commercial charcoal chain have all served to bring Senegal to a state where alternatives are desperately being sought, and dramatic environmental degradation has become a reality.

The history of forest exploitation has been covered in section 3.2 of the Retrospective Report²¹ while the economic implications of the charcoal trade in general and the energy debate in particular are analyzed in the preceding chapter of this report.

At the environmental level, efforts must be made to slow down forest decline while encouraging the development of wood reserves. The former can only be achieved if the irrational and often anarchic and illegal exploitation is stopped immediately, and if the population is asked to pay the real price of their energy. The International Monetary Fund (IMF) has already demanded this of gas; the government should be demanding this of charcoal and wood. What is the value of a 100-year old tree? Great political courage is required to tackle this aspect of the energy dilemma.

The other side of the debate — the development of additional wood reserves — is politically easier to implement, but time does not allow procrastination. Such activities as the massive development of village woodlots, local management of community forests, local management or

²¹ See “The Charcoal Dilemma.”

co-management of classified forests, and local forest protection schemes must be enacted rapidly. Fortunately, these ideas appear to be developing into government policy.

To quote the World Bank²²:

“ . . . assuming non-sustainable exploitation with . . . natural regrowth . . . under the most realistic scenario (2 percent annual growth) . . . between 1997 and the year 2000 total charcoal consumption in Senegal will result in an accumulated loss of anywhere from 60,000 ha to 100,000 ha of forest lands, and between [1997] and the year 2010 a loss of everywhere from 270,000 ha to 450,000 ha, the latter being equivalent to one half to two thirds of the total Tambacounda and Kolda forest lands.”

And that is just from charcoal exploitation. It does not include the transformation of forests to agricultural land.

The Way Forward

Short- and medium-term assistance: Assist GOS in developing a rational and nationwide energy policy. Assist at the field level to encourage increasing wood reserves and improved energy management.

1.2.9 Resource Management Systems

Several systems for resource management are being tried across Sahelian Africa. These range from individual management, to community management, to co-management and government control. The “best” system to use depends on the type of resource to be managed, although the choice of management methods depends very much on the political will and capacities of the country. In the Senegalese context, decentralization has opened certain possibilities while state ownership of land closes others. Below, we examine the various possibilities and indicate the most favorable methods.

Individual Management

Apart from the choice of agricultural techniques to use on their fields, individuals currently have few rights. Therefore, they have little say in how resources should be managed. Individual can only become empowered if GOS reforms its land ownership policies and adopts corresponding legislation to grant land title to individuals.

Community Management

With the law of decentralization, community resources occurring within the boundaries of that community are the property (but not the land) of the community and can be managed by it. This is a sound step forward, but it presupposes that the local communities have the ability to ensure that the resources are managed in a sustainable fashion. Furthermore, there are far too many cases where outsiders have arrived with (supposedly) official papers authorizing them to exploit

²² The World Bank (1997): “Staff Appraisal Report, Republic of Senegal, Sustainable and Participatory Energy Management Project,” Report no. 16367-SE, p17.

the community's resources. Until such disavowal of local community rights is halted, the ability of communities to manage their resources sustainably will remain problematic.

Co-management

Co-management provides an intermediate solution between independent community management and full state control. It is generally introduced to provide communities living on the edges of protected areas with rights to exploit certain products (dead wood, medicinal plants, fruits, and sometimes live wood) in a manner agreed upon ahead of time between government technical services and the local populations. The system is in place in a variety of countries such as Guinea-Conakry, Madagascar, Niger, and Burkina Faso. It is also being used in Senegal, for the most part in buffer zones around national parks. Its extension to classified forests might be a logical step and could be used to halt the current migration into these forests by agriculturists seeking land.

Government Control

Classified and protected areas remain outside the bounds of the law of decentralization, and any exploitation in these areas has to be sanctioned at the central government level. For example, use of government plantations and classified forests still requires the permission of agents of the Forestry Service. This mechanism should ideally be pursued as a stopgap until co-management or community management agreements can be established. Currently, this management system relies too much on the vagaries of individual forest agents and insufficiently on sound management principles. This means that a local household can be refused permission to collect wood while an outsider can be given the right to cut large sectors. This does not instill a sustainable management philosophy in either the local person or the outsider.

The Way Forward

Short- and medium-term assistance: Assist GOS in reviewing and updating its policy of natural resource management in order to better empower local communities and ensure a rational and sustainable utilization of resources.

1.2.10 Role of Different Sectors of Society

Different project interventions over time have frequently favored one section of society over another. This has been summed up in the Retrospective Report²³. We propose that development interventions always bear in mind the structures of the societies within which they operate before deciding to favor one sector over another within that society. When a decision is reached to work with one particular sector of that society, agents must clearly explain the logic to the disenfranchised members and obtain their approval for the choice, thus ensuring that the decision is, as far as possible, a community choice. If not, there is the potential for creating disharmony within the target community. Frequent choices are to work with women (e.g., KAED), with youth (e.g., UJAK), with richer villagers (e.g., CBNRM), or with business groups (e.g., CBNRM). While such selection is not intrinsically wrong, it does mean that certain sectors of

²³ Chapter 4: "Lessons for Future Consideration," Part 2: "Scale of intervention and target population."

society will be excluded. Far better to adopt a system that allows all members of society to receive attention, even if they are obliged to satisfy certain criteria before being accepted into the scheme. This does not, however, imply that everyone in the society will be a beneficiary — simply that they will be provided the opportunity to participate.

The Way Forward

All assistance programs: Avoid alienating sectors of society by rigorously defining who should be assisted. Rather, establish criteria that would allow all members of society to be assisted, provided they are able and willing to match those criteria.

Institutional and Political Framework

1.3 Institutional Issues

1.3.1 The Need for Improved Coordination

A plethora of actors exists in the general field of agriculture and natural resource management, including government services, non-governmental organizations (NGOs), donors, and the private sector. Failing to coordinate this diversity of interventions seriously compromises development processes by promoting duplication, enhancing competition, and failing to learn from the experiences of others. GOS could considerably improve the development processes by clearly signaling to all development structures that everyone’s first priority is to enhance the livelihoods of the Senegalese population.

Based on observations garnered during field visits, there is a need to increase the level of coordination and to focus combined and complementary efforts more effectively at the community level. There exist a number of structures of coordination and “concertation” in Senegal. These include the “*cadre de concertation* between the GOS and the producers,” represented by CNCR and APCR. Similarly, for the NEAP and various agricultural “*filieres*” (peanut, cotton, rice, etc.), there are also “*cadres de concertation* between the GOS and the donors.” At the lower level, there are also numerous “*cadres de coordination* and *de concertation* between the NGOs and the producers.” Some of these structures have not been functional, or, if they have been, they have not always been permanent and have been sectoral and operating, in most cases, as task forces. An analysis of all these mechanisms of coordination and “concertation” is essential to know the role that they have played, and what role, if any, can be expected from them now.

The Way Forward

Short-term assistance: Assist GOS in reviewing coordinating structures and mechanisms in AG/NRM, with a view to recommending measures for improved coordination.

Structures promoting integrated community development include the CERPs, the basic governmental technical team at the *arrondissement* level. The most functional in most zones are the bodies composed of NGOs working with farmer organizations (*the cadres de concertation ONG/organisations paysannes*). Also existing are traditional government services such as the

inspectors of agriculture, livestock, forests and water, and so on. However, in many cases, the traditional services can best be described as being in partial hibernation.

The Way Forward

Short and medium-term assistance: Prioritize support to local-level structures, especially the CERPs, to develop local capacity mechanisms for an integrated approach covering all relevant activities occurring in the same zone.

1.3.2 Information and Information Flow

Timely and reliable information is key to improved coordination. In the development context, information must flow freely to and from decision-makers to ensure that an activity is progressing according to plan. To the extent that the information received is inaccurate, incomplete, withheld (i.e., deceptively presented) or hard to obtain, decisions that follow may be inappropriate. If actions are pursued on the basis of flawed information, the results are likely to be flawed as well.

In recent years, donors, through an assortment of projects, have spent considerable amounts of money developing a wide range of information systems. Many of these systems are only subsets of what could be a larger information system — if all these information systems could be integrated. In most instances though, the information available is too specific, too disaggregated, too difficult to interpret, or not useful beyond its immediate application.

Eventually, a set of sub-systems could comprise a National Environmental Information System. Clearly, this is not an original idea. The CSE, with significant support from EROS, has made great strides towards this purpose and has developed a “big picture” perspective that offers a good deal of information at the macro level. At the practitioner level, though, a practical application is not in place. As the Internet develops, and connections are extended to rural areas, more immediate access will be available to field-level personnel. In the mean time, local information remains just that. It is not verified, aggregated, transferred, shared, or, in many cases, applied. As a long-term measure, a relatively simple, locally-based information system (at the rural community level, for example) — even if it were maintained in a simple-to-access paper format on an annual basis — which received input from the various technical agents working in the zone, might help reinforce the lines of communication and strengthen field level interventions.

The idea of a comprehensive information system for rural development is catching on quickly across the whole spectrum of development structures. For example, at the Regional Development Agency (ARD) level, the region of Kaolack told us that they would ask any structure wishing to work in the region first to register with them. This will allow the ARD to know where interventions will occur and what they will do, and thus to ensure that cooperation and coordination between different interventions can occur while providing guidance in case of need.

Such an information system could be significantly enriched if all developing structures involved in, for example, a region provided information on such items as:

- Their zones of intervention (CR, villages, watersheds, etc.)

- The techniques and methods being used
- Obstacles encountered and how they were overcome
- Results achieved and follow-ups necessary
- Key successes that others should witness
- Costs, spread effect, and sustainability
- Location of local structures/entrepreneurs with specific skills
- Documentation on key techniques, methodologies and practices²⁴

To succeed in the shortest time possible, development structures must seek to learn from what others working in the same discipline are doing and adopt whatever proves the most effective and pertinent.

We appreciate that nothing in the list is earth-shatteringly new; nonetheless, such a coordinated information system does not exist.

The Way Forward

Short- and medium-term assistance: Assist GOS and ARDs in developing a comprehensive information system for rural development.

1.3.3 The Role of Central Government

Throughout the post-independence history of Senegal, the central government has played a dominant role in the economic life of the nation. While central government has historically assumed a command-and-control philosophy, a more appropriate and adapted role should focus on: fostering contact and communications for all communities; ensuring effective service delivery; monitoring the national resource base; and advising local (decentralized) government structures and private sector operators of impending problems in their respective sectors. The government should also facilitate collaboration and cooperation between actors operating at multiple (regional) levels.

While decentralized government should continue to be supported, there remains a need within the GOS to coordinate policy efforts at the highest level. The current ministerial structure, however, segregates rather than integrates policy-making units that should interact with each other. It is beyond the scope or the ability of this study to instruct the GOS to adopt appropriate adjustment measures. To bring about the effective resolution of the coordination issue, several alternatives are presented here to promote the public policy discussion.

Conseil Supérieur des Ressources Naturelles et de l'Environnement (CONSERE)

Senegal nominally possesses a structure — CONSERE (*Conseil Supérieur des Ressources Naturelles et de l'Environnement*) — that could be charged with a certain level of environmental

²⁴ AFRICARE and PSPI have developed a series of practical guides to village interventions; PAGERNA have photographic displays of their village-level intervention methods; a "Toolkit" for the monitoring and evaluation of village-level interventions exists (Marks & Ba, 1996); the TRACKER system has been developed by USAID that brings together natural resources information from across Sahelian Africa; and so on.

coordination, although its brief does not cover agriculture. However, we presently do not consider that CONSERE has either the political power or the scope to adequately coordinate the broad range of activities within the AG/NRM sector.

Ministry of Rural Development, the Environment and Land Use Planning (MRDE)²⁵

One mechanism that potentially could tighten coordination between technicians working in the rural development disciplines is a ministry that combines all technical services related to broad-based rural development into a single governmental structure. The MRDE could include the sub-ministries or departments of:

- Agriculture (production, marketing, plant protection, and research)
- Livestock (production, marketing, veterinary medicine, and research)
- Water and forestry (similar to the current structure)
- Environment (to include both rural and urban environmental concerns and broad issues such as the use of domestic energy)
- Hydraulic resources (boreholes and wells, irrigation technology, and water management)
- Agricultural marketing (cross-cutting and market coordination)
- Agricultural equipment and technology
- Rural enterprise²⁶

Figure 1 illustrates the organizational structure of the proposed ministry.

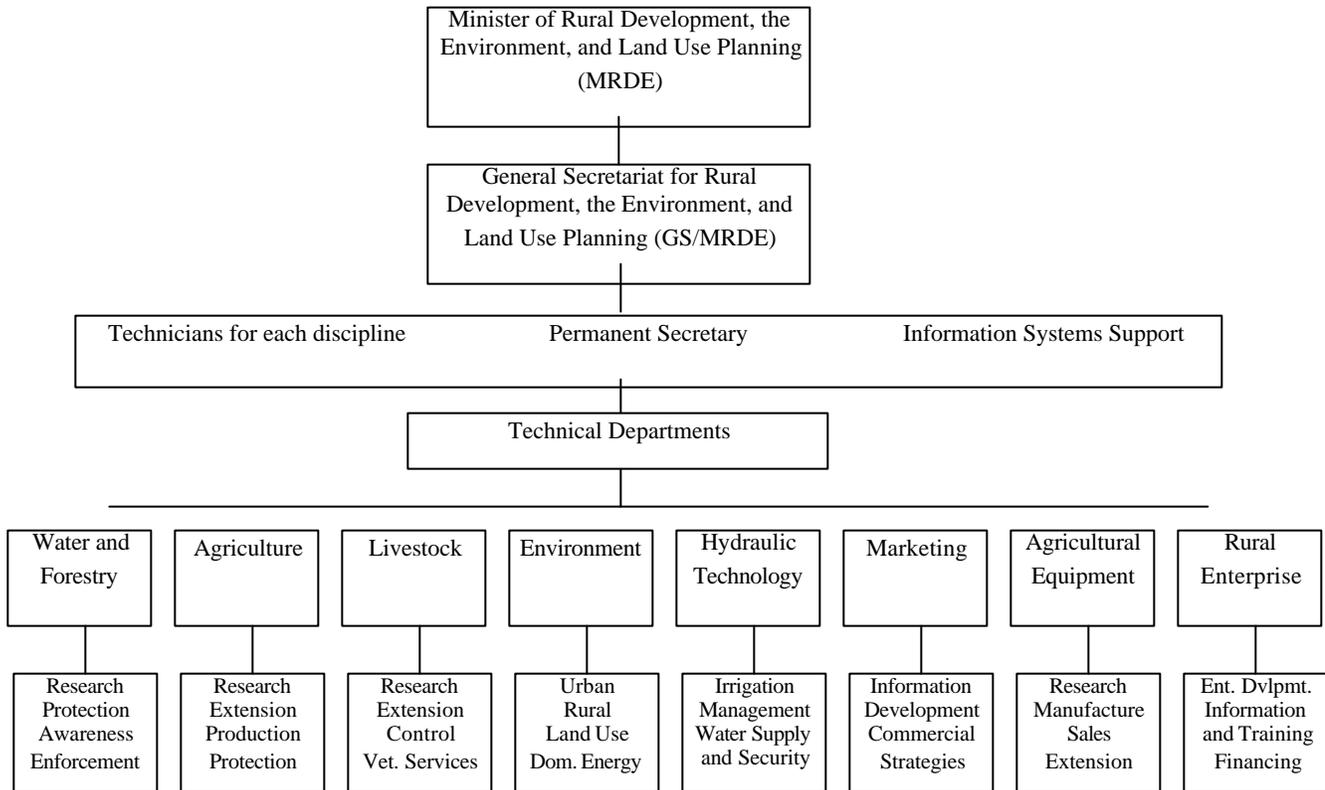
Internal operations. Within each of the technical sub-ministries or directorates, programs would be conducted — similar to the way government is currently practiced — with an awareness of the sectoral priorities and specificities pertaining to each technical discipline. Researchers would work closely with extension structures to ensure speedy dissemination of effective research findings. The respective technical sub-ministries or directorates would still cover protection of plants, animals and forestry resources. Through the rural enterprise department, a corps of specialized private-sector technicians could eventually emerge to provide services that currently are provided to producers through government structures (e.g., plant protection or extension services from master farmers). Production would be linked to commercial strategies developed in collaboration with the marketing department.

²⁵ This description of a “super-ministry” is presented to elicit further discussion from participants in Senegal’s governmental policy dialogue. It is modeled on the U.S. Department of Agriculture — a ministerial structure that regroups more than a dozen different departments, each of which contributes to the overall performance of the United States’ broadly based agricultural economy. These departments range from the various technical production disciplines to include the Agricultural Meteorological Service, the Agricultural Marketing Service, the Forestry Service, and the Economic Research Service. The principal benefit that accrues from such a structure is that each technical unit is within the same “house,” potentially less subject to interdepartmental rivalry, which in turn potentially facilitates communication between technicians working on similar issues.

²⁶ A technical department at the directorate level should be added to promote rural enterprise. The enterprises include those promoting agricultural production and agricultural support services. To the extent possible, the purpose of this group would be to develop diversified enterprise opportunities to support upstream and downstream activities to complement agricultural production.

Coordination mechanism. Interposed between the technical departments and the minister would be a permanent secretariat coordinating ministry activities within each of the 320 rural communities. The coordinating structure is unusual in the African context, but the study team considers it important. It would be a permanent structure within the ministry, a general secretariat (GS/MRDE) that would cover and coordinate the activities of individual departments within the ministry.

FIGURE 1: Schematic Representation of Proposed Ministry of Rural Development, the Environment, and Land Use Planning (MRDE)



Personnel of the GS/MRDE would be selected through a competitive process, similar to the way personnel are chosen for international structures. This would help ensure that qualified and knowledgeable technicians are chosen for this important structure. The technicians in the GS/MRDE would be responsible for coordinating programs and activities carried out by the various technical departments within the ministry. It would also link external aid to activities already being carried out and priorities within the rural sector of Senegal. Significantly, the technicians of the GS/MRDE would *not* have a decision-making role, per se. Their efforts would simply enable coordination, consistency of approach, and coherence between the various partners in the rural sector.

Information systems. Among the tools used by the GS/MRDE, or other senior coordinating body, would be a comprehensive database listing the technical and external aid activities taking place within each village, rural community, and region. This database would be maintained by the

coordinating unit,²⁷ receive information from each of the various participants in the rural development sector and be permanently available via the Internet. The database could be linked to a map (through an interface similar to that found in Geographic Information Systems).

Within each region, the database would be available at the ARD where a workstation and technical assistance would be available to any interested user. As electrical and telephone connectivity is extended to rural areas, additional workstations could be setup in more remote areas. Within the database, one would expect to find the kinds of interventions pursued for each activity, the methodologies used, the specificity of the beneficiary groups (eg., women, youth, etc.), as well as the localization of the activities. This would improve the potential to disseminate knowledge about and broaden the replication of successful AG/NRM activities.

Regional representation. At the departmental and sub-prefecture levels, each of the technical services would be represented as part of a multidisciplinary team of rural development specialists. Rather than being based in separate and sometimes distant buildings, these teams would work out of a common building. This proximity on a daily basis is intended to encourage coordination and foster a team effort. One senior agent would lead the team and also would cover all of the administrative requirements for the entire team. This would free up the others to devote more time to their technical responsibilities. At the *arrondissement* level, the CERP would benefit through a more focused and coordinated effort from the MDRE field team.

1.3.4 Decentralized Government Structures: Rural Communities and Regions

Nearly 30 years after the concept of the Rural Community was introduced in Senegal, the decentralized government structures are still in an emerging phase. This can be attributed, in part, to the fact that many of the people in Rural Community leadership roles were not functionally literate either in French or national languages and lacked clearly formed ideas about their roles and responsibilities. In addition, they did not benefit from constructive training, monitoring, or coaching to ensure that the local government institutions were engaged in good governance practices. These structures have since evolved, with varying degrees of effectiveness. Various technical commissions exist in each rural community structure. However, there remains substantial room for improvement as the rural councils and their commissions are neither able to ensure full coverage of the range of problems confronting their communities nor effective control over the nine competencies transferred to the rural communities. One of the principal constraints is, of course, the sparse amount of money available to rural councils to fund community activities. Capacity-building of committee and council members also remains a need of many rural communities.

In 1996, regional governmental structures were added to the decentralization mix. In effect, the region now consists of all the rural communities, the municipalities and — for region-wide activities — the region. Regional Development Agencies (ARDs) are being organized in several regions of the country. These ARDs will seek a role to play in the planning of activities within their region. The ARD could serve as a central point for coordination and information for

²⁷ The justification for limiting input access to a few technicians who work for the coordinating unit is that experience shows that data input errors tend to be minimized when input tasks are relegated to a small group of experienced, specialized operators who are familiar with the application(s).

development and rural-focused commercial activities within the region. As with the rural councils, one of the principal long-term constraints for the ARD will be how they manage to fund their activities. In the short-term, that concern is mitigated by a World Bank-sponsored institutional building project. However, over time the rural communities and municipalities of the region will be expected to contribute funds to support regional activities.

Thus, the problems common to the decentralized governmental structures in Senegal are their capacity to practice good governance and funding. USAID has recently begun an interesting initiative through its democracy and governance strategic objective (SO2) to address the capacity and the financial resource issues. This type of support is to be encouraged. In the absence of a revitalized productive base in the rural jurisdictions, it will be difficult to generate the funds needed through fiscal fees to carry on meaningful local or regional development activities.

The Way Forward

Short- and medium-term assistance: GOS and development agencies should work together to ensure efficient and complementary capacity-building in the Ag/NRM sector at each of the decentralization levels, and particularly at the level of local collectivities.

1.3.5 GOS Technical Services

Senegalese government technical services have in the past suffered an undefined technical agenda and lack of resources, being largely dependent on project funds and resources. In recent years, with decentralization and the assignment of groups of technicians to specific community structures as part of a multidisciplinary CERP team, the technicians' sense of purpose and morale may have been given a boost. However, in the absence of an operating budget, it is difficult to accomplish anything.

Many of the technicians assigned to the field have reasonable knowledge of their technical disciplines and are capable of resolving many of the problems that they encounter. Some of them may lack the transfer skills inherent in an excellent extension agent; but additional training in rural promotion and communication of technical messages could resolve that problem. The underlying problem in reinforcing the abilities of these field agents to better serve the needs of the community is the persistent question of how to fund their activities.

Technical assistance and expertise is essential, especially if “new” techniques are going to be disseminated. Dependence on continued external technical assistance is not a sustainable strategy. However, in the short term, such dependence may be necessary, provided options are explored for more sustainable solutions, which may include strategic and targeted technical assistance. Eventually, when conditions permit, farmers — either directly or through community taxes — may be able to pay a portion of the costs to keep the CERPs operating or to fund other technical service options.

Even with limited funding, government technicians have an important role in informing the people in their jurisdictions about programs and policies that apply to them and assisting them to make the most out of the few opportunities that are available. The technicians can also contribute

to rural community council deliberations and help guide the leadership of those communities in their programmatic choices.

The Way Forward

Short- and medium-term assistance: Help GOS develop a program for better utilizing government technicians at the local collective level (regions, communes, and *communautés rurales*). This would involve training in their defined roles and functions plus more specialized technical enhancement to enable them to carry out their advisory roles more skillfully.

1.3.6. Promotion of the Private Sector

To expand upon the idea that farmers one day may be able to pay for advice and counsel, one objective of the professionalism of agriculture should be to move toward the promotion of a national policy of private-sector technical expertise. Such a policy has already been implemented in Senegal and other West African countries with the creation of a private veterinary corps. Another private-sector service with which village dwellers have long experience is well-digging. When a village well begins to lose its recharge capacity, due to a falling water table or sedimentation, money is collected from those who use the well and a well digger is called.

Private-sector extension or technology specialists — similar to private veterinarians — could include such professions as: irrigation specialists (especially drip irrigation vendors and technicians); organic gardeners (composting, non-toxic insect and disease control); seed producers; and erosion control specialists. The emergence of specialized rural entrepreneurs will be a fundamental structural change for Senegal’s agricultural sector. With some 13,000 villages spread across 320 rural communities, and 70 percent of Senegal’s estimated 12 million people engaged in some form of agricultural production, such a transformation could literally provide thousands, if not tens of thousands of jobs. More importantly, if the expertise provided through the rural enterprise channel proved effective, the farm economy could be boosted to a more viable level. The DYNA Enterprises is already assisting in this field.

For such a scheme to work, farmers will need to have successful, revenue-generating farm enterprises. Under the conditions present throughout much of the country, the privatization option is not currently achievable. However, one possibility would be to prepare the farm economy for eventual restructuring by providing subsidies to facilitate the transition from the current system. Although subsidies are not sustainable tools, in this situation they could prove to be useful. In a sense, it would provide “free advertising” for the rural entrepreneurs by permitting farmers, who might be difficult to convince otherwise, to benefit from a “free trial” of supported services. Clearly, this measure needs to be studied more closely, but at first appraisal it would appear to be an appealing target.

1.3.7 Non-governmental Organizations

Taking advantage of their strong communication skills and their close ties to villages, NGOs can be used to develop, test, and “perfect” approaches, which can then be generalized and applied on a broader scale by larger efforts supported by donors. This “laboratory” role of NGOs in the overall development process has existed in a *de facto* manner for many years. Perhaps it is time to recognize it formally and derive the maximum benefit possible from it.

1.3.8 Religious Authorities

The major Islamic brotherhoods that dominate Senegalese religious life are powerful forces governing the social and cultural, and, to some extent, political comportment of the country. Their influence has a profound effect on populations' behavior towards the Ag/NRM sector. On several occasions, the call has gone out to the faithful to increase peanut production and the response was massive. Other actions suggested by these religious authorities have resulted in negative ecological consequences. The example of M'Bégué/Khelkom is a prominent example.²⁸

To the extent that these religious leaders might be open to promoting an enabling environment to contribute to better AG/NRM practices, appropriate members of the GOS could approach them to foster awareness and solicit their cooperation. If their unequivocal influence could be directed toward encouraging people to adopt more rational practices, the effects could be potent. This is a sensitive matter, but if handled correctly, the support of the religious leaders of Senegal could help energize large-scale participation and compliance with the new environmental vision.

The Way Forward

Short-term assistance: Assist GOS in approaching religious leaders in order to gain their support for a nationwide AG/NRM program. One type of action that might prove helpful is a sensitizing campaign targeted toward religious leaders using an adaptation of the EROS and CSE presentation on the degradation of Senegal's natural resource base.

1.4 Policy Issues

1.4.1 Public Policy Measures: Fiscal Measures

To contribute to the public policy debate at the national level, which is an important accompanying measure to any technical intervention being carried out at the community level, the following section suggests a range of fiscal measures which may contribute to the overall goal of protecting Senegal's natural resource base in a sustainable way.

Governments have a wide range of incentive and disincentive tools available to them to induce public compliance to specific policy orientations. These tools range from police action at one extreme to advertising focused on persuading people to subscribe to a given program. Positioned somewhere between those two extremes is the use of targeted fiscal measures. Among the most effective of the measures available, taxation has direct influence on consumers' behavior. Each time the consumer considers the purchase of a good that has been fiscally targeted, the post-tax price prompts the consumer to reflect on the "message" that the government is trying to convey.

The application of tax increases must be studied well, especially since their enactment sometimes can engender strong reaction from the public. That outcome is certainly undesirable. Therefore, if fiscal measures are applied, they should also be accompanied by an extensive public information campaign to explain the rationale underlying the policy. Although such information may not assuage the economic sting of such measures, at least the public will be able to consider the technical justification for their adoption.

²⁸ See "The Case of the Forest of Kelkom," section 3 of the Retrospective Report.

Illustrative fiscal measures

It is clear that the set of measures that already are in place has had virtually no effect on abating the over-exploitation of the nation's remaining forest resources. Charcoal production quotas are granted according to criteria that retain a certain level of intrigue. According to a 1997 report,

“It is estimated that out of the . . . 1,800 legally registered ‘exploitants forestiers’ only some 20 traders actually work in and control the production of charcoal. The remainder [of] registered traders buy charcoal production licenses and resell them afterwards to the traders that produce charcoal. That secondary — and illegal — transaction of those quotas takes place in a well-organized black market environment that resembles a well-functioning stock or futures market.”²⁹

The same report states: “[C]harcoal production quotas are based on charcoal outputs and not on wood inputs and thus provide no incentive for wood conservation in the carbonization process.”³⁰ Quota holders enter a forest, begin cutting according to spatial, not economic or conservational, concerns. Specifically, the operator selects an area of the forest then essentially clear-cuts it, without regard for the age or future service of the tree. Furthermore, larger trees are targeted without particular concern for alternate values besides their use for charcoal. No effort is made to use improved charcoal production methods like the Casamance charcoal kiln, which has a significantly higher wood-to-charcoal conversion than the low efficiency traditional kiln (from which only 18 percent of the quantity of wood burned remains as charcoal). Such methods do not attempt to maximize the value of the wood.

In no case is the wood valued at its “real” economic price. Under the current pricing structure, there is no value or price applied to the age of a tree or consideration given to how long it may have taken for a given tree to reach its size. If there were, certain types of trees would cost substantially more than others; older trees, with more wood, would be considerably more expensive than younger ones; trees with more highly prized woods would be more valuable than others. One needs to calculate the cost, measured by the amount of time and effort required, to grow a tree of a particular species to a specified size.

These practices, regrettably, are not followed in Senegal's forestry sector, even though — through clear vision, committed effort, and public support drummed up by awareness campaigns — they are not very difficult to put into practice. One can only conclude that the level of awareness, political will, or commitment has not been strong enough to influence such important change in conservation policies.

An example, which has strong current implications, is the use of hardwoods for manufacture of *djembés*, a type of local drum that has become very popular both within other parts of Africa and

²⁹ The World Bank, “Staff Appraisal Report, Republic of Senegal, Sustainable and Participatory Energy Management Project,” p. 12. The current PROGEDE activity financed by the World Bank is an ambitious attempt at integrated management of the forestry resources in Tambacounda and Kolda regions, with a range of actions oriented to adjusting the demand characteristics for domestic energy. These actions include introducing alternative fuels such as kerosene and shifting the price of all domestic energy products toward market prices that reflect their real economic costs.

³⁰ The World Bank, *ibid*, p. 14.

as an export item to Western countries. While traveling through the eastern and southern parts of the country, one can see numerous trucks transporting both charcoal and wood. Many of the wood trucks had relatively large girthed logs that were targeted for use as *djëmbé* wood, not household domestic energy usage. Such wood should be taxed, either at the point of removal or during transport, to slow down the unabated growth of this “cottage industry.” Again, the “real” or replacement value of the tree is not considered.

An additional fiscal measure, which easily could be applied, would be to place an export tax on every *djëmbé* leaving the country. This tax should be introduced quickly and set high enough, (for example, 75,000 CFA, or about \$100, per drum) to attempt to slow down the over-cutting problem. An accompanying measure could include an awareness campaign, which shows forests being ravaged to harvest logs that then are turned into *djëmbés*. Posters depicting this theme could be posted in hotels and other places frequented by tourists. Hotels also would have clearly posted signs that *djëmbés* will be subjected to an export tax, payable at the port of departure.

The purpose of these taxes or fees is not to stop the manufacture of *djëmbés* — simply to move the price of the *djëmbé* closer to the “real” cost of the natural resources used to produce the drum. This is not presently done. The funds collected from the export taxes could be used to re-plant appropriate varieties of trees to ensure that there always will be trees appropriate for the manufacture of *djëmbés*.

Domestic energy

Energy used for domestic purposes is by far the greatest drain on the natural resources base. The World Bank estimates that the household sector accounts for 58 percent of energy consumption in Senegal.³¹ The exploitation of forest resources for transformation into charcoal or for use as firewood is the dominant source of fuel for Senegalese families. Propane gas has taken on an important role for many families in the Dakar urban agglomeration, but even many families that use gas continue to use charcoal for specific purposes. However, the GOS has committed to an energy policy that will shift toward full-cost pricing of energy products so that the market prices reflect the real economic costs.

Specifically, in the “Energy Sector Policy Letter” signed by the Ministers of the Economy; Finance and Planning; and Energy, Mines, and Industry on 30 January 1997, the government committed itself to eliminate the subsidy on butane gas progressively before the end of 1999.

While that date has passed, the intent of the government remains and is the subject of pressure from IMF representatives. At the macroeconomic level, and with respect to a prudent management of scarce public funds, this policy can be understood. However, on a broader level, there exists a macro perspective that takes into account not just the economic ramifications of an action but also the ecological and sociopolitical consequences: The lifting of the subsidy would raise the price of gas, used by many thousands of urban households, and bring about a consequent rise in the demand of alternate domestic fuels (i.e., firewood and charcoal). Specifically, urban households living at the margin likely would be motivated to abandon gas if the price differential of gas-to-traditional fuels was sufficient to trigger substitution.

³¹ The World Bank, *ibid*, p. 14.

We believe that this particular policy characterizes the incoherent and inconsistent approach to public policy — specifically in relation to environmental conservation policy. If subsidies on cooking gas are lifted, and simultaneous accompanying measures to proportionally raise the price of firewood and charcoal are not applied, rising consumer demand for wood-based fuels likely would have a dramatic and severe impact on the remaining natural resource base in Senegal. We cannot guarantee this consumer reaction, but we fear that market signals would go out that would result in ever more intensive clearing of the remaining domestic wood resources.

To stimulate desired consumer behavior without further jeopardizing the natural resource stock, a range of fiscal measures could be enacted in addition to the current taxation, via the National Forestry Fund (FNF) of charcoal quotas. The proceeds from these tax measures could be applied to reinforce the sustainable natural resource management practices and, similarly, to the FNF that primarily supports reforestation. Alternatively, a fund could be established to enable the government to support subsidies on “preferred” fuels (i.e., gas) or even to assist poorer families to adopt gas as a primary cooking fuel.

*Bidding for Forestry Quotas.*³² Charcoal production licenses (quotas) currently are distributed by the same Forestry Service that historically gave the quotas to urban-based traders. This resulted in the “creation of a vertically integrated and oligopolistic industry with widespread corruption problems.”³³ If the rural communities that control the resources under the Forestry Code put in place in 1995 could publicly auction these quotas, two problems could be palliated: 1) the rural community could take direct control of the resource and eliminate all presumptive outside intervention; and 2) the receipts from such an auction would help bring direly needed funds into the coffers of the rural community. The mechanisms of such auction would obviously have to be carefully developed, but they could involve rural communities delimiting areas of forest and selling to the highest bidder the right to exploit that area for charcoal. Not only would rural communities receive revenue more closely linked to the true market value, but exploiters would be induced to get the maximum amount of charcoal out of a given area of land — this can only lead to more efficient exploitation and conversion methods. Mechanisms would need to be put in place to counter common auction manipulation practices such as “ringing” (bidders agreeing not to bid against each other during the auction and then settling the price between themselves after the auction is finished). However, the introduction of stiff financial penalties and the threat of exclusion from later auctions should dissuade the majority of potential illegal practices.

Corrective taxes on charcoal. “Charcoal consumption accounts for about 27 percent of traditional fuels but represents 55 percent of the out-take of forest resources for energy use.”³⁴ Total charcoal consumption could be reduced if the market price for this fuel were raised significantly. As discussed in the previous section, charcoal manufacture is very inefficient. The Gambia has determined that its impact on the environment is not desirable and has formally banned charcoal. Such a ban would be difficult to enforce; however, a significant tax increase would be relatively easy to enforce because the charcoal trucks have only one road into the Dakar market.

³² Jacques Faye, referred to elsewhere in this report, suggested this innovative approach.

³³ The World Bank, *op. cit.*, p. 12.

³⁴ The World Bank, *ibid.*, p. 11.

Restrictive tax on firewood that is transported by road. Similar to the proposed charcoal tax, wood that came into the urban market could be taxed, again with the intent of: 1) pricing the fuel at a level closer to the real economic cost of the resource, and 2) inciting substitution behavior toward alternative (non-forestry derived) fuels. The trucks transporting the wood could be taxed at the entry point to the urban market.

The surplus tax receipts generated from the increased taxes on traditional fuels could be applied to bring down the retail prices charged for bottled propane gas. This transfer might help encourage, through a relatively lower price differential, the use of alternative fuels.

Promote widespread adoption of wood-burning and other improved stoves. As an accompanying measure, the widespread adoption of the *baan ak suuf* (or wood-burning stove) and the corresponding disappearance of the traditional and wasteful *fourneau malgach* and the *diambar* (ceramic-lined, more efficient) stove for charcoal could help improve the conservation rate for traditional fuels. As Gonzalez observed in his 1992 report:

“The widespread diffusion of the improved cookstove *baan ak suuf*, made from clay and dry manure . . . constitutes one of the biggest successes for natural resource management in Senegal. The stoves can reduce fuelwood and charcoal consumption by 50 percent. Imagine if everyone in rural Senegal used the *baan ak suuf*! If the stove increased fuel efficiency by just 30 percent, wood consumption would decrease by 2100m³ each day or the equivalent of 35 semi-truckloads. The USAID Renewable Energy project funded, for a mere \$124,000, the initial CERER research that developed the *baan ak suuf* in 1980.”³⁵

There was a significant effort undertaken in the 1980s to promote the *baan ak suuf* in rural areas. For indeterminate reasons, the use of the stove was never widely adopted over the long-term. Even though most people in rural zones visited by the study team knew what the *baan ak suuf* was and knew of its advantages, for the most part they were not using it. One constraint seems to be that the women did not know how to build and repair the stoves. PAGERNA and the U.S. Peace Corps have begun teaching village women how to make and maintain the *baan ak suuf*. These women, in turn, are charged with teaching the method to other women, and so on. This sort of self-sustaining replication is an ideal method for transferring appropriate technologies.

In 1997, the World Bank stated:

“Based on available information, the best program in operation today is the USAID-funded Appropriate Technology International (ATI) Diambar charcoal stove program. This program supports the production of stoves in Dakar and Thiès. The Diambar stove, which consists of a ceramic interior covered in sheet metal, is proving to be very efficient (30-40 percent) under normal household use conditions and has a high consumer acceptability. A wider dissemination of this promising stove, however, has been limited by availability of investment credit to the small artisans who produce the ceramic and the metal shell. . . . [A]t the estimated 30-40 percent efficiency range, a wider dissemination

³⁵ Gonzalez, P., op. cit., p. 43.

of the Diambar stove could result in a significant reduction in charcoal consumption and expenditures at the household level.”³⁶

These improved cook stove programs need to be reviewed, and pending correction of technical constraints, efforts should be redoubled to promote these conservation technologies. If such promising and effective technologies exist, a marketing study needs to be conducted to identify demand constraints and parameters that could incite adoption. A campaign to stimulate consumer acceptance should follow.

1.5 Economic and Financial Issues

1.5.1 Rural Credit

As agricultural output has diminished, rural savings, in all forms, also have been depleted. To accomplish activities such as intensive agriculture a certain amount of investment will be required.

Experience has shown that mutual credit associations, owned and operated by the community itself, are an effective way to encourage savings and provide credit to rural communities that are not otherwise served by more formal banking services. There are numerous experiences with effective credit programs. Since there is no justification for reinventing something that already works, new interventions should refer to the proven methods that are in practice.

While a credit component can be built into a natural resources or agricultural program, it is not necessary for the agency executing the program to carry out the credit intervention. Where possible, synergies should be sought with institutions that have relevant specialties. This definitely is one type of collaboration or partnership that should be investigated fully.

The Way Forward

Short-term assistance: Assist GOS in carrying out a full review of rural credit systems and developing the best model for replication across the country.

1.5.2. Generation of Value from the Protection of Natural Resources

Natural resource protection should deliver real paybacks to the communities or individuals carrying out the protection. The model has already been applied for example in buffer zone management around the national parks of Djoudj and Niokolo Koba. PROGEDE is attempting to set up community management in several forested zones in the Tambacounda region. The model could now be extended to other sites, by permitting a system of independent local management or co-management with a technical service. The important elements are to provide local communities with both the ownership incentive and the legal rights to seek redress if illegal transgressions are made.

Other areas for promotion that are proven to cause resources to be protected while providing considerable income are ecotourism and artisanal activities. The former is still in its infancy in

³⁶ The World Bank, op. cit., p. 20.

Senegal while the latter is developing and diversifying rapidly. Senegal has several under-exploited national treasures such as Niokolo Koba, Djoudj and the coastal island parks of Sine-Saloum. These are generally on the ecotourist route but could easily handle an increase in visitors. Other areas also exist that do not usually figure on the tourist itinerary, for example, the Ferlo, the stone megaliths of the southern Saloum, the forests of Tambacounda and the department of Kedougou in general. These areas get far fewer visitors than the national parks while offering considerable pleasures. The development of tourist *campements* in these zones would provide opportunities for diverse local employment both within the *campements* and in providing services and goods to them.

The Way Forward

Short- and medium-term assistance: Assist in developing rural enterprises that explicitly respect the sustainable management of natural resources.³⁷

1.5.3 Commercialization for Local Consumption and Export

The conditions related to both local marketing and export have been raised in previous sections dealing with agriculture. However, there exists enormous potential for profitable investment in agriculture and in natural resources generally. These could include the development of modern growing techniques being demonstrated by the experimental farm at Keur Momar Sarr; the planting of woodlots, orchards, and precious wood plantations; the extraction of essential oils; the marketing of medical plants; the transformation of agricultural products; the production of juices, sweets and so on based on natural products; and the production of a broad range of artisanal wares. There are many more business possibilities that could result from the sustainable use of agriculture and natural resources.

Government could help this diversification by providing the necessary fiscal incentives and removing the barriers to business start-up and personnel recruitment. Tax breaks have proven a good method to encourage entrepreneurs in many western nations, and they would certainly help job and wealth creation in Senegal.

The Way Forward

Short- and medium-term assistance: Assist GOS in developing and executing an “Alternative Livelihoods” strategy in order to increase youth employment and tempt the rural population away from unsustainable agricultural and natural resource exploitation practices.

An additional benefit of stimulating the development of alternative economic strategies is that increased job creation would serve both to reduce youth unemployment and to entice people away from under-performing farming systems. By concentrating on developing alternative and more attractive livelihoods, the natural resources of Senegal could be both protected and revitalized.

³⁷ The activities of DYNA Enterprises (USAID) would appear to offer a good model.

CHAPTER 2

Possible Lines for Future Interventions

2.1 Introduction

Chapter one lays out different elements of a holistic approach toward the modernization/revitalization of agriculture and the sustainable management of natural resources in Senegal. These chapters have drawn heavily from the “Lessons Learned” identified during the preparation of the Retrospective Report.

Each section has been accompanied by details of the suggested “Ways Forward,” considered necessary if the holistic approach is to be successfully accomplished. This approach incorporates all sectors of society participating in the development process: GOS, donors, NGOs, the private sector, and the Senegalese population in general. It also considers not only factors directly related to AG/NRM, but also those that can provide the enabling conditions required for success in the AG/NRM field. These include the institutional, political and economic climates, as well as donor coordination and transparency.

In chapter two, we bring together these diverse elements and propose possible development interventions in Senegal’s AG/NRM sector. No one donor should carry out all of these interventions; rather, the GOS might wish to build an AG/NRM program around these proposals, allowing the donor community and the private sector to buy into the program. However, if this is to occur, GOS and the development community must be prepared to build together the program for the AG/NRM sector. This would require considerable cooperation between partners. GOS must be prepared to carry out a comprehensive policy review, probably aided by donor and private-sector expertise. The program approach does not mean that there will no longer be a place for individual projects, but rather that projects would work within the confines of a recognized and accepted AG/NRM sector program.

Should GOS and development partners not be prepared to adopt a program approach for the AG/NRM sector, the proposed interventions could still form valuable components of their individual activities. The proposals contained here are not dependent upon the program approach, but they would be much facilitated by it. The lessons learned pertaining to the project approach — those contained in the Retrospective Report — should be examined before considering any project intervention.

Not all of the elements and recommendations developed below can be carried out immediately. Some are of greater importance and therefore should be targeted immediately, while others are less urgent or require a longer input and would be better targeted over the longer term. To help select inputs and allow for future planning, we have labeled these potential interventions as:

- *Short-term interventions:* To begin as rapidly as possible and likely to take up to 18 months to accomplish

- *Medium-term interventions*: To begin as soon as possible but likely to require from 18 months to five years to accomplish (i.e., approximately the “usual” project cycle)
- *Long-term interventions*: Likely to take more than five years to accomplish

Not surprisingly, the majority of recommendations are for interventions over the short/medium-term and so could be developed by GOS and donors within standard project cycles.

2.2 The Proposed AG/NRM Program

The major components required to develop the AG/NRM sector program are:

- Identify the principal and secondary priorities for the AG/NRM program
- Define and structure the role of GOS in the development processes
- Define the role of specific donors and other development partners
- Define and reorient the role of the private sector
- Structure a unified approach for information sharing
- Identify specific intervention technologies for AG/NRM sector interventions

Each component is reviewed below, and the suggested “Ways Forward” from chapter one are brought together and evaluated.

2.2.1 Develop an AG/NRM Sector Program Approach

This approach will not only require the development of the AG/NRM program itself but also of a set of commonly agreed strategies that ensure cooperation between partners and the adoption of specific standardized approaches in the field. Such standardization does not refer to technical activities; those should be left, as much as possible, to individual development structures. Rather, it refers to approaches for such fundamental matters as the funding of NRM interventions at the local level. We would like to see donors avoid potentially conflictive situations where, for example, CBNRM finances 85 percent of a given NRM activity while PAGERNA only finances the purchase of a small amount of material; or where one intervention pays per diem to CR committees and another does not. If a standard approach to financing could be adopted, beneficiaries would not be tempted to play one donor against another. In all cases, before an approach is adopted, it should be weighed according to its potential to remain as a sustainable practice once the intervention period and external funding end.

2.2.2 Role of GOS in the Development Processes

Throughout this document, we have been critical of the role government has played in development processes during the last 40 years. This criticism is not an attempt to apportion blame for the rapid and alarming decline in agriculture production and in the quality of the natural resources base. Rather, it is intended to show the ideal role of government as the *chef d’orchestre* of the development processes in Senegal, a role that we hope this contribution will help bring about

The most important role that GOS can play today is that of facilitator, ensuring that the optimum enabling conditions are in place to permit other players in the development processes (beneficiaries, donors, NGOs, private sector, etc.) to operate in the most favorable environment possible. We see four areas in particular where GOS can make an enormous difference and where cooperation from the donor community could be particularly pertinent:

- Institutional coordination: national and decentralized levels
- Establishing a favorable policy/legal environment
- Establishing a favorable fiscal environment
- Establishing a sound technical environment

1. Institutional Coordination: National and Decentralized

For the program approach to be effective at both the national and local level, there will need to be established strong and recognized coordination units. At the central level, such coordination would also require the development of a sound policy unit for advising GOS on appropriate and necessary modifications in policy directly related to the AG/NRM sector.

2. Policy/Legal Environment

Many areas of state policy are crucial to the improvement of agriculture and the better management of natural resources. Policy areas that require particularly rapid attention are: increased investment in AG/NRM sector, local community rights, sound energy policy, and moving the population away from marginal lands.

3. Fiscal Environment

Currently, there is little incentive to invest in the AG/NRM sector. In contrast, many incentives promoting sector exploitation are in place. By appropriate use of fiscal measures, GOS can bring into play important tactics to move the country toward rational utilization of natural resources and modernization of the agricultural sector. Key among these fiscal incentives are valorizing AG/NRM and increased investment in AG/NRM sector.

4. Technical Environment

Although the Senegalese civil service has shrunk significantly during the last decade, GOS nonetheless still counts a large cadre of personnel and expertise in the technical disciplines of agriculture, regional planning, the environment, livestock, hydraulics, forestry, and others related to AG/NRM. Currently, this expertise is not adequately channeled into a complementary and integrated capacity-building program at the community level. Donors could assist GOS by supporting this process.

2.2.3 Role of Donors and Other Development Structures

Without sufficient cooperation with GOS and willingness to develop an AG/NRM sector program, such a program cannot succeed, and the AG/NRM sector will continue its decline.

1. Role of the Private Sector

The private sector is still very small, but it is undergoing rapid growth and is on a very steep learning curve. The development of a strong and efficient private sector will likely contribute more to the future of the AG/NRM sector than any other component. The private sector therefore needs stimulating and nurturing by, for example, promoting rural entrepreneurs and enterprises.

2. Information Sharing

Development partners possess enormous quantities of invaluable data. These need organizing in an appropriate National Environment Information System and should be made available to the entire development community. Only with such an information system can data be better circulated and development partners learn from the experience of others. Hence, we propose a comprehensive, computerized information system for rural development at the national, regional, and, eventually, CR levels. Other useful resources include a directory of community interventions and an inventory of techniques.

3. Developments in the AG/NRM Sector

This section contains the “field” activities being proposed to revitalize the agricultural sector and improve the sustainable management of natural resources. Activities are divided into five complementary sections:

- Agricultural modernization
- Rehabilitation of low/non-productive soils
- Sustainable natural resources management systems
- Technical and communication services: capacity-building and research
- Assistance to different sectors of society

Agricultural Modernization

Activities required to revitalize the agricultural sector and to promote modernization of production systems are:

- Put in place the necessary political and economic facilities to support the evolution of the agricultural sector
- Through policy changes, permit farmers to gain legal title to their land, allowing them to buy and sell land, encouraging greater investment in the quality of the land, and helping to promote larger farm units (medium-term)
- Review the livestock sector and develop future strategies, respecting not only the need to develop a more efficient intensive sector but also the need to maintain existing ties with traditional, integrated agriculture and extensive cattle-rearing

Rehabilitation of Low-production or Non-productive Soils

The greatest way to make relatively significant impact on agricultural production would be to promote the widespread dispersion of relatively simple measures to reclaim abandoned land and increase the productivity of impoverished soils. The most important of these are to:

- Develop and apply strategies for better water management
- Develop techniques in the field for increasing the amount of time that water is available after the end of the rainy season
- Develop techniques for reclaiming salt-damaged lands and countering salt intrusion
- Develop techniques for reclaiming land eroded by water
- Develop techniques to increase productivity of marginal arid lands using adapted traditional methods
- Develop irrigation programs in suitable sites
- Promote local expertise in these techniques (short/medium-term)

Sustainable Natural Resources Management

Sustainable natural resource management techniques fit into two basic and complementary structures: those related to agricultural production (e.g., manure application, planting of windbreaks, agro-forestry, integrated systems, etc.); and those related to non-agricultural resources (e.g., forests, pastures, mangroves, etc.). They are treated together in this section.

Technical and Communication Services

Considerable technical experience exists, both in the public and private sector. If the technicians of these two sectors could collaborate together in a complementary and integrated manner, rural development progress could be considerably enhanced. Further, media communication is now becoming a powerful tool in Senegal, and this should be integrated into any widespread extension program. Key activities that the technical communities should be advocating are:

- Develop a program for better utilizing government technicians at the CR level; assist GOS in developing a corps of agricultural technicians at the rural community level; and ensure cooperation between different players in the field
- Determine the future of agricultural research in the country — if the private sector is chosen, consider privatizing the facilities of ISRA and strengthening the private sector

- Diversify Senegalese agricultural away from low-value traditional crops toward higher-value, revenue-generating products
- Help local community structures to know their rights and to ensure that those rights are respected
- Develop powerful anti-bushfire messages
- Develop social marketing campaigns to increase the awareness level of the Senegalese population that their natural resource management practices are currently unsustainable

Sectors of Society

Any agricultural modernization program will have both very positive and negative effects on different sectors of society. This fact needs to be considered within any AG/NRM program. Key components are:

- Develop a program of alternative livelihoods for those rural populations for farmers on arid marginal land
- Develop plans for rationally utilizing marginal lands currently used for agriculture.

Target Populations

- Establish criteria allowing all members of society to be assisted if they are able to match those criteria
- Assist GOS in its ambition to encourage more young people to return to the land by helping to strengthen youth training and capacity building, especially in natural resource management and agricultural techniques
- Assist GOS in approaching religious leaders to gain their support for a nationwide AG/NRM program

CHAPTER 3

Options for AG/NRM Interventions

3.1 Introduction

Currently, USAID/Senegal has no appropriate AG/NRM Strategic Objective. This is in a country where a majority of the population rely, at least partially, on rural resources for their livelihoods and where standards of living have fallen dramatically during the past 20 years. However, USAID does have two strategic objectives with some strong links to rural development:

SO-1: “Private Sector: Sustainable Increases in Private-Sector Income-Generating Activities”

SO-2: “Democracy/Governance: More Effective, Democratic, and Accountable Local Management of Services and Resources”

SO-1 is specifically promoting economic empowerment, thus enabling people to have real choices in the investment of their labor and resources. It is to be achieved by promoting small and medium business initiatives in different sectors and through improvements in the enabling environment for private-sector investment.³⁸

SO-2 is increasing the ability of Senegalese to identify and prioritize local issues and to mobilize resources at local levels to address their major concerns. Activities include increasing capacity of local institutions, increasing access to financial resources, increasing participation in local affairs, and more effective implementation of policies and regulations related to decentralization.³⁹

3.2 Perceived Need for Further Ag/NRM Activities

Despite the strong links of both SOs to rural development, there are many areas that are not adequately covered by the two SOs, and indeed do not logically form a coherent part of those two SOs. Hence, the purpose of this chapter is to put forward proposals for additional activities that could be designed into a separate SO, specifically targeting the AG/NRM sector, which has the necessary form and content to dovetail into and complement the two SOs referenced above.

Should USAID/Senegal consider increasing its exposure to rural development, it will find in the current document the many varied and extensive possibilities that exist for interventions in the Senegalese Ag/NRM. All of these interventions seek to better the livelihoods of the rural population by encouraging improved agricultural practices and sustainable natural resource management techniques.

Future activities could valuably target the Increase in Rural Incomes from Sustainable Agriculture and Natural Resource Management Practices.

³⁸ USAID-Senegal: Summary of the Country Strategic Plan (1998-2006), Private Sector Strategic Objective (SO-1).

³⁹ USAID-Senegal: Summary of the Country Strategic Plan (1998-2006), Democracy/Governance Strategic Objective (SO-2).

3.3 Targets as Components of the Desired Objective

Logically, sustainable practices and techniques will only take hold if the rural economy can be stimulated by an improved agricultural marketing system; this, in turn, will be stimulated by the presence of favorable enabling conditions that only GOS can induce. Four complementary objectives need to be targeted in order to build, individually and synergistically, toward the desired increase in rural income:

Target 1: Improve the Policy Environment for the Ag/NRM Sector

Currently, there is insufficient coordination of activities within the sector: Government fiscal and resource-management policies tend to work against rural occupations while favoring non-sustainable exploitation and urban populations. Thus, rural populations lack the motivation to manage resources in a rational, sustainable fashion and to invest in their resources for the future. There is great need to improve coordination between diverse government departments and the development community, as well as to review policies specifically affecting rural livelihoods.

Target 2: Increase the Productivity of Agricultural Lands

This lack of motivation of the rural population has resulted in a drastic and more-or-less continuous decline in the natural resources base in general and agricultural production in particular. Large areas of traditional agricultural land in Senegal yield far below their real potential while significant areas of what were once highly productive soils have now been abandoned. If some of the abandoned soils could be reclaimed for agriculture while productivity on impoverished soils was raised, the effect on rural livelihoods would be enormous.

Target 3: Increase the Natural Resources Base

Since independence, the natural resources base of Senegal has been raided, usually by outside exploiters providing no encouragement to local communities to undertake either conservation activities or to sustainably manage their resources. As a consequence, Senegal's resources have declined alarmingly over the past 40 years, to such an extent that the once expansive forests are in danger of disappearing negatively affecting rural stability, the country's bio-diversity, and climatic change. Communities need to be empowered (hence a cross-linkage with SO-2), and resources need to be re-established in order to allow for their sustainable and rational management.

Target 4: Increase Rural Employment

With agricultural livelihoods declining so rapidly, why are there still more than 8 million people in Senegal who rely at least partially on the AG/NRM sector? Much of the answer to this question lies in the fact that they have few other options available, and among those alternatives that do exist (such as urban migration), few can offer much guaranteed improvement in lifestyle. However, if the agriculture and natural resource management sectors can become more dynamic and rewarding, not only would living standards improve, but a host of secondary and tertiary activities, and thus employment, would also be encouraged. Here we envisage a strong link with SO-1).

3.4 Components of Four the Targets

Each target would be obtained via the combined effects of a number of contributory objectives. Although not exhaustive, these could include the following:

Target 1: Improve the Policy Environment for the AG/NRM Sector

To develop a favorable policy environment for the AG/NRM sector three complementary objectives must be achieved:

Objective 1.1: Establish a GOS Program Coordination Office

Throughout the prospective report we have argued in favor of the establishment of an AG/NRM coordination unit within government. The unit would be directly responsible for developing a sound AG/NRM program within which the individual activities of all development structures could be coordinated, as much synergy as possible generated, and duplication avoided. This unit would not operate in a vacuum but rather would deal directly and openly with all development structures.

Consequently, this office would need to have sufficient authority to speak with all sectors of GOS that touch on rural development in general and AG/NRM in particular. It would also need the flexibility to be able to work with and help coordinate exchanges between the local, regional and central strata of government, donors, and other actors in the development arena. The unit could not be created immediately; neither would it be able to function without initial assistance.

USAID could intervene as follows:

- Assist GOS in structuring the Program Coordination Office (PCO), establish its status, develop and clarify its roles and responsibilities, produce internal rules, staff selection policies, etc.
- Carry out capacity-building for the proper development and efficient running of the PCO
- Assist with the development of an AG/NRM program, and develop ties with other development partners
- Prioritize activities necessary to achieve success within the AG/NRM program
- Develop work programs for the different components of the AG/NRM program

Objective 1.2: AG/NRM Policy Reforms Undertaken

Current policy does not seek to stimulate the AG/NRM sector; rather, it would appear frequently to operate against investment in agricultural production and the sustainable management of resources. Hence, the entire sector needs to be reviewed, and more adequate and stimulatory policies need to be developed to provide fiscal stimuli for investment in agriculture, protection

rights for natural resources, and fiscal measures for ensuring that resources are sold for their true, environmental value.

Potential areas of policy that might be targeted for revision could include:

- Energy taxes (favor renewable or alternative fuels over non-renewable charcoal or wood)
- Land ownership
- Fiscal stimuli for investment in agriculture
- Ending monopoly situations in the agricultural supply and purchasing chains

Objective 1.3: National AG/NRM Information System Functional

A tremendous wealth of knowledge concerning the rural sector exists in Senegal following many years of interventions by the development community. However, the sharing of this data has frequently been poor or non-existent, causing actors in the development world to frequently repeat mistakes of their predecessors or to continually “reinvent the wheel.” Sustainable and rapid development will not occur unless transparency, information-sharing, and cooperation can be strengthened in Senegal. Thus we propose that a national information system be developed and be open to supply information to all who wish to have access. Among activities that could be envisaged in this sub-result are:

- Development of coordinating structure
- Definition of system contents
- Integration of existing systems
- Definition of roles and functions
- Rules of access, addition of data, and standardization
- Capacity-building at central and local levels

Target 2: Increase the Productivity of Agricultural Lands

To increase the productivity of agricultural lands in Senegal, a series of elements is required. Not all elements be covered in this target, although those considered the most important are developed as individual objectives.

Objective 2.1: Low-production or Non-Productive Lands Rehabilitated

Enormous areas of agricultural land, certainly the majority, are either yielding very low levels of production or have been abandoned. Increasing production, by even small amounts, and bringing back into cultivation a percentage of the abandoned land would provide tremendous boosts to Senegalese agriculture and rural incomes. Among activities that could be undertaken here are:

- Reclaim salt-intruded soils
- Control erosion and reclaim eroded soils
- Increase use of soil-enriching processes
- Rotate crops
- Use intrans

Objective 2.2: Use of Recognized NRM Techniques in Agricultural Production Systems Increased

This objective complements the prior one by seeking to stimulate wider and more intense use of recognized NRM techniques. Among those likely to be used in this sector are:

- Water management techniques: improvement of temporary ponds (mares), mini-dams, *zai* holes, etc. (irrigation should not be included here)
- Agro-forestry techniques: windbreaks, live hedging, trees in fields, etc.
- Alternative land use (for marginal sites): plantations, wood lots, protected areas, pastures, etc.

Objective 2.3: Agricultural Marketing System Strengthened

Many efforts have been made to raise agricultural production. However, this has not always been accompanied by an improved marketing system able to accommodate the increased production. This inevitably softens prices, discouraging the producer. Furthermore, all producers in a region traditionally tend to produce the same products, of the same quality, at the same time, and release them onto the market together. The price depression that this engenders requires attention. This objective will seek therefore to ensure that an ultimate increase in agricultural production through the two previous objectives can be accompanied by an adaptable market system and that producers can adapt to the requirements of the market by modifying their production. Some of the likely activities in this objective are:

- Modifying crop types and varieties to spread the production season
- Assisting with marketing techniques to obtain better prices
- Providing market details to farmers' groups
- Acting as intermediary between Ag/NRM enterprises and producers

Target 3: Improve the Natural Resources Base

The natural resources of Senegal are in rapid decline and many vegetation types, especially forests, are likely to practically disappear in the not-too-distant future due to over-exploitation for charcoal and/or agricultural lands. Unfortunately, natural regeneration is hindered by frequent and extensive bushfires. The law of decentralization stipulates that the local communities should manage resources outside of classified areas. However, in reality, there is still considerable, non-sustainable exploitation by outsider concerns, nullifying the local benefits that the law was supposed to provide. Furthermore, there is a considerable lack of capacity at the local level, as

far as planning and responding to perceived problems are concerned. These problems can, in part, be overcome by technical assistance and, in part, by directed communications campaigns. This target proposes four complementary objectives:

Objective 3.1: Village-level AG/NRM Development Programs Undertaken

Coordination of NRM actions in a village or between villages (depending on scale) should be an important element of development programs. Too frequently, activities are undertaken in isolation so that impacts are muted by other problems arising. GTZ programs such as that of PAGERNA have shown the way forward for community development, and their model should be replicated. Activities would include:

- Definition of problems and corrective strategies (participative approach)
- Development of village or inter-village development plans (simple)
- Assistance for the rational utilization of land
- Definition of likely costs
- Definition of approach and financing mechanisms
- Work-sharing and time scheduling

Objective 3.2: Community Management of Local Resources Increased

Assistance to communities for the sound management of their resources, with activities including:

- Understanding the law and community rights
- Dealing with contention and outside exploitation
- Production of simple resource inventories and development of sustainable exploitation plans
- Execution and monitoring of the plans
- Methods to improve community resources

Objective 3.3: Communication Campaigns for Promoting NRM Techniques Undertaken

Rural communities are becoming more exposed to different forms of public media, particularly radio and television, and these media should be used more widely. For example, intense communications campaigns could be used to expose the rural population to:

- Improved NRM practices
- The danger of over-exploitation
- Community rights
- Where to go for help or advice on NR problems

Additionally, we propose that USAID study the possibility of coordinating with influential religious leaders to improve the response to NRM messages. We believe that this medium that has never been used by the development community.

Objective 3.4: Frequency and Extent of Bushfires Reduced

Frequent study has shown the very negative effects of uncontrolled bushfires,⁴⁰ and the Forest Service has had little success in either preventing or fighting fires. Its lack of success has been due, in part, to: the lack of manpower and equipment (that USAID should not seek to correct); the incorrect use of early burns (*feux précoces*); the failure to use modern fire detection techniques (available at CSE) and to arouse public awareness of the negative effects of fire.

Activities that USAID could support in seeking to reduce fires are:

- Improved use of remotely sensed fire-detection techniques (in cooperation with CSE)
- Socio-economic studies to better identify the causes and reasons for fires
- Allowing development of improved communications campaigns to sensitize the public and to generate public opinion against fires (see previous objective)

Target 4: Increase Rural Employment

The agricultural and NRM sectors cannot be expected to grow significantly unless there is a parallel and commensurate increase in the private sector, both of expertise in improved agricultural techniques and in the market system for increased agricultural production and diversification. Further, such nascent enterprises would certainly require access to funds in order to develop and expand. This IR seeks to aid the private sector (and thus would cooperate with the activities of SO-1). We anticipate that it would be active in three areas:

Objective 4.1: Cadre of AG/NRM Technicians Established

If agriculture is to develop, local expertise will need to be readily available to assist and advise farmers in remedial activities. We believe that there will develop a ready market for the following skills:

- Water-management techniques (mini-barrage, irrigation techniques, etc.)
- Erosion-control methods (gully plugs, cordon *pierreux*, windbreaks, etc.)

Advances in this sector would require considerable training in management and marketing techniques for the nascent entrepreneurs. If the private sector can develop, more able farmers might generate additional income by broadcasting their specialties in other communities. Furthermore, this objective could provide valuable support to GOS endeavors to boost youth employment by helping the young return to rural areas. Providing training in improved AG/NRM techniques and increasing business acumen could deliver important results.

⁴⁰ See, for example, the Bushfire section in Chapter 3 of the current report.

Objective 4.2: Number of AG/NRM-Related Enterprises Increased

There is likely to be a significant increase in demand for services both to provide intrants to producers and to purchase/transform agricultural products. Furthermore, we anticipate that increasing numbers of the rural population will seek to leave agriculture and find work in the private sector. Hence, assistance with developing this sector should produce positive effects at all levels. The types of enterprises that could be stimulated include:

- Marketing concerns
- Transformation businesses
- Product/intrant suppliers
- Tree nurseries

Objective 4.3: Capacity to Mobilize Financial Resources for SME Strengthened

Activities aimed at establishing or strengthening local credit associations.

Conclusion

The future of agriculture in Senegal is at a crossroads. Many approaches have been tried in the effort to bring sustainable development to the country's rural and urban populations. Indeed, the state of agriculture and natural resources in Senegal is critical, but we believe that viable options exist to turn the situation around. These include building on promising and innovative approaches and encouraging more widespread adoption of proven systems and technologies. But they also require understanding and acceptance of the need for fundamental change, and the political will to implement needed changes. These changes range from policy decisions in sensitive areas such as natural resources taxation and land tenure, to setting up or adapting structures to facilitate change.

We strongly believe that a more coordinated approach is needed by development partners to maximize the impact and effectiveness of current and future activities. More strategic “program” approaches are being developed, and have the potential to provide an effective framework for cooperative action. The Government of Senegal should play a leading role in this, at both national and decentralized levels. Central to the program approach is the need for improved communications, notably improved information systems, including the application and sharing of information to meet development goals.

Effectively addressing agriculture and natural resources problems in Senegal means more than simply treating agriculture and natural resources as interdependent issues — it also means situating them in a broader rural development context that promotes diversification, private sector development, and alternative employment generation. Many technical solutions exist, but they must be supported by policy and economic incentives to encourage wider adoption.

This report indicates areas where USAID can play a role in moving forward both the dialogue and the process of improving agricultural and natural resources management in Senegal. This may not require huge investments, but rather targeted and focused interventions to leverage existing and planned initiatives. We suggest a proposed framework to accomplish this important and timely support.

ANNEX A

Consulting Mission Calendar

7 May 2000: Team mobilized.

8 May 2000: Get in touch with contacts with the USAID mission.
Meeting with the USAID Director regarding the justifications and aspects of the study.

9 May 2000: Meeting with David Gibson and the team of consultants regarding the aspects of the retrospective study and the mission's calendar in Dakar and in the field.

9 May 2000 - 29 May 2000: Retrospective study and lessons learned

- Analysis of available documentation and meetings with resourceful people in regards to the retrospective study
- Drafting of the retrospective study.
- Information sessions with a restricted team from USAID: 15, 22, and 29 May 2000
- Overhauling/implementation of retrospective study 31 May 2000

1 June - 10 June 2000: Mission out in the field

- Lac de Guiers-vallée du Fleuve Sénégal
- Kaolack
- Tambacounda
- Kolda

12 June 2000: Prospective study

- Analysis of available documentation and meetings with resourceful people in regards to the prospective study up till 23 June 2000
- Information sessions with a restricted team from USAID: 16 and 26 June 2000
- Drafting of the prospective study up till 29 June 2000

30 June 2000 - 1 July 2000

- Preparation for the inception workshop

3 July 2000:

- Inception workshop

ANNEX B

Field Mission Calendar

Lac de Guiers, vallée du Fleuve

- 1 June 2000:** Keur Momar SARR and N'Dioum
Meeting and visit of Keur Momar SARR's farm with the agricultural team:
- Papa Amadou SIDIBE, Farm Foreman
 - Arona TRAORE, Irrigation Specialist
 - Bounama FAYE, Operations Coordinator
 - Abdoulaye FAYE, Maintenance Coordinator
 - Mr. GUEYE, Logistics Coordinator
- Meeting with the PAGEN team's headquarters at Ndioum with:
- Djibril Moussa LAM, Coordinator
 - Abdoul Mamoudou BA, responsable du développement organisation
 - Belal BA, Livestock Specialist
 - Samba Beydary DIALLO, Civil Engineer, Water and Forestry, Chief, Water Management and Logistics Division

2 June 2000: Podor

Meeting with Abdourahima N'DIAYE at the SAED (Nianga) Delegation

Meeting with the UJAK (Union des Jeunes Agriculteurs) team from Koïli Wirdi

- Siley Bocar WADE, Program Officer, President of Culture and Sports
- Mlle Ramata BA, Program Officer
- Mme Banel Ly DIOP, Women's Activity Specialist

3 June 2000: Trip from N'Dioum to Kaolack (via Ferlo, Linguère and Diourbel)

Visit of Restoration Project of salinated fields at N'Diaffate with Abdoulaye MBAYE, Station Chief of ISRA at N'Diaffate

4 June 2000: Kaolack and region

Meeting at the headquarters of Africare to Kaolack with

- Coumba Diouf SECK, Coordinator PRASS II
- Boubacar SOW, Coordinator of the Credit Monitoring Unit

Visit of N'Gayène (PCGRN) beneficiary
Visit Pakane N'Diawnaari beneficiary (CR of Médina-Sabakh)
Visit of Darou Mougnauguène (CR of Prokhane)

5 June 2000: Kaolack and region

Meeting with the Development Agency with

- El Hadj Ibrahima THIAM, Director
- Amar LY, Chief, Local Communities Division

Meeting at the headquarters of PAGERNA to Kaolack with project team :

- Wilfried KREMER, Technical Advisor
- Madame SARR, Sociologist
- Saliou MBODJ, Land Use Planner

Visit of the Coordination Unit of Diama Fara

- Gabions
- Fascines
- Sea Transports

Continuation onto Tambacounda

6 June 2000: Tambacounda

Meeting with Mr. Babacar Salif GUEYE, PROGEDE Director of Regional Operations of Tambacounda

Meeting at GADEC with Mr. Lamine DIALLO, Regional Coordinator

Site visit of a mini-dam

Meeting with the PCGRN team dispatched to the Tambacounda region

- Pape SARR, Division Head
- Mamory DIAGNE, Chief Officer, Missirah zone
- Boubacar THIAM, Chief Officer, Kolda zone
- Ousmane SECK, Consultant, Association Conseil pour l'Action (ACA)

7 June 2000: Tambacounda, Missirah, Neteboulou

Meeting at Missirah with Moussa DIALLO, Sub-Prefect, Missirah

Meetings at Missirah with the members of the Local Administration Committees:

- Kutambo CISSE (Missirah)
- Tidiane CISSE (Missirah)

- Thierno Amadou DIALLO, Vice President, Administration Committee (Hamdallaye N'Diataldé)
- Bankari KABA, Treasurer, Administration Committee (Missirah)
- Taguy DIALLO, SAV Commission (Yaocounda)

Meetings with the CERP team of Missirah

- Dielemakhan CISSOKHO
- Mamadou Mansour N'DIAYE

Visit to Gouloumbou

- GIE Beneficiary (Amadou Barro WATT)
- GIE Beneficiary (Mr. COULIBALY)

Visit of the Bantantini banana plantation

8 juin 2000: Kolda

Meeting at Kolda with Dorith von BEHAIM, PSPI Technical Advisor

Meeting at Kolda with Mamadou Mao BALDE, President of the Rural Council of Pata

Meeting at Kolda with Mansour SARR, Coordinator of Projet Foresterie Rurale de Kolda (PFRK)

9 June 2000: Kolda and region

Visit of the village of Soulabaly (Rural Council of N'Dorna)

- Pépinière du Groupement des Femmes avec Samba BARRY
- Meetings in the village of N'Diao with Modou Fana CISSE (Rural Council of N'Dorna)
- Visite Plantations Anacardières, Fosse Compostières, classe alphabétisation
- Mamadou CISSE, N'Dian village Chief and other persons of distinction (?)

Meetings at Pata with :

- Aliou BALDE, Président du Comité de Gestion
- Aliou MBALO, Animateur de zone

Continuation onto Kaolack

10 June 2000: Kaolack to Dakar (via Fatick, le Sine)

Visit of an independent promoter, N'Déné DIOUF of the N'Gane village (Gandiaye)

- Tree Nursery
- Market gardening with acquired technologies

Visit of la Petite Côte

- Samba Dia /Palmarin
- Djifere and Pointe de Sangomar
- Water reservoir at Pointe Sarère.

ANNEX C

Professional Contacts

1. Dakar

First Name	Last Name	Organization	Function
1.1. Projects			
Charles “Chuck”	MAY	DYNA Entreprises	Chief Technical Advisor
Jim	FICKES	CBNRM	Chief Technical Advisor
Kent	ELBOW	CRNRM	Technical Advisor
Papa Meïssa	DIOPP	CBNRM	Training Officer
Mamadou	DIANKA	PROGEDE	Director, Demand Component
1.2. Government			
Benjamin	DIOUF	ANCAR	Managing Director
Moctar	NIANG	CSE	Managing Director
Ababacar	BOYE	Forestry Service	Assistant Director
Aboubacry	LOM	Planning Directorate	Director
Mme.	SECK	Planning Directorate	Division Chief
Abdoulaye	SENE	Mission Vallées Fossiles	Director
Mr.	SECK	Mission Vallées Fossiles	Program Officer
Colonnel Pape M.	DIOP	President’s Office	Technical Advisor/Natural Resources/Ag
Pape	DIOUF	Ministry of Agriculture	Minister of Agriculture
1.3. Donors			
Mike	McGAHUEY	USAID/Washington	Program Officer
Gertjan	TEMPLEMAN	Embassy of the Netherlands	First Secretary (Development Assistance)
Michael	SIEBERT	GTZ	Coordinator and Technical Advisor for Natural Resources
Marie Dia	BA	FAO	Program Assistant for Natural Resource Management
Arona	FALL	UNDP	Program Officer

First Name	Last Name	Organization	Function
1.4. NGO			
Gorgui Sène Mamadou	DIALLO CISSOKHO	Africare CNCR (National Farmer's Association)	Program Officer President of CNCR
Ousmane Thierno Ndiogou	THIOUNE SECK SECK	ENDA Syspro ENDA Syspro ENDA Syspro	Program Officer Program Officer Program Officer
1.5. Others			
Médoune	DIENE	Former Director of Agriculture	Consultant
Khassim	NDOUR	Private Gardner at Sébikotane	
Jacques	FAYE	Swiss International Aide and Former Director of ISRA	Consultant
Oussoubi	TOURE	Former CONSERE Director	Consultant
2. Lac de Guier, Keur Momar Sarr, Vallée du Fleuve			
2.1. Government			
Papa Amadou	SIDIBE	Pilot Farm at Keur Momar	Farm Foreman
Arona	TRAORE	Pilot Farm at Keur Momar	Irrigation Specialist
Bouname	FAYE	Pilot Farm at Keur Momar	Operations Coordinator
Abdoulaye	FAYE	Pilot Farm at Keur Momar	Maintenance Coordinator
Mr.	GUEYE	Pilot Farm at Keur Momar	Logistics Coordinator
Abdourahim	NDIAYE	SAED	Irrigation Specialist
2.2. NGO			
Djibril Moussa	LAM	PAGEN	Coordinator
Abdou Mamour	BA	PAGEN	Activities Coordinator
Belel	BA	PAGEN	Livestock Specialist
Ciré Bocar	WANE	UJAK	Program Officer
Mlle Ramata	BA	UJAK	Program Officer
Mme Belel Ly	DIOP	UJAK	Women's Activity Specialist

First Name	Last Name	Organization	Function
3. Kaolack			
3.1. Government			
Ablaye	MBAYE	ISRA	Station Chief
El Hadj Ibrahima	THIAM	ARD	Director
3.2. Projects			
Wilfried	KREMER	PAGERNA	Technical Advisor
Mme	SARR	PAGERNA	Sociologist
Saliou	MBODJ	PAGERNA	Land Use Planner
3.3. NGO			
Coumba Diouf	SECK	Africare	Coordinator PRASS II
Boubacar	SOW	Africare	Coordinator
3.4. Others			
N'Déné	DIOUF	N'Gane, near Gandiaye	Independent Farmer
4. Tambacounda			
4.1. Projects			
Babacar Salif	GUEYE	PROGEDE	Director of Regional Operations
Pape	SARR	CBNRM	Division Head
Mamory	DIAGNE	CBNRM	Chief Officer, Missirah zone
Boubacar	THIAM	CBNRM	Chief Officer, Kolda zone
Ousmane	SECK	CBNRM	Consultant, ACA
Amadou Barro	WATT	GIE	CBNRM Beneficiary
Mr.	COULIBALY	GIE	CBNRM Beneficiary
4.2. Government of Senegal			
Moussa	DIALLO		Sub-Prefect, Missirah
Dialimakha	CISSOKHO	CERP	Forestry Agent
Mamadou	NDIAYE	CERP	Agricultural Agent
Mansour			
4.3. NGO			
Lamine	DIALLO	GADEC	Regional Coordinator

First Name	Last Name	Organization	Function
5. Kolda			
5.1. Projects			
Dorith	VON BEHAIM	PSPI	Technical Advisor
Mansour Samba	SARR BARRY	PFRK Rural Community of N'Dorna	Coordinator CBNRM Beneficiary
Modou Fana	CISSE	Rural Community of N'Dorna	CBNRM Beneficiary
Aliou	BALDE	PATA	President, CBNRM Management Committee
5.2. Others			
Mamadou Mao	BALDE	Rural Community of N'Dorna	President of the Rural Council of Pata

ANNEX D

Bibliography

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