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Natural Resource Management Institution Building in the Decentralizing Context of West Africa: the SANREM CRSP Approach

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Abstract

A far-reaching restructuring is beginning to take place in West Africa. There is general recognition in the region that central governments are poorly placed to make many decisions appropriate for local levels. Particularly in areas of agriculture and natural resource management (NRM), local populations are being asked to take leadership in deciding appropriate land uses and ownership/usufruct of resources. The continuing and accelerating degradation of the natural resource base and changes in the socioeconomic environment of the region has added urgency to decentralization strategies. However, the current policy of decentralization across West Africa has become largely a matter of deconcentration. Although village-level (*terroir*) management has demonstrated significant success in community-based NRM, authority and resources resulting from decentralization laws do not reach this level. This paper describes the SANREM CRSP's attempt to organize and support a provincial-level NRM advisory board and orient technical interventions by providing training in Holistic Management.

I Introduction

Historically, West African civil society has been suppressed by a highly centralized formal regime instituted under colonialism that has largely been maintained under nearly 40 years of independence. This highly centralized structure dominated customary local governance constraining it to the village arena (Ribot, 1999). Today, a far-reaching restructuring is beginning to take place. There is general recognition in the region that central governments are poorly placed to make many decisions appropriate for local levels. Particularly in areas of agriculture and natural resource management (NRM), local populations are being asked to take leadership in deciding appropriate land uses and ownership/usufruct of resources. Decentralization laws (i.e., devolving decision-making authority over local matters, particularly land use and natural resource allocation) such as those in Senegal, Niger, Mali, Burkina Faso, and The Gambia (Bohrer and Hobbs, 1996) are attempts to facilitate the needed restructuring and empowering of local populations.

The reality of decentralization so far is that local decision-makers have very little discretion in decision-making, and few skills for effective implementation and monitoring of decisions taken. The institutions which have been set up to govern natural resources at the local level rarely have budgetary discretion, perceived local legitimacy, and a mandate for more than awareness- building. This is particularly the case where local governmental units have been newly created or empowered by decentralization laws. As a result, the current policy of decentralization across West Africa has become largely a matter of deconcentration (i.e., strengthening the national government at the local level) of state power (Benjaminsen, 1997).

The continuing and accelerating degradation of the natural resource base in the region has added urgency to decentralization strategies. Recurrent drought - with its concurrent threat of climatic change, advancing desertification and the deteriorating natural resource base - has heightened fears of increased conflict among populations in West Africa. In particular, the unique agricultural and pastoral systems and constituent peoples of the West African Sahel appear increasingly vulnerable to conflict given the intensifying population pressure and changing socioeconomic conditions affecting all in the region. Indeed, NRM-related conflicts appear to be becoming more common and serious. Given this volatile situation, the research and development community has become more involved in the search for appropriate institutional support for decision-makers at the newly decentralized (provincial) levels. This paper reviews the landscape/lifescape context and state of NRM in the region and describes the SANREM (Sustainable Agriculture and Natural Resource Management) CRSP (Collaborative Research Support Program) strategy for supporting newly empowered decentralized institutions in Mali.

II Background: The Landscape of Agro-Pastoral Systems in Arid and Semi-Arid West Africa

The arid and semi-arid region of West Africa is commonly known as the Sahel. In general, the Sahel is characterized by a monomial rainfall regime with an annual rainfall from 100-200 mm and rarely exceeding 1,000mm (McIntire *et al.*, 1992) to 1,200mm (Sanders *et al.*, 1996). The region experiences sporadic and locally highly variable rainfall patterns. Annual rainfall levels overall have been decreasing over the course of this century (Farmer, 1989; Sunzuni, 1992). Some authors believe this trend dates back to the 17th century (Rasmusson, 1987). Marked climatic/weather change over the last two decades in the Sahel has shortened the rainy season, substantially modifying the landscape of the region as rainfall isohyets have moved southward.

The recurrent droughts of the 70s and 80s have further disturbed the equilibrium of the natural vegetation while the irregular distribution of rainfall has contributed to increased land erodability and the reduction of land area suitable for cultivation. Drought has transformed the landscape through: (1) water shortage which limits grazing and settlement; (2) soil degradation due to depletion of mineral elements (mining of crop nutrients without replacement through continuous cropping), and the consequent exposure to fluctuating environmental condition (wind and water erosion) leading to further reduction in water holding capacity; and (3) changing the equilibrium and composition of natural vegetation, in particular leading to the disappearance of perennial grasses (Gillet, 1975).

In combination with weather/climatic changes, other stresses have led to severe land degradation in the region. Low fertility (phosphorus and nitrogen), low humus content and low water retention capacity of the soils has limited rainfed agriculture in the region and the productivity of natural vegetation (Sunzini, 1992). Only 8% of the land area in the Sahel is suitable for agriculture and irrigated agriculture currently occupies only about 5% of this land. "Despite the semi-arid zone's low theoretical support capacity, population density is often higher than in subhumid and humid agroclimates [zones of sub-saharan Africa]" (McIntire, *et al.*, 1992). With a population growth rate of more than 2.5% per year, more land has had to be put in cultivation to satisfy food needs. Additional lands have come from existing fallow or from increasingly marginal lands that have been traditionally shared with herders. The once 10-15 year fallow period is now reduced to 1 or 2 years or has entirely disappeared (Sanders, *et al.*, 1996). As a result, soils are losing their production potential as indicated by productivity declines for both food crops and cash crops on traditional agricultural lands. As these yields have declined, farmers have reacted by expanding production into marginal lands where current cultivation techniques are no longer adapted to the new environmental conditions and intensifying production in well-watered zones, where the potential for conflict with traditional herders have increased.

Non-irrigated agriculture in the Sahel is only possible in areas where the length of the growing season allows crop maturation. The lack of water, in association with high temperatures (up to 45° C at certain periods of the year), is the most limiting factor for agricultural productivity in the region. Rainfed and recessional agriculture are the dominant practice (McIntire *et al.*, 1992; Tabor, 1993; and Sanders *et al.*, 1996). In the arid zone, millet and sorghum are cultivated near water points. In the semi-arid zone, the important food crops are millet, sorghum, cowpeas and maize (McIntire *et al.*, 1992; FAO, 1986). Sorghum predominates in the heavier soils and millet in the sandy soils (Sanders *et al.*, 1996). The main cash-crops are cotton and groundnut. Farmers are predominantly small-holders using traditional farming systems which mix food crops and cash crops on the same farming unit. Purchased agricultural inputs are rarely used on food crops, and less is used on peanuts and cotton than in the past.

Although the potential for rainfed agriculture intensification is limited, the large potential for irrigation is not fully exploited. Both modern and traditional irrigation schemes are present in the region. Modern irrigation schemes have been developed in Mali and Senegal along the Niger and Senegal Rivers. The main objective has been self-sufficiency in rice but productivity has always been low. Modern irrigation at small and medium scales based on dams is also present, and traditional irrigation is practiced in various parts of the region. In addition to the flooded systems in the inland delta of Niger in Mali, floating-rice cultivation

in the valleys and flood-recession cereal cultivation are traditionally practiced by farmers. The shaduf-type irrigation also exists around the oases. Ground water is used in other traditional systems for fruit and vegetable production where ground water is close to the surface and markets are available.

Pastoralists vary herd composition depending upon the type of long-term environmental adaptation required, drought, and markets. Natural vegetation (range and fallow), crop residues, and water are the main resources used by pastoralists. Water is of particular importance because it largely determines the value of other resources. Grazing resources are comprised of annual and perennial grasses and woody vegetation. Rainfall variability significantly affects the quality and quantity of these resources. Because the length of the rainy season and the amount of rainfall in the northern part of the region make it unsuitable for agriculture, these areas can only be used by pastoralists who produce meat, milk and animal by-products. These contributions to the national economy are important although only the surplus is usually marketed (Aronson, 1980; Konczacki, 1978).

In the past, pastoralists have been blamed for causing land degradation through overgrazing and overstocking. However, recent research in rangeland ecology has demonstrated that pastoral land stewardship practices are not as culpable as previously believed for two reasons (Behnke, 1995; Pratt *et al.*, 1997). African rangeland (at least many species) is very resilient, capable of rapid regeneration during the rainy season despite being trampled or grazed down to the surface. Furthermore, pastoralist use of mobility and other herd management strategies have helped to demonstrate the adaptability of pastoralism to erratic rainfall in the zone (Shanmugaratman *et al.* 1992; Behnke R. 1995). In fact, pasture productivity is variable and the theory of constant carrying capacity is no longer considered valid (Behnke and Scoones, 1992). New approaches to rangeland ecology and study of past trends of climate and weather variation in the region suggest that land degradation is due more to climate variation than to actions of the pastoralists. Within this new perspective, "opportunistic" and planned range management strategies may be used to manipulate vegetative composition to favor production of nutritious species and reduce thicket-forming or poisonous species (Pratt *et al.*, 1997).

III Background: The Lifescape of Arid and Semi-Arid Agricultural and Livestock Systems

Traditionally, three general systems of production have characterized the Sahel: agro-forestry, agro-sylvo-pastoral, and sylvo-pastoral (Sunzini, 1992). These systems, however, are in transition as herders and farmers seek out new means of survival in a transforming ecology: herders are sedentarizing; agro-pastoralists are increasingly using trees for animal feed and soil fertility enhancement; and agriculturalists are raising more livestock. In addition, significant and increasing numbers of each of these groups seek urban employment, thereby reducing available labor and often shifting management responsibilities to already overburdened and under-trained women.

Traditional production systems have existed in various mixes depending on available resources and the ethnic groups present. Sustainable NRM has been a conscious practice, if not always explicit (Watts, 1987; Pratt *et al.*, 1997; Park, 1993; although Blench, 1997, disagrees). The agricultural systems used were largely extensive in terms of land. That is, the ratio of output to input was low: for cultivation, new fields were cropped nearly every year and large areas were left in fallow or for animal grazing. A key adaptive strategy was to maximize returns to labor on a selective temporal and spatial basis (Park, 1993). Fishing and gathering were also extensive, performed on a relatively large natural resource base (water or forest). Watts (1987) suggests these systems operated on four basic principles of resource use: (1) application of a variety of techniques for soil fertility maintenance; (2) complex land-use combinations, exploiting the variety in accessible microenvironments; (3) intercropping; and (4) adaptive capability in response to climatic uncertainties and risk.

Ethnic groups were associated with specializations in distinct but interrelated systems. For example, the Maure, Tuareg and Fulanis (Peul) in Mauritania, Mali and Niger were pastoralists (nomads or transhumants), the Bozo in Mali were fisherfolk, while the Mossi in Burkina Faso, Bambaras in Mali, and Wolof in Senegal were sedentary farmers. Some sedentary farmers like the Serere in Senegal owned livestock and integrated them with their crop production activities. A multitude of additional ethnic groups also existed, each with their own particular natural resource niche.

Although different ethnic groups tended to choose particular production systems, within clans there was considerable division of labor between castes, i.e., who may be farmers, herders, warriors, fishermen, specialized craftsmen, or slaves (Ngaido, 1993b). In the northern pastoral zones, sedentary society at oases and around watering holes were populated by subordinant classes of politico-military societies of nomadic peoples. In the more southerly agricultural zones, the sedentary populations were often dominant. Among these ethnic groups, farmers could arrange for local herders to tend cattle that they owned.

Management strategies reflected the needs of each system for natural resources. Sedentary farmers organized their production on a concentric basis within their terroirs (usually equivalent to traditional village lands), first cultivating fields around their dwellings, then in the village, and finally in the bush. Fisherfolk migrated along the river with the fish after each annual flooding period (Ambach, 1996). Pastoralists operated on a larger scale moving their herds from place to place seeking pastures for grazing and water for their animals according to seasonal availability (Pratt *et al.*, 1997). During the rainy season they traveled north and returned south as the pastures and water holes dried up.

While various specializations developed in farming and herding, complementary relationships have led to interaction between farmers and herders through livestock sharing and bartering milk for grain. Milk/grain bartering was conducted in Burkina Faso (Delgado, 1978), in Mali (Swift, 1985), in Niger (Bernus, 1974) as well as elsewhere in West Africa (Swift, 1988). Cultivators obtained manure and labor for taking care of animals in return for cash, crop residue, or water rights (access to wells and water points) given to herders (Heasley and Delahanty, 1996). These relationships have decreased as sedentary farmers have increasingly come to manage their own cattle herds and herders become sedentary (Toulmin, 1983). In Mali, the Peul became largely sedentarized in the mid-1980s, expanding their system into agro-pastoralism (Kebe and Hilhorst, 1997).

Significant intra-household specializations are also present, especially between old and young and between men and women. As a general rule, planning and decision-making are left to the senior members of the household (most frequently the male household head). For the most part women are charged with household and reproductive tasks (food preparation, collecting water and firewood, childcare, etc.). Women are also often involved with tending livestock kept around the homestead and, in particular, milking and processing dairy products. In nomadic households, women are also often responsible for taking down and rebuilding the household structures. Men, on the other hand, are charged with clearing and preparing land for cultivation, herd management (herding, castration, vaccination and slaughter), and digging wells (Pointing, 1995). As population increases put pressure on the limited resource base - intensifying livestock production, sedentarizing into agro-pastoral production systems, and increasing migration in search of employment - women appear to be taking on more of what had been seen as masculine tasks (Pointing, 1995).

Land tenure in West Africa has traditionally served to balance the needs of various households for land within low population pressure production systems (Sanders *et al.*, 1996). Rights to the use of natural resources tended to vary from season to season and from resource to resource. Customary law required constant interpretation and adaptation by local authorities (Ngaido, 1996).

Access to land is determined at the village level, first through the lineage, then through the household. Leaders of the original or conquering lineage or ethnic group are often the only ones deemed capable of "owning" property (Ngaido, 1993a). For the most part, male household heads inherit the use right to the majority of land that they farm. Some may borrow from others in the same lineage, or outside the lineage (Matlon, 1994). Temporary use rights may be had under sharecropping or rental arrangements. Slaves may

also access land through their masters (Ngaido, 1993a). Women, as well as other subordinate family members, have traditionally had access to lands through the male household head. Inheritance of land by women, although occasionally practiced, is rare as it would tend to fragment household and lineage lands (Ngaido, 1993a). Within pastoral systems, women are not authorized to own cattle as such; however, childbearing may establish rights in, and responsibility for, milk (Pointing, 1995).

Wealth may not only be indicated by the amount of land controlled and operated, but also by the size and composition of the herd. Wealth differentials among sedentary households determine the capacity to withstand drought and subsequent famine. Poorer farmers may be forced to sell off productive assets, while richer farmers may even gain (Frankenberger and Lynham, 1993). Similarly, wealth status also determines the vulnerability of the pastoralist to distress, (e.g. a drought or disease epidemics); poor pastoralists may lose their herds or have them reduced to only a breeding nucleus (or lower) while rich pastoralist may increase their herds. The poorer the pastoralist, the more likely he is to disappear after such a disaster, thus widening intra-system disparities. Survival strategies have led some marginalized and impoverished populations to becoming salaried herders and others to sedentarization. Traditional support mechanisms no longer function (e.g. cow sharing; Bovin, 1995). Sedentarization reduces herd size and the economic returns from raising livestock (Horowitz and Jowkar, 1995). As men migrate in search of seasonal employment, women's workload increases. Intensification of milk or meat production, on the other hand, leads to further individualization and differentiation of wealth.

Presently, another type of entrepreneur is growing in West African countries: the absentee herder or farmer, i.e. an owner of livestock or of a farm living in the city. This category of entrepreneur is caused by ongoing changes due to drought and consequent economic problems that have been impoverishing rural people relative to urban inhabitants. In the Ivory Coast, some urban inhabitants hire workers to grow cash crops (coffee, coconut, rice) on their behalf on rural or semi-urban lands. Most of the time, they get the legal right to use these lands straight from government institutions in Abidjan; this is a step leading to conflicts with local people who are the traditional landholders (Moore et al., 1999). In the Sahelian countries, this pattern is more frequent among pastoral populations. Poor herders, who lost their livestock during previous droughts and have been unable to re-stock their herds, hire out to take care of urban rich people's livestock in return for a salary or other beneficial arrangements (Moore et al., 1999).

IV Decentralized Context for NRM

To alleviate effects of periodic drought and promote development, different types of strategies have been implemented to assist agro-pastoral groups. Most recent among these have been participatory approaches that coincide with the growing trends of democratization and decentralization. Previous interventions, although systematic, have largely failed to increase agricultural or livestock production and have even resulted in a higher rates of depletion of natural resources. The reason for such poor results is generally perceived as stemming from the weak involvement of the local population in the conception, design, implementation and evaluation of these interventions that were consequently seen as being imposed on the local communities. Such failures called for new community-based approaches such as *gestion de terroir* (GT) and the development of pastoral organizations in the Sahelian countries.

GT is a multi-sector and global strategy aiming to establish new socioeconomic and ecological equilibria in order to achieve food self-sufficiency and to preserve/regenerate the productive potential of natural resources (Rochette, 1985). The approach, advocated by many NGOs and promoted by national governments for development at the local level, is a suitable starting point for managing NRM at the newly formed or empowered district levels. The GT approach centers on organizing local (village or terroir) management committees and, from this base, begins the consensus-building process toward village-level management of natural resources. Although target local committees are gaining experience, they are still too few in number to have a major impact on NRM in the region. Despite the promise of these forms of local management for the future of NRM, they still need considerable support in the form of literacy and

budgetary training and although diversity of committee membership is urged, the tendency is for local elites to dominate and for women and pastoralists to be excluded (Bohrer and Hobbs, 1996).

The GT's greatest strength is also its greatest shortcoming. Because it is village-based, it is close to the people and can potentially be very participatory. However, because it is village-based, the committees are far removed structurally from the lowest governmental administrative level (typically composed of tens of villages) that has the decentralized mandate and potential resources appropriate to effectively manage natural resources. It is also not clear that this approach to decentralization would benefit pastoral communities (Benjaminsen, 1997) whose economic activities extend well beyond the limits of a village.

To deal with this problem, Pastoral Organizations (PO) have recently been organized throughout West Africa as new type of community-based NRM institution (Shanmugaratnam et al., 1992). The POs treat all types of institutional arrangements that regulate individual and collective actions by pastoralists in an attempt to safeguard and promote their economic, social, cultural and political interests. They are legally organized by the government and dependent on the state for technical assistance, supplies and financial resources (Vedeld, 1992). The functions of the POs are related to acquiring secure land tenure, resource management, provision of services, communication of information, external relations and the building and maintenance of community coherence and morale. Key factors that determine the viability of POs include food security, water security, land security, herd ownership, credit, veterinary services, marketing, economic self-sufficiency and literacy (Shanmugaratnam *et. al.*, .1992). Although POs have been successful in organizing pastoral communities, integrating the POs with the GT and other management systems remains problematic.

IV. The SANREM CRSP Project in West Africa

Within the decentralizing West African NRM context, the SANREM CRSP has developed a two-fold strategy to support the movement toward decentralization with improved natural resource management. The strategy elements are:

1. The development of a participatory model to deal with NRM issues at the new "commune" (provincial) level, and
2. The seeking out, adapting, and testing of a consensus building agricultural and NRM model that can be used at this level that deals explicitly with livestock and agricultural interactions (including potential conflicts) within a landscape ecology framework.

NRMAC. The first element of the SANREM strategy has led the project to develop and support a commune-level Natural Resource Management Advisory Committee (NRMAC). The primary purpose of the NRMAC is to provide a forum for reflection on NRM in order to improve communal resource management. As such, it provides the SANREM CRSP project with advice concerning commune priorities and decision making information needs, improves the prevention, mitigation, and resolution of NRM conflicts, and aides in planning for the rational use of natural resources within the target locality (in this case, the Commune of Madiama). It also provides a potential model for decentralized NRM decision-making throughout the region. For individual leaders, participation in the committee is designed to improve leadership capacities and skills in working with technical assistance in the planning and implementation of NRM activities. The NRMAC established in Madiama is already beginning to fulfill this promise, effectively communicating with both the project and the populations it represents and assisting the project to focus on high priority and feasible technical interventions.

The NRMAC was set up in the Commune of Madiama through the collaboration of all SANREM CRSP partners (the Institut d'Economie Rural - IER/Mopti researchers, the Mayor of the commune of Madiama, the Head of the Madiama Branch of the Mopti Rice Office, CARE-Mali and a representative of the World Bank NRM Project). Villagers in all ten villages in the Commune of Madiama were informed of the

objectives, potential value and role of the NRMAC, and participatory goals for existing village committees with the view toward eliciting membership of each village. Subsequently, an assembly was held in each village under the direction of the village chief to select a diverse group of delegates (four or five) to represent the village in a commune-wide general assembly held to elect the NRMAC. According to the importance of the activity, each village selected either two herders, two farmers, or one of each. In addition they also selected two or three more villagers to represent women, hunters, fisherfolk, and crafts/forest gatherers. The locally important irrigation management committees and herders associations were also invited to participate.

NRM User groups had already been established by the project in the three villages where the initial SANREM CRSP Participatory Landscape/Lifescape Appraisal had been conducted. The World Bank NRM Project (PGRN) had also been working with village-level NRM committees in three other villages of in the commune. These committees met and selected their representatives. The four remaining villages in the commune were completely new to the idea of village NRM committees and the meetings in those villages were more extensive. Initially, one of those villages declined to participate and each of the nine remaining villages, the local irrigation management committee, and the local herders association sent three to five representatives (45 in all including 7 women) to the General Assembly meeting in the central village of Madiama.

The General Assembly meeting was opened by the Mayor of Madiama Commune, followed by IER researchers who presented SANREM CRSP West Africa objectives and the expected role and structure of the NRMAC. Translations into Peul and Bambara were provided. Also participating in the meeting were an additional twenty representatives of IER, CARE, PGRN, the deconcentrated government services, and recently elected commune representatives to the Rural Counsel (the formal representative commune legislative body). Participants were divided into four commissions to discuss respectively: organizational and administrative issues; dryland farming, rice farming and fishing issues; livestock, hunting, gathering, and craft issues; and the role of women. After these commissions reported their conclusions to the plenary assembly, elections were held for positions on the NRMAC. Without further outside assistance the assembly elected an Executive Board composed of a President, Administrative Secretary, Communication Secretary, and Organization Secretary. The rest of the committee was elected to provide representatives for each of the following commissions: Dryland Farming, Fishing, Rice Parcels, Women's Affairs (2), Livestock, Hunting, and Crafts/forest gathering.

Since its founding at the end of 1999, the NRMAC has participated in Holistic Management training, met to consolidate and prioritize village level priorities for agricultural research assistance, and initiated a program of institution building under the guidance of CARE/Mali. Twenty-seven SANREM CRSP-West Africa collaborators participated in the initial five-day Holistic Resource Management Workshop on Consensus Building and Conflict. Participants including ten IER scientists, three U.S. scientists, seven deconcentrated government service agents, the Madiama Commune Mayor and his adjoint, and five representatives of the NRMAC. After the workshop, NRMAC members (with the support of the HRM trainers) reviewed the workshop for the full committee and then led the partners in a transect tour and an HM-focused discussion of natural resource features of the commune. Additional training in Holistic Management and conflict resolution was conducted in May 2000. At this time, the NRMAC and SANREM researchers applied the holistic model to define research interventions in the previously identified commune priority areas of soil fertility management for crops and pasture management.

Holistic Management. The second element of the SANREM strategy has led the project to adapt the Holistic Management Model (Savory, 1988) as the key cornerstone for building consensus and planning technical interventions to deal with agricultural and NRM problems and issues at the commune level. This model, illustrated in the graphic below, provides a framework for conceptualizing agricultural, livestock, and NRM problems and relationships and proposes forward-looking strategies to deal with them. Although simple and accessible to farmers, livestock producers and local-level NRM decision makers, Holistic Management is also robust enough to engage researchers in diagnostics and prescriptions: it can serve as an effective bridge between local stakeholders and the research community during research planning, implementation, and evaluation processes.

The Holistic Management Model emphasizes the importance of sustainable activities that enable the four defining processes of the ecosystem (water and nutrient cycles, natural succession and energy flow) to function within the "whole" under management without external subsidies or importations that may have negative consequences elsewhere. For example, the deep concern within Madiama over declining soil fertility and degraded pastureland resources implicates all four basic processes, but the nutrient cycle in particular. To meet the holistic sustainability criteria, management and researchers must together consider how nutrients presently circulate within the whole, how and why they enter the sub-whole of crop production, how and why they leave it, and what actions can better direct this flow through the upper soil horizons of cultivated areas and cause nutrients to accumulate in useful form. Traditionally, livestock are by far the most powerful and efficient agents of fertility transfer accessible to local management. Thus, close coordination between planning for grazing and cropping areas is required. By providing the framework for discussing the tools available for affecting the ecosystem pillars and how intervention strategies using these tools can be tested, the holistic model provides an ideal tool for planning. The planning process is focused on outcomes that lead to the holistic goal, which encompasses the future condition of the landscape necessary to produce the level and mix of production required to sustain the desired quality of life. A major strength of the holistic model is its flexibility; it is explicitly recognized that all planning *per se* is imperfect so that careful monitoring and re-planning are expected.

IV. Conclusions

Because natural resource management issues exist at multiple scales, projects must seek out and transmit science-based solutions to decision-maker problems which traverse these scales. Nevertheless, SANREM efforts have been tightly focused by the recent and general move throughout West Africa toward decentralization of NRM-related decision making authority to the local level. Decentralization has provided a unique challenge and opportunity for SANREM. Although adequate prescriptions regarding NRM-related issues at different scales may already exist, a systematic and coherent understanding of problems and potential solutions at the district level is only now beginning to emerge. By concentrating the major portion of its energy and resources on the problems at this new scale and its relationships to the NRM problems faced by local farmer/pastoralist stakeholders, SANREM will make an important contribution. By integrating the participatory NRMAC model with the diagnostic and consensus building Holistic Management Model, SANREM will continue to define and refine targeted interventions and actions to meet project and commune development and NRM objectives.

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