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# USAID/Senegal Nature-Wealth-Power Retrospective Study Contribution on “Nature”

**JULY 2013**

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## Table of Contents

Introduction .....	4
Methodology.....	5
Evolution of USAID investments in Environment and Natural Resources .....	6
Focus on desertification control and fuelwood .....	6
Sand dune stabilization and reforestation.....	7
Community based natural resource management .....	8
Integration of NRM into agriculture .....	9
Integrating enterprise development, decentralization and NRM .....	10
Biodiversity conservation, wildlife management and fisheries .....	11
Observations on the changing context for NRM and sustainable rural development .....	12
Insights from Environmental Monitoring .....	12
Analysis of land use / land cover change in the southern peanut basin .....	14
Assessment of the impacts of charcoal harvesting and forest management.....	15
Analysis of changes in vegetative cover on-farms.....	19
Survey of NRM Practices.....	23
Increased attention to decentralization and tenure security.....	24
NRM Stocktaking.....	25
Recognition of Environmental Income .....	26
Nature Wealth and Power .....	28
Principles and recommendations for Nature in NWP.....	29
Investing in Tomorrow’s Forest .....	31
The Wula Nafaa project .....	32
Objective, strategy and organization.....	32
Approach and Tools of Wula Nafaa .....	34
Community based facilitators.....	34
Strengthening and Training of Producer and NRM Groups.....	35
Communication and Outreach.....	36

Identification of Targeted Value Chains.....	36
Local Conventions and Land Use Plans .....	36
Forest Inventories and Management Plans .....	37
Achievements and Outcomes .....	43
Outcomes reported by Wula Nafaa .....	43
Critical assistance provided by Wula Nafaa .....	45
Yield increases from infrastructure investments and conservation farming .....	48
Summary of key activities aimed at improved NRM .....	49
Challenges and Lessons Learned.....	50
Forest management planning .....	50
Long term sustainable financing of NRM interventions .....	51
Monitoring of changes in forest cover and resource condition .....	52
Shifting Government priorities and approaches.....	54
Learning from experiences in Namibia and Madagascar.....	55
Reflections on USAID/Senegal’s E/NR portfolio .....	56
Attention to the role of trees and forests in sustainable landscape management .....	56
Attention to wildlife, livestock and rangeland management .....	57
Attention to climate change and resilience .....	57
Conclusions and Recommendations .....	58
Overview of the achievements and outcomes of USAID’s investments.....	58
Progress and impacts in relation to the NWP framework for Nature .....	60
Recommendations .....	61
Annex A: Contacts for Key Informant Interviews.....	63
Annex B: Changes in Land Use and Land Cover in Senegal and the Gambia 1975-2010.....	64
Annex C: Schema for Participatory Forest Management Planning Process .....	65
Annex D: Barriers Reduced by the Wula Nafaa Policy Component .....	66
Annex E: List of Documents Consulted .....	68

## List of Acronyms

AG	Agriculture
CBFM	Community based forest management
CBNRM	Community based natural resource management
CBO	Community based organization
CF	Conservation farming
CFU	Conservation Farming Unit (Zambia)
CILSS	Comité Inter-état de Lutte contre la Sécheresse dans le Sahel
CLUSA	Cooperative League of the USA (National Cooperative Business Association)
CR	Communauté Rurale or Rural Community (administrative jurisdiction)
CSE	Centre de Suivi Ecologique
DGL-Felo	Democracy and Local Governance – Progress (USAID project)
DHS	Demographic health survey
E/NR	Environment/Natural Resource
FMNR	Farmer managed natural regeneration
GAF	Gestion et Administration Financière / Accounting and Financial Management
GREP	Groupe Recherche Environnement et Presse
IED	Innovation, Environnement, Développement - Afrique
ISRA	Institut Sénégalais de Recherche Agricole
ITF	Investing in Tomorrow's Forest
KAED	Kaolack Agricultural Enterprise Development
NGO	Non-governmental organization
NFM	Natural Forest Management
NKNP	Niokolo Koba National Park
NR	Natural Resources
NRBAR	Natural Resource Based Agricultural Research
NRM	Natural Resource Management
NTFP	Non timber forest product

NWP	Nature Wealth Power
PAGERNA	Projet d'Auto-promotion et de Gestion des Ressources Naturelles
PEA	Programmatic Environmental Assessment
PES	Payment for Ecosystem Services
PGIE	Projet de Gestion Intégrée de l'Environnement
REDD	Reduced Emissions from Deforestation and Degradation
UNDP	United Nations Development Program
USAID	United States Agency for International Development
USFS	United States Forest Service
USGS	United States Geological Survey
WRI	World Resources Institute

## Introduction

This report was prepared by the World Resources Institute as a contribution to a larger retrospective study of USAID's investments in environment and natural resource management programs over the past thirty years. The study provides a particular focus on lessons learned in applying the "Nature Wealth and Power"<sup>1</sup> or NWP framework through the implementation of the USAID funded Agriculture / Natural Resource or Wula Nafaa project, which was launched in 2003. The second phase of Wula Nafaa will be completed in 2014.

The retrospective study is being prepared with a view towards "telling the story" of the historical context and evolution of USAID's long term commitment to sustainable development in Senegal through assistance provided in managing natural resources. The study is designed to contribute to a greater appreciation of the achievements and impacts of USAID investments in Environment / Natural Resource (E/NR) projects. The study aims to capitalize on key lessons learned from these projects and to provide guidance to increase the effectiveness of follow-on interventions aimed at addressing poverty alleviation, economic growth, environmental governance and climate change adaptation as well as improved natural resource management, biodiversity conservation and related sustainable development objectives.

The analysis carried out by WRI includes an investigation of aspects related to "Nature" (this report) and "Power" (a companion report).<sup>2</sup> The main questions investigated while preparing the Nature report are related to the successes and shortcomings in applying the NWP approach to support the sustainable use, improved management and increased productivity of natural resources (forests, soils, water, pastures, wildlife and fisheries) and to contribute to environmental rehabilitation and recovery in Senegal. The Power report looks into issues of good governance, such as participation, representation, transparency, and the distribution, exercise and accountability of power in natural resources management.

Another report has been prepared to report on "Wealth" related to Wula Nafaa, and is based on a comparative assessment of the socio-economic status of populations within and outside the areas targeted by Wula Nafaa.<sup>3</sup> Data on socio-economic status was obtained through analysis of key variables included in demographic-health surveys (DHS) carried out over the past 20 years. A consolidated, summary report for the Senegal Retrospective study is under preparation by the team leader and consultants mobilized by the USFS/International Programs.

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<sup>1</sup> See Nature, Wealth and Power: Emerging Best Practice for Revitalizing Rural Africa. USAID in collaboration with CIFOR, Winrock, WRI, IRG. Washington, D.C. 2002.

<sup>2</sup> See Evaluating the Impact of the Wula Nafaa Natural Resources Management Program in Senegal on the Distribution, Exercise and Accountability of Power. WRI, 2013

<sup>3</sup> See Evaluating the Impact of the Wula Nafaa Natural Resources Management Program in Senegal on the Socio-economic Status of the Population: A Quasi-experimental Design Analysis. Bechir Rassas, 2013.

## Methodology

The Nature report is based on a review of available project documentation and related literature, together with interviews with key informants carried out in late 2012 and early 2013. Most of the documentation reviewed was produced by USAID project teams, and is largely in the form of quarterly progress reports, annual reports and technical or thematic reports prepared with USAID project funding. Several published articles in the scientific literature were also consulted, along with documentation related to environment and natural resource management (NRM) issues in Senegal prepared by technical departments of the government of Senegal, NGOs and other projects. As this report was prepared as a desk study in Washington, D.C., we were not able to supplement the document review with field visits and interviews with a range of key informants in Senegal; most of the persons contacted for this report are now residing in the US but have had some association with USAID or the Wula Nafaa project.

At the outset, it was proposed to assess the impacts of USAID investments through a review of the evidence of changes in the conditions of natural resources. The findings in this regard, however, are limited by the emphasis in USAID progress reports on project implementation activities. Project monitoring and evaluation has been focused on indicators designed to show socio-economic and development impacts, as well as progress in completing designed activities. The project reports describe specific project related accomplishments at the household or community level, and most reported “successes” were related to income generation at the household and community level and summary descriptions of benefits on natural resources. While there were reports of some baseline data collection in relation to biodiversity, forest cover and other environmental and natural resource indicators, it was difficult to find data on changes in natural resource conditions and resource productivity at the landscape level directly attributable to USAID funded projects.

As noted in the report, USAID has supported a number of significant interventions on long term environmental monitoring at the national level in Senegal, including an analysis of long term changes in land use and land cover. This information provides useful context for the analysis of medium to longer term impacts on the natural resources in the areas directly impacted by USAID projects. Similarly, USAID supported a series of surveys of knowledge, attitude and practices at a sub-national scale, which provided some insights into the extent of adoption of selected NRM practices by rural populations. However, there is still a paucity of data about the direct and cumulative impacts of USAID projects and associated NRM interventions on the natural resource base, and on the scaling up of NRM practices within and outside the landscapes targeted by USAID projects.

## Evolution of USAID investments in Environment and Natural Resources<sup>4</sup>

### Focus on desertification control and fuelwood

In Senegal as in other Sahelian and sub-Saharan African countries, USAID's programming in Environment and Natural Resources Management was influenced by a series of perceived crises and challenges. In the late sixties and early 1970's, the region was affected by recurrent droughts, crop failures, loss of livestock and associated food shortages, human hardship and land degradation. Development assistance programs focused on humanitarian relief in the short term and desertification control and other longer term development interventions, including training and capacity building, health and nutrition, agriculture and rural development. Programming for environment / natural resource interventions were initially focused on addressing a perceived driver of land degradation – which was thought to be deforestation resulting from unsustainable harvesting and high levels of consumption of fuelwood. In retrospect, it is interesting to note that other important drivers of land degradation and loss of ecosystem services and biodiversity were recognized, even if they were not directly addressed by E/NR programs in the 1970's and 1980's focused on desertification control and fuelwood production; these drivers include population growth and demographic pressures leading to high rates of conversion of forests to cropland, unsustainable agricultural practices linked to “extensification”, along with agricultural development strategies and forest policies that resulted in the removal of trees from cropland.<sup>5</sup>

In the 1980's, USAID and other donors provided funding for increased fuelwood production through large-scale fuelwood plantations, most often carried out by state forest agencies. In Senegal, investments were made to establish a large fuelwood plantation in Bandia, in western Senegal in proximity to major urban centers. Within a few years, NRM technicians and practitioners working in Senegal and across the Sahel to support reforestation and fuelwood production projects noted that the costs of site preparation, plantation and maintenance were not justified by the modest growth rates of the selected “fast growing” exotic species such as Neem, Cassia, Gmelina and Eucalyptus.<sup>6</sup> Within a decade, as more experience was gained with the protection and management of natural woodlands, it became clear that in lieu of investing in state-managed industrial fuelwood plantations, much could be done to restore and improve the forest cover through the regeneration and improved management of remaining reserved or classified forests. Natural forest management (NFM) was more cost effective than plantations, as it required less investment in mechanized land clearing and replanting; much of the

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<sup>4</sup> For more information, see Senegal Biodiversity and Tropical Forest Assessment. March, 2008. PLACE IQC Task Order no. 1 and TR&D. Senegal Agriculture Sector Retrospective Study. 1996.

<sup>5</sup> Extensification refers to short term strategies by rural households to produce more food for larger families, while compensating for stagnant or declining yields crops, by clearing more land and cultivating larger fields. To counter extensification, more attention is needed to restore soil fertility on existing permanent cropland, and to adopt conservation farming, integrated soil fertility management, agroforestry and other practices associated with intensification and diversification of agricultural production systems. Integrated landscape management approaches based on land use planning and integration of a consideration of ecosystem services and sustainable land management are also needed.

<sup>6</sup> See Winterbottom, R., and P. Hazlewood. (1989). "Agroforestry and Sustainable Development: Making the Connection." *Ambio* 16:19-43.

relatively high cost of fuelwood plantations was related to the use of bulldozers for site preparation, nurseries to produce seedlings, and paid labor for fire protection and other required plantation maintenance. NFM also provided a broader range of economically valuable forest products, including fodder and other non-timber forest products (NTFPs) and considerable scope for community participation through co-management and other approaches. Multiple studies revealed the diversity and value of these products from the “useless brush” that plantation projects worked to clear away.<sup>7</sup> In time, NFM projects were able to capitalize on the interest of local communities in sustaining a flow of these products to engage them in the improved protection and management of natural forests.

In addition to reforestation, many donors including USAID began to invest in developing and promoting the use of improved cookstoves and bottled gas or other substitutes, in order to help reduce the dependence of rural and urban communities on charcoal and fuelwood for cooking. Over the years, there has been continued interest by USAID, GTZ as well as other donors, in incorporating support for more efficient cookstoves and policy measures to facilitate the transition to other fuels and more sustainable production of biomass fuels for household energy into NRM and rural development projects. In Senegal, USAID worked with VITA and other partners to support the development of the Casamance kiln as a means to increase the efficiency and reduce of loss of energy in the charcoal production process. Variations of the Casamance kiln continue to be promoted among charcoal producers. In the past decade, the World Bank funded PROGEDE project included a component aimed at increasing the efficiency of charcoal production.

### **Sand dune stabilization and reforestation**

A noteworthy effort in Senegal that showed success and lasting impact was the stabilization of dunes and protection of productive vegetable gardens in the coastal areas north of Dakar. With technical support from FAO and others in the late 1970’s and 1980’s, Food for Work programs provided an effective means to fund the investment and mobilize local communities to stabilize sand dunes along Senegal’s northwest coast by planting strips of *Casuarina equisetifolia* trees. Project evaluations and field visits determined that the windbreaks were successful in stabilizing the dunes and in protecting the adjacent cropland. These benefits have in turn reinforced continued local and national efforts to ensure their protection and management in order to help maintain the productivity of the vegetable gardens along the coast. Monitoring and mapping of long term changes in land use / land cover by the USGS and CSE revealed that the area of bare, sandy land (mainly coastal dunes) decreased by 72% between 1975 and 2000, largely as a result of the success of coastal reforestation and dune stabilization projects.<sup>8</sup>

In the late 1980’s and 1990’s, these fuelwood plantation and dune fixation programs evolved into a major effort to support tree-planting and the establishment of community woodlots, as well as

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<sup>7</sup> See Kjell Christophersen and F. Weber, 1982. Energy Potential from Native Brushland in Niger: the economic perspective. Report to Office of Energy, USAID (aka Useless Brush Study); Kjell Christophersen, 1988, An Economic Approach To Arid Forest Project Design: Experience From Sahelian Countries, E/DI, USAID and Univ. of Idaho; Julia Morris, c 1982 Survey of NTFPs from the Dinderesso Forest. Economic analysis of NFM projects in Burkina Faso in the 1980’s revealed that fodder and NTFPs provided equivalent returns from forest management to harvested wood products.

<sup>8</sup> USGS, CSE, CILSS, USAID. March, 2007. Land use and land cover change in Senegal: a synthesis.

extensive planting along roads through the USAID/Senegal Reforestation Project (SRP). This project worked closely with the Forest Service to provide food for work and cash payments as incentives for tree-planting, principally Eucalyptus. The SRP provided institutional support to the Senegal Forest Service and raised the profile of annual tree-planting campaigns. Much of the tree planting was along roads and in the public domain and carried out as “public works” projects. In retrospect, the project revealed that long-term sustainable progress in reforestation and in restoring forest cover could not be achieved simply by investing in nurseries, seedling production and government managed plantations and extension efforts. Rather, more attention was needed to mobilize and empower communities to address tensions among competing land uses for the production of agricultural crops and livestock production as well as forests and other products and ecosystem services. It was also important to clarify resource rights and to increase economic incentives for local investment in trees on farms and in the protection and management of remaining forests through tenure reforms and removal of barriers to the production and marketing of tree and forest products.

### **Community based natural resource management**

As more recognition was given to the need for community based land use planning and decentralized natural resources management, the SRP was followed by the Community Based Natural Resource Management (CBNRM) or *Projet de Gestion Communautaire des Ressources Naturelles* (PGCRN) project, from 1993-2003. Like the SRP, this project was implemented through the Forest Service and Ministry of Environment, which limited its ability to address issues related to agricultural development and the root causes of unsustainable farming, and deforestation driven by conversion of forest to farmland. Also, for political reasons, the CBNRM project did not attempt to engage communities in the sustainable production and direct marketing of charcoal from community managed forests or in community based wildlife management. Rather, this project provided capacity building for community based land use planning and resource mapping, and provided a variety of assistance to implement specific CBNRM activities in targeted locations. These included the provision of small grants for soil and water conservation, for the establishment of woodlots and other NRM practices in rural landscapes.

Although it was a national program, the CBNRM project design did not lead to a national movement or sustainable, landscape level transformations across large areas. Support for CBNRM activities in local communities was largely provided by project funded technical assistance and field staff, and with the exception of CSE, did not focus on building a network of national NGOs to support CBNRM or service providers from the private sector. And while the CBNRM project was designed to increase local participation in project implementation, the technical interventions were still largely driven by the Forest Service, with their preference for planting fast-growing trees such as Eucalyptus. Eucalyptus was well suited in some locations to produce crops of poles, but a significant unmet need was the extension of agroforestry practices and the empowerment of farmers themselves to innovate and develop more effective approaches to address problems of erosion, mining of soil nutrients and declines in soil fertility and soil organic matter.

With the involvement of Peace Corps and others, efforts were made to promote windbreaks with cashew and other species, but these did not lead to the large scale adoption of such practices. While the Ministry of Environment, the Forest Service, NGOs and others worked to promote reforestation and

community based land use planning to promote the adoption of NRM practices, the legacy of the Ministry of Agriculture and SODEVA's push for animal traction, mechanized agriculture, removal of trees in fields and dependence on state-subsidized agricultural inputs contributed to agricultural "extensification", and widespread reduction of forests and tree cover in agricultural landscapes and other non-sustainable practices and land degradation.

### **Integration of NRM into agriculture**

As experience was gained with projects in the forestry sector across the West African Sahel, it became increasingly evident that investment in more than tree-planting, natural forest management and CBNRM would be necessary to address the root causes of land degradation, deforestation and conversion of natural forest to farmland or barren, unproductive land. Studies by CILSS and USAID support for "stocktaking" exercises revealed both the need and the opportunity to build upon farmer initiatives and to increase efforts to support the diversification, intensification and sustainability of agricultural production systems, for both rainfed crops and livestock.<sup>9</sup> These studies highlighted needs and opportunities to invest in restoring and encouraging traditional agroforestry systems, and in soil and water conservation, including rainwater harvesting and composting, manuring, mulching or other methods to restore and manage soil fertility.

For years, USAID and others invested in agricultural research. In Senegal, support for agriculture and farming systems research evolved to include an effort specifically aimed at integrating NRM into agricultural research - the Natural Resource Based Agricultural Research (NRBAR) project. This project provided support from 1991-1998 to investigate a series of improved agricultural practices and technologies such as composting, conventional soil and water conservation practices, agroforestry and soil fertility management. While difficult to judge the long term impact, considerable resources were provided for long term human resources development and institutional strengthening for institutions like the Institut Sénégalais de Recherche Agricole (ISRA).

A number of these improved agricultural and NRM practices and technologies were promoted in the Kaolack Agricultural Enterprise Development (KAED) project implemented in the Kaolack region by Africare from 1992-1997.<sup>10</sup> This project demonstrated that improved crop yields and increases in local incomes and other benefits were possible through the adoption of on-farm NRM and sustainable agricultural practices such as windbreaks, field boundary tree planting, and other agroforestry and soil fertility management practices. The KAED project demonstrated these improved technologies could be introduced through a participatory approach based on the organization and strengthening of community organizations, particularly groups of women. Through the participatory approach, the technologies were applied to achieve locally determined objectives related to income-generation, increased food security, diversification of incomes, and intensification of crop production systems. The women's groups and rural organizations assisted by KAED also provided a solid foundation for developing local capacity through training in functional literacy, accounting and enterprise management, as well as the adoption

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<sup>9</sup> See R. M. Rochette. 1989. Le Sahel en lute contre la desertification: lecons d'experience. CILSS, GTZ. And Asif Shaikh et al.,1989. Opportunities for Sustainable Development. USAID, IRG.

<sup>10</sup> Eriksen, John, David Miller. 1998. KAED Impact Evaluation. USAID

of these NRM and sustainable agricultural practices. Through the use of NRM practices that increased crop production, the groups generated sufficient income to invest in the further intensification and diversification of their production systems through livestock fattening, dry season gardens and other means. The management of their own savings and the operations of their groups enabled them to gain access to commercial credit, which provided the resources for additional investment in local enterprises and further increases in income.

### **Integrating enterprise development, decentralization and NRM**

USAID's investments in Economic Growth had provided promising results through the Dyna Entreprise project, which provided support from 1999-2004 for micro-enterprise development and income generation by providing training and other assistance to private sector operators engaged in business development services in targeted value chains. Dyna Entreprise developed a number of training modules and approaches that worked well to support micro-enterprise development and income generation. However, the project targeted urban based, small manufacturing, retailing and service enterprises, and did not include specific activities aimed at ensuring the sustainable use of resources that provided the raw material for enterprises.<sup>11</sup>

USAID's support for decentralization policies and strengthening of Rural Communities (CR, administrative districts or counties) led to the design of the remarkably successful Democracy and Governance project – DGL Felo. This project invested heavily in training, capacity building and empowerment at the level of Rural Communities, and was directly engaged in supporting the role of Rural Communities in improving the protection, conservation and management of community forests and other natural resources.<sup>12</sup>

It was at this point in 2002-2003, when the Agriculture / Natural Resource Management project was designed with a view towards capitalizing on lessons learned from CBNRM experiences, along with other biodiversity conservation, enterprise development, poverty reduction and governance projects, such as Dyna Entreprise and DGL-Felo. The AG/NRM project, which later became known as the first phase of Wula Nafaa, was funded jointly by USAID/Senegal's Economic Growth strategic objective (SO1) and NRM strategic objective (SO2).<sup>13</sup> It included components aimed at 1) generating economic benefits for local communities through the development of natural resource based rural enterprises and non-traditional agriculture such as fonio and cashew, 2) reinforcing the clarification of rights and responsibilities and associated participatory NRM plans, local conventions and by-laws and other measures to strengthen decentralized, community based NRM and environmental governance, and 3) support for policy and institutional reforms to address barriers to scaling up sustainable natural resource use and local investment in improved NRM.

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<sup>11</sup> IBM, 2004. Final Evaluation Report: Evaluation of Dyna-entreprise Activities in Senegal. AMAP.

<sup>12</sup> For more information on DGL-Felo, see companion report on Power.

<sup>13</sup> SO1 was aimed at sustainable increases in private sector income-generating activities in selected sectors, and SO2 was aimed at improved delivery of services and sustainable use of resources in targeted areas. See USAID/Senegal AG-NRM Program – Wula Nafaa Final Report Feb 2003-May 2008 prepared by International Resources Group.

By design, the Wula Nafaa project leveraged the experience of prior projects related to CBNRM, enterprise development and governance to support an integrated approach well suited to the application of the principles and action recommendations of the NWP framework. Unlike many of the earlier forestry sector and NRM projects, Wula Nafaa was not limited to promoting tree planting, agroforestry or a particular technology related to the improved management of natural resources; rather, it explicitly took account of the need to incorporate attention to income generation and market led enterprise development as well as sustainable resource use. And Wula Nafaa went well beyond the scope of conventional enterprise development and poverty reduction projects to integrate not only NRM but also the all-important elements of resource rights, effective decentralization and good governance.

### **Biodiversity conservation, wildlife management and fisheries**

In Senegal, there was relatively little experience with integrated conservation and development projects (ICDPs) although USAID and other donors provided some support aimed at the improved conservation of the Niokolo Koba National Park (NKNP). For much of the 1980's, 1990's and up until recently, however, the wildlife and biodiversity of the park continued to suffer from uncontrolled poaching and encroachment of agriculture along the park's boundaries. Over the past decade, a series of projects, including USAID's Wula Nafaa project, land use mapping and assessments by USGS, the GEF-funded environmental conservation project PGIE as well as interventions by university researchers and NGOs such as the Jane Goodall Institute have contributed to the demarcation of community conserved areas in the buffer zones of NKNP, and supported interventions aimed at reducing conflicts between wildlife and local communities and increasing the economic benefit for communities from wildlife-based ecotourism.<sup>14</sup>

The fate of wildlife outside of the national parks and beyond the buffer zones of NKNP, however, has been heavily impacted by Senegal's particular approach to wildlife hunting. Large expanses of wildlife habitat are managed directly by the Ministry of Environment, as "zone d'intérêt cynégétique" (ZIC) and "zones amodiées". In the 1990's, some 33 hunting concessions were leased by the State, covering 3.2 million hectares or 16% of the national territory.<sup>15</sup> Most leases were rented to private investors and some were managed directly by the Forest Service. Private operators were authorized to host groups of hunters during the regulated open hunting season. The system was designed to provide some controls on hunting by issuing permits for the number of game that could be harvested and by limiting hunting to an open season in specific zones, to help wildlife populations recover during the closed season. However, the state managed system does not share hunting revenues in an equitable manner with local communities, and does not provide significant incentives for local communities to protect and manage wildlife. In addition, with its focus on capturing revenue for the State from hunting concessions, Senegal's system does little to stem the degradation of wildlife habitat and loss of wildlife related to

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<sup>14</sup> More information about the status of biodiversity, major threats to biodiversity conservation and efforts to address them can be found in the series of 118/119 assessments of tropical forests and biodiversity prepared with USAID assistance. See for example, USAID, 2008, Senegal Biodiversity and Tropical Forest Assessment, PLACE IQC task order #1, Ecodit.

<sup>15</sup> Chiekh Omar Ba, J. Bishop et al., 2006. The economic value of wild resources in Senegal: a preliminary evaluation. IUCN

livestock movements, cropland encroachment and non-sustainable grazing and farming practices in and around these concessions.

Despite the significant contribution of funds to the national treasury from concession and hunting fees, the Forest Service has very limited resources to enforce wildlife conservation policies and hunting regulations. For example, a small team of 3 or 4 Forest Service agents with one vehicle was tasked with protecting and managing the 1.9 million hectare ZIC of Faleme near Kedougou –an area equivalent to 10% of the national territory. So, with a relatively weak and poorly equipped Forest Service and without the engagement of local communities, there has been little effective management over the years to conserve wildlife and to maintain the integrity of biodiversity rich areas.<sup>16</sup>

Over the past five years, as part of the second phase of Wula Nafaa and in cooperation with the University of Rhode Island through the COMFISH project, USAID/Senegal has provided assistance to improve the management of coastal estuaries and associated fisheries. These projects were aimed at strengthening community-based management of local fisheries and the improved management of mangroves through the adoption of Local Conventions and empowerment of local bodies charged with managing artisanal fisheries. These local bodies were able to raise awareness of the risks and costs of overfishing, and helped to establish and increase the effectiveness of sanctuaries and closed fishing periods.<sup>17</sup>

## Observations on the changing context for NRM and sustainable rural development

### Insights from Environmental Monitoring

An important element of USAID ENV/NR assistance to Senegal was in the area of long term environmental monitoring.<sup>18</sup> USAID together with UNDP and others provided technical assistance over a span of more than 10 years through a series of remote sensing and environmental monitoring projects which played a central role in establishing and developing the capabilities of the Centre de Suivi Ecologique (CSE).<sup>19</sup> This center benefitted greatly from a long term association with the US Geological Survey and US remote sensing specialists and geographers. In the 1980's, a comprehensive network of some 600 field sites were established to provide baseline inventory information on the condition of the natural resource base. This information was used to prepare the "Plan National d'Aménagement du Territoire", and has continued to serve as a point of reference for assessing changes in land cover and

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<sup>16</sup> During the first phase of Wula Nafaa, the project investigated the needs and opportunities to conserve wildlife by reforming the hunting concession system and shifting towards community based wildlife management models based on the experience from Namibia, Burkina Faso and other countries (see policy component activities listed in Annex D; however, the efforts were rebuffed by the Forest Service, much as the CBNRM project was precluded from intervening in charcoal production.

<sup>17</sup> See Plan de Gestion des Zones de Cueillette des Mollusques et Coques, CLPA de Missirah et CLPA de Toubacouta. Region de Fatick, Communaute Rurale de Toubacouta. Fevrier 2011.

<sup>18</sup> Pers comm. Gray Tappan. See also: USGS, CSE, CILSS, USAID 2007. Land Use and Land Cover Change in Senegal: a synthesis.

<sup>19</sup> See <http://svr-web.cse.sn/>

land use. In addition, the remote sensing, mapping and GIS capabilities of the CSE have been utilized by a multitude of development projects including USAID's CBNRM project and others, including the most recent generation of projects aimed at assessing carbon sequestration and the prospects for developing REDD+ and other climate change mitigation and adaptation projects.

The work by USGS, CSE and others helped to document the effects of drought and land use pressures in the 1970's- 1980's when tree mortality was significant, and continuing into the 1980's and 1990's when population growth contributed to land degradation, especially in the densely populated peanut basin. The overall trends of gradual expansion of cropland into savanna woodlands, and the growth in large urban settlements are visible in land use /land cover maps prepared by USGS for 1975, 2000 and 2010<sup>20</sup> (See Annex B)

Some of the major long term trends in land use and land cover changes in Senegal from the 1960's to 2000 that were revealed by the USGS/CSE analysis include:<sup>21</sup>

- Steady encroachment of agricultural lands on natural habitats, with associated declines in biodiversity and tree density
- 57 percent loss of Senegal's dense forests (from 252 km<sup>2</sup> to 108 km<sup>2</sup>) between 1975 and 2000, including:
  - o Noted loss of riverine forest cover in the Senegal River valley west of Podor
  - o Noted loss of semi-evergreen forests in the lower Casamance, and of the biologically important gallery forests (decline of 6%)
- 17 percent increase in bare soil (1228 km<sup>2</sup> to 1432 km<sup>2</sup>) mainly in the ferruginous pastoral ecoregion as a result of land degradation and drier conditions
- Significant decrease in agricultural area in the West Central Agricultural region (Peanut basin) with cropland being abandoned and shifting to fallow, shrub and tree savanna (driven by low prices for peanuts and out-migration to urban areas, particularly Dakar and Touba)
- Significant expansion of agriculture and conversion of savanna to farmland (loss of 127 km<sup>2</sup> per year) outside of the peanut basin
- 102 percent increase in irrigated agriculture, from 328 km<sup>2</sup> to 664 km<sup>2</sup>

While there have been rapid changes in some ecological regions and in some land use / land cover classes such as dense forests, there has been relative stability in others, with respect to land use and land cover conversions. From 1965 to 2000, cultivated land increased from 18 percent to 23 percent of the country. With the combined loss of dense forest and conversion of shrub and tree and wooded savannas to farmland, deforestation in Senegal amounted to more than 300 km<sup>2</sup> or about 34,000 hectare/ year. However, as of 2000, Senegal's savannas, woodlands and forests still covered more than

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<sup>20</sup> Images provided by Gray Tappan, USGS, January, 2013.

<sup>21</sup> See USGS, CSE, CILSS, USAID. 2007. Land use and land-cover change in Senegal: a Synthesis.

two-thirds of the country, and the rate of agricultural expansion had slowed, from an increase of 33,000 ha/year during the period 1965-1985 to about 19,000 ha/yr between 1985-2000.<sup>22</sup>

It is important to note that this analysis of land use / land cover changes mainly tracks *conversion* from one class of land use/land cover to another. The USGS noted in their summary report, however, that there has been extensive land cover *modification* within given land use / land cover classes – and that these changes account for most of the woody biomass and carbon losses, and more than actual change in land use/ land cover classes.<sup>23</sup> While very informative, this national level analysis does not provide a complete assessment of qualitative changes in the forest cover and natural resource base within a given land use / land cover class. For example, it does not provide detailed information about changes in the density of trees on farmland, or changes in soil fertility, or changes in the composition of remaining areas of dense forest and savannas.

Given the importance of these “within class” changes in the conditions of natural resources, one of the latest mapping products prepared by USGS – a detailed land use and forest cover map for southeastern Senegal – is of particular interest.<sup>24</sup> This latest generation of a 1:200,000 scale land use map provides an excellent baseline for monitoring land use changes, with detail on 24 land use units, including different vegetative types and formations, water bodies, wetlands, as well as settlements, dryland and irrigated croplands, orchards and quarries. NGOs such as those working on chimpanzee conservation efforts in Senegal have found this map to be very helpful in identifying gallery forests and other critical habitats for chimpanzee conservation and in orienting strategic interventions by conservation projects on the ground with local communities. The map also informed land use planning and natural resource conservation efforts facilitated by Wula Nafaa, such as the establishment of community nature reserves around the NKNP and in the Kedougou region.<sup>25</sup>

### **Analysis of land use / land cover change in the southern peanut basin**

As part of Senegal’s national environmental monitoring activities, in 2000, a team of USGS specialists used landsat, corona and other imagery to assess 30 years of land resource changes in an agricultural area of west-central Senegal that had experienced rapid population growth, a decline in rainfall, expansion of agricultural lands and degradation of vegetation and soil resources.<sup>26</sup> The study area covers 213,355 hectares, including deltaic flats and mangrove forests in the western part, and continental plains and agricultural landscapes with scattered trees in fields in the eastern part.

This study documented a 115% increase in cropland, 87% decrease in woodlands as well as a reduction in the area of mangroves, gallery forests, and old field bushlands. The reduction in the area of bushland

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<sup>22</sup> G. Tappan, M. Sall, E. Wood and M. Cushing, 2003. Ecoregions and land-cover trends in Senegal. USGS/EROS Data Center.

<sup>23</sup> Wooster, P.L. et al. 2004. Land Use Change and Terrestrial Carbon Stocks in Senegal. *Journal of Arid Environments*, 59, 625-642. Cited in USGS, 2007.

<sup>24</sup> See USAID-USGS-CSE-MEPN-ISE Occupation des Terres du Sud-Est du Sénégal. USGS, 2012.

<sup>25</sup> Pers. comm. Gray Tappan, USGS; see also more information in following section.

<sup>26</sup> G. Tappan, A. Hadj, E. Wood and R. Lietzow, 2000. Use of Argon, Corona and Landsat imagery to assess 30 years of land resource changes in west-central Senegal. *Photogrammetric Engineering and Remote Sensing*, vol 66, no. 6. pp. 727-735.

or fallowed cropland was particularly noteworthy, declining between 1963 and 1992 from 57,063 ha to 2,337 ha in the study site. This represents the loss of a bush-fallow system that served to reconstitute soil fertility, as well as a reduction in an important resource used as a source of woodfuel, construction material, grazing land and other forest products. The area of savanna woodlands (with a canopy cover over 50 percent) also decreased during this period, from 30,312 to 20,756 ha, and the remaining areas of woodland were quite degraded, with tree cover ranging from 20 to 50 percent. All of the five protected forests in the study area were in an advanced state of degradation, as evidenced by a loss of tree density and biodiversity.<sup>27</sup> See figure 1

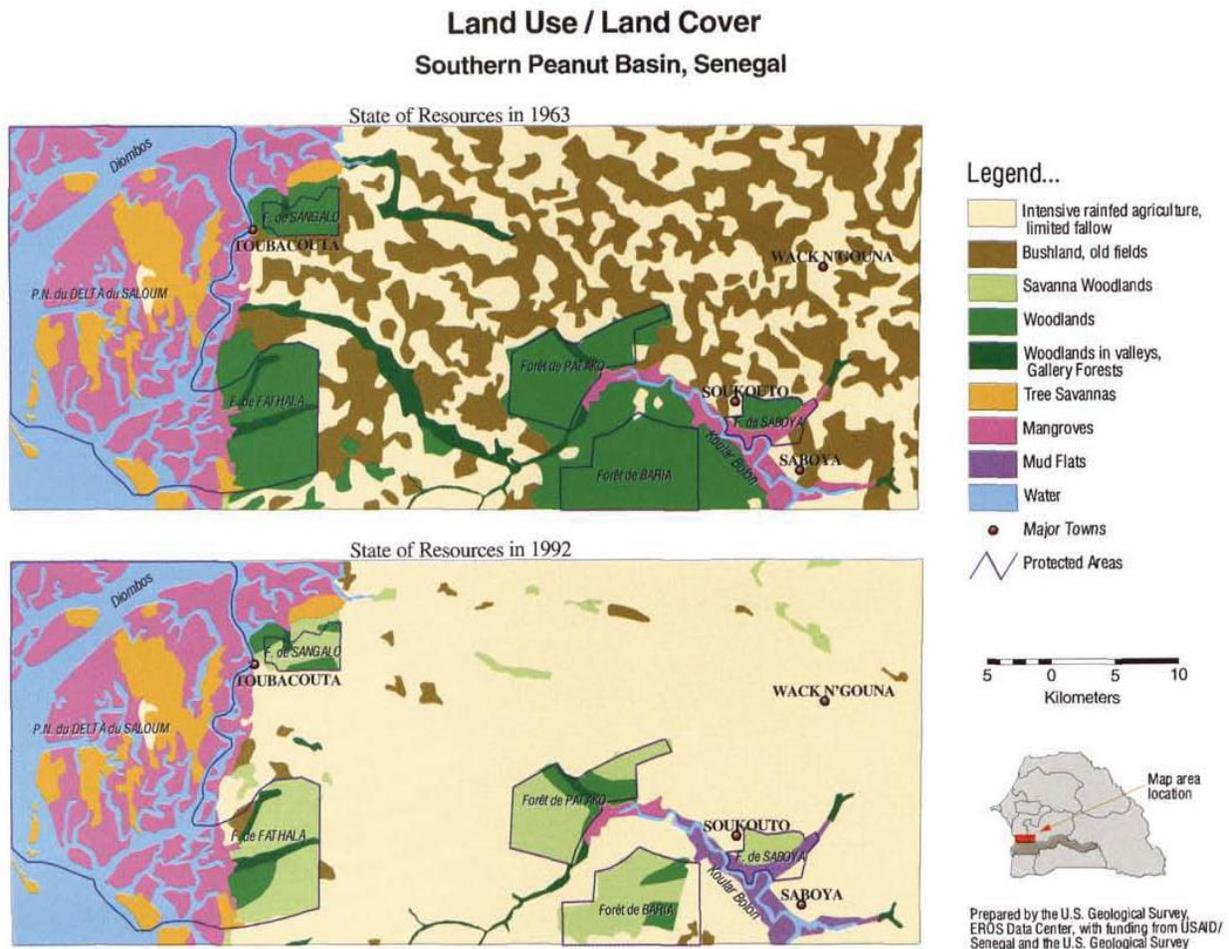


Figure 1. Map pair depicting land use and land cover changes in the southern peanut basin, 1963-1992

Source: Tappan et al, 2000.

### Assessment of the impacts of charcoal harvesting and forest management

In 1997, the National Environmental Action Plan for Senegal was published by the Ministry of Environment and Nature Protection and CONSERE, and it noted that charcoal production was a key contributor to land degradation along with population growth and expansion of cropland. 95% of the

<sup>27</sup> Tappan et al. 2000. P. 732.

urban population of Senegal uses charcoal as the primary source of energy for cooking, and the demand for charcoal, has had an impact on more than 50% of the wooded savannas of Senegal.<sup>28</sup> Uncontrolled bush fires and grazing, along with weakly regulated cutting of high value hardwood timber and harvesting of other forest products also contribute to the degradation of these woodlands.

Field studies and interviews with local stakeholders indicate that woodlands impacted by charcoal production do regenerate, but that fuelwood collection and charcoal production are reducing biodiversity in these areas.<sup>29</sup> As noted by Wurster:

“Over the last 20 years in Senegal, a change is being documented by scientists, government officials and local people – fuelwood is becoming scarcer around charcoal consuming urban centers causing charcoal producers to travel greater distances away from these centers to collect charcoal. In 1985, nearly all of Senegal had adequate forest cover allowing for most regions to produce and export charcoal. As population increased and demand for charcoal grew in urban centers, particularly around Dakar, forest resources became degraded to the point where there were too few trees to produce charcoal.”<sup>30</sup>

By 2010, government quotas allowed charcoal production in only two regions: Tambacounda and Kolda. As a way to stem the tide against deforestation and degradation of Senegal’s forests and savanna woodlands, 213 forest areas covering more than 19 million hectares were set aside as “classified” forests to be protected and managed by the Forest Service of Senegal. Tambacounda is one of the regions with one of the largest areas of classified forests, totaling 1,635,819 ha in 17 forests.<sup>31</sup> As evidenced by the analysis of land use / land cover change in the southern peanut basin by Tappan et al., however, the classification of these forest reserves and assignment of management responsibilities to the Forest Service has had only limited success in preventing their degradation. In principle, classified forests are off limits for charcoal production, and up until 1998, the Forest Service allocated all charcoal production quotas to unclassified forest and woodland areas. Since 1998, local authorities of Rural Communities have been more involved in managing the allocation of production quotas in these rural areas. With support from the World Bank PROGEDE and USAID Wula Nafaa projects, more than 700,000 hectares of co-managed classified and community forests have been included in the charcoal producing areas.

Using remote sensing, field surveys and interviews, in 2008, Wurster assessed the effect of varying forest management strategies on forest structure and diversity, regeneration and sustainability after harvesting of trees for charcoal production on 77 plots (16 undisturbed and 61 harvested) in the Tambacounda region. The plots included sites affecting by 4 different forest management regimes,

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<sup>28</sup> G. Tappan, M. Sall, E. Wood and M Cushing, 2004. Ecoregions and land cover trends in Senegal. *Journal of Arid Environments*, 59, 427-462, cited in Karl Wurster, 2010. *Management Matter? Effects of Charcoal Production Management on Woodland Regeneration in Senegal*. PhD dissertation, University of Maryland.

<sup>29</sup> G. Tappan, 2004 and K. Wurster, 2010.

<sup>30</sup> K. Wurster, 2010.

<sup>31</sup> Plan d’action forestier tropical du Senegal, 1993, cited in Wurster, 2010.

including two types of government management (Classified Forest - CF, Communaute Rural Forest - CRF) and two types of co-managed forests (Progede-PRO and Wula Nafaa-WN). See Figure 2

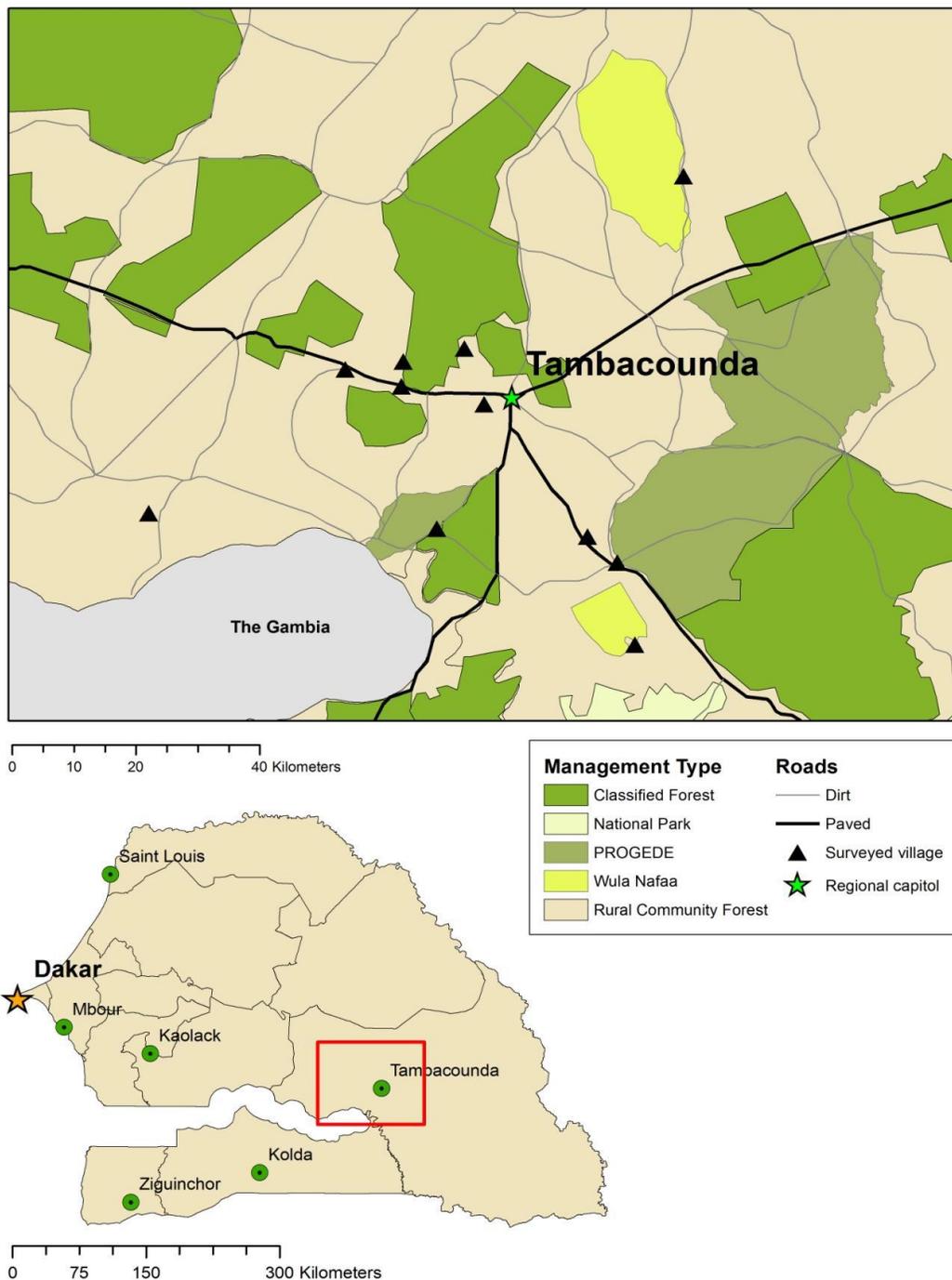


Figure 2 Location of forest management types in the Tambacounda study area.

Source: Wurster, 2010, p. 85.

Wurster analyzed the average of Simpson's diversity index values to compare differences between undisturbed and harvested plots within each forest management type. Results from his study indicate that species composition and structure in harvested and undisturbed plots are significantly different. Harvesting of trees for charcoal significantly changed the structure and species composition of the forest. Not surprisingly, average tree height and diameters were smaller in harvested areas. While regeneration of *Combretum glutinosum* is robust in all harvested plots, large hardwood tree species were rare in both harvested and undisturbed plots. Co-managed plots had higher species diversity than traditionally harvested, government managed plots, but large declines of species diversity were observed between undisturbed and harvested plots.<sup>32</sup> See Figure 3

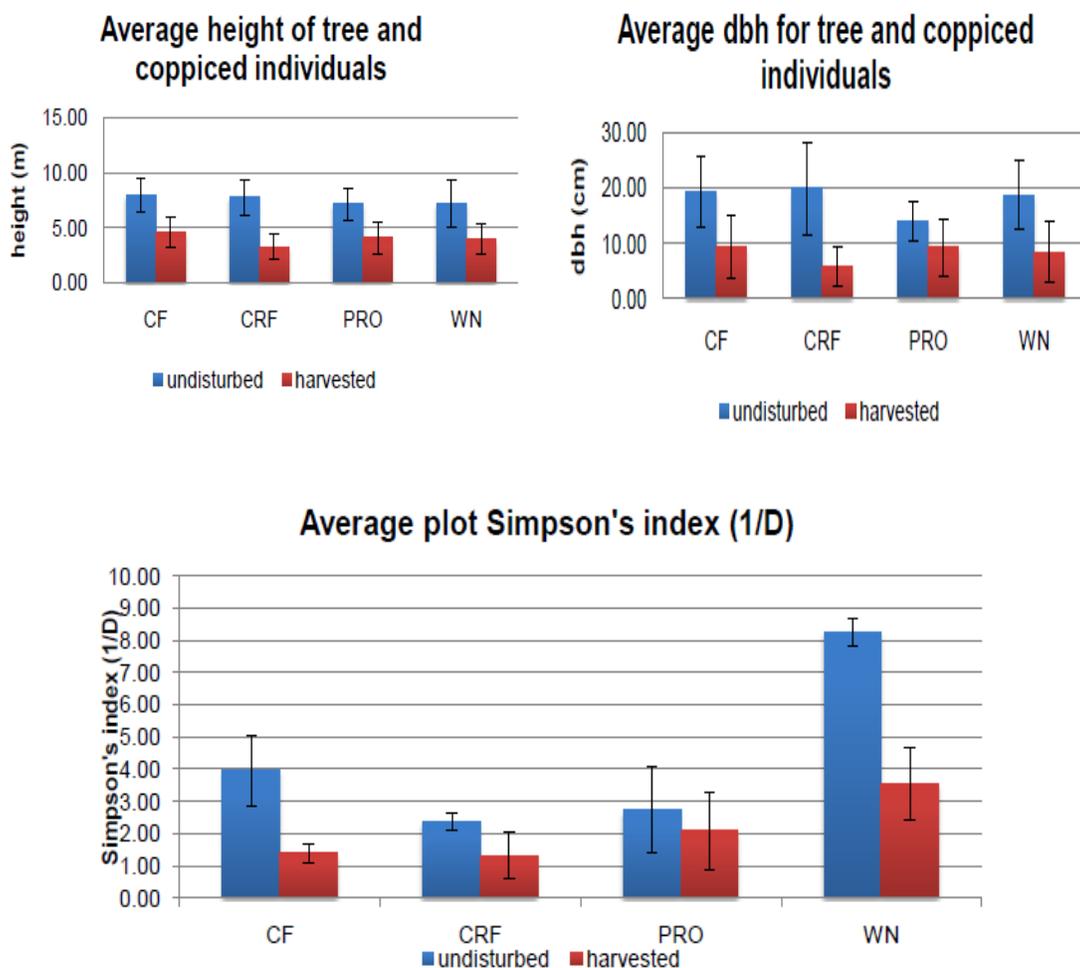


Figure 3: Analysis of average height, diameter and biodiversity index in undisturbed and harvested plots within forest management types. Source: Wurster, 2010, pp. 96-97.

<sup>32</sup> K. Wurster, 2010, p. 96-97.

Wurster concluded that “a new forest landscape is taking shape in the Tambacounda region, one dominated by fast growing and resilient species. Forest management could play an important role in slowing this change, but currently is having little influence on forest composition, structure and regeneration rates.”<sup>33</sup>

As charcoal production has extended to rural areas farther and farther from Dakar and other urban centers of consumption, and as the woodlands of the Tambacounda region have been impacted by charcoal production, local people interviewed by Wurster described changes in terms of the reduction of wildlife, tree species diversity and large trees. Wurster noted that the interviews revealed how other sources of disturbance contributed to the changes in the woodland landscapes, including livestock grazing, fire and harvesting of large trees for timber.

This study provides important insights into the changing dynamics of forests and woodland formations in areas affected by charcoal production and subject to different management regimes. One should be careful, however, to not conclude that charcoal production cannot be sustained and should be phased out, and that efforts to bring forests under management are ineffective and should be abandoned. Wurster’s research suggests that current modes of charcoal production do contribute to a loss of biodiversity and that forest management efforts need to be strengthened to deal more effectively with issues of uncontrolled grazing, wild fires, illegal cutting and rotation cycles that are apparently too short for adequate regeneration of harvested areas. As Wurster himself notes, “forest management had the potential to play an important role, but under current government or co-management types, a lack of consistent action and forestry law enforcement exists”.<sup>34</sup> Wurster also notes that despite a move towards decentralized forest management and empowerment of local authorities, more progress is needed.<sup>35</sup>

“The reality is a majority of the indirect and direct decision making power is still held by government officials. The current relationship between Forest Service and local groups results in local populations having little power to control and/or manage legal or illegal forest activities. Local people felt they didn’t have the responsibility of authority to tell another community member to stop cutting timber. Because of this, many illegal activities occurring in the forest, particularly timber harvesting, are left untouched and unenforced.”<sup>36</sup>

### **Analysis of changes in vegetative cover on-farms**

While there has not been an analysis of changes in on-farm trees and shrubs at the national level, a case study was carried out in central Senegal to examine the evidence of “greening” in the southeastern part of the “peanut basin”, in the vicinity of Kaolack and Fatick. Remote sensing specialists Herrmann and Tappan have made use of changes in the remotely sensed “normalized difference vegetation index” or NDVI and other data to identify areas where the vegetative cover, woody biomass and ecosystem health

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<sup>33</sup> K. Wurster, 2010, p. 78.

<sup>34</sup> K. Wurster, 2010, p. 160.

<sup>35</sup> See also analysis and recommendations in “Power” report.

<sup>36</sup> K. Wurster, 2010, pp. 160-161.

appear to be relatively stable, degrading, or improving.<sup>37</sup> An analysis of NDVI data for the period 1983 to 2010 along with a comparison of repeat photographs from earlier environmental monitoring efforts was combined with ground-truthing fieldwork, focus group discussions and interviews with local communities living near 18 sites in the region of Kaolack and Fatick.

This analysis indicated that there had been an overall decline in species richness, with fewer large trees, and shift in the vegetative cover to include more shrubs and drought-tolerant species.<sup>38</sup> (see Figure 4). This finding is similar to research by P. Gonzalez who documented a significant decrease in species richness and tree density in northwestern Senegal over the period 1945 to 1993, which he attributed to both an increase in population density and changes in the climate.<sup>39</sup> In the area studied by Herrmann and Tappan, tree densities were stable or decreased at all sites. This is of concern, as the woody vegetation is a key component of savanna ecosystems, and plays an important role in influencing soil water storage, nutrient cycling, erosion control, provides wildlife habitat and other ecosystem goods and services that directly support livelihoods, such as the provision of livestock browse, wild leaves and fruits, traditional medicines, and timber for construction, charcoal and firewood.<sup>40</sup> In some of the “greening” sites, there were increases in shrub densities, particularly of *Combretum* and *Guiera*, although the denser shrub cover masked an impoverishment in terms of reduced species richness, and a shift towards more xeric or drought tolerant species.

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<sup>37</sup> NDVI is the Normalized Difference Vegetation Index – or a normalized ratio of reflectances in the red and near-infrared portions of the electromagnetic spectrum which are sensitive to the amount of green vegetation on the ground; thus, NDVI is a means to monitor vegetative dynamics.

<sup>38</sup> S.M. Herrmann and G.G Tappan, Vegetation impoverishment despite greening: A case study from central Senegal. *Journal of Arid Environments* 90 (2013) 55-66

<sup>39</sup> P. Gonzalez, 2001. Desertification and a shift of forest species in the West African Sahel. *Climate Research* 17, 217-228.

<sup>40</sup> Herrmann and Tappan, 2013, p. 56.

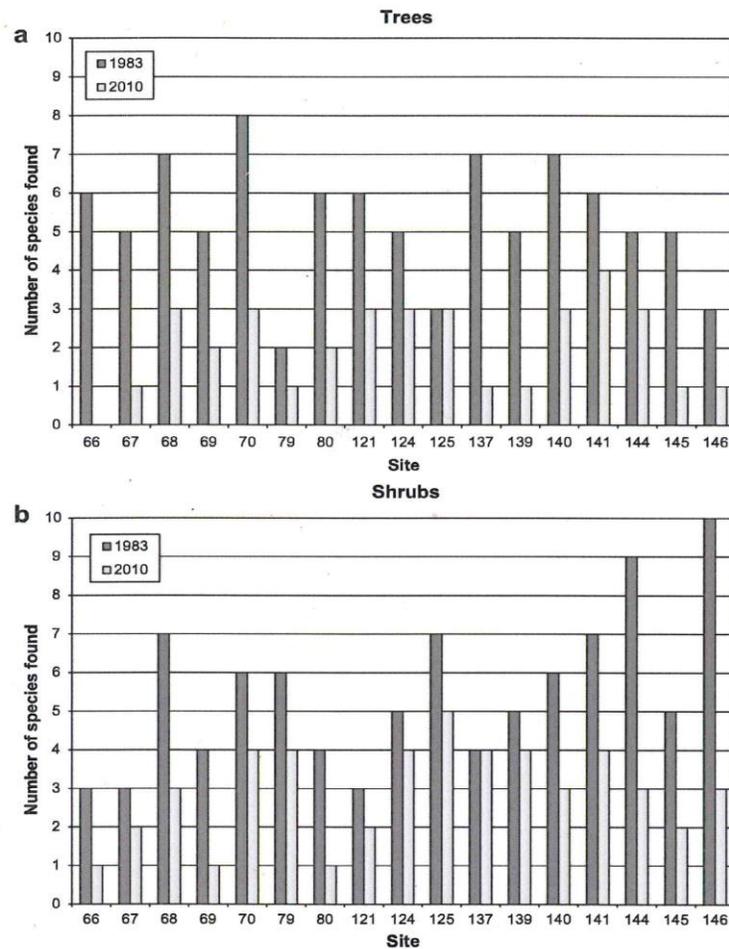


Figure 4. Changes in numbers of tree and shrub species found at each numbered site, 1983 – 2010

Source: Herrmann, Tappan, 2013 p. 60

The research revealed three pathways to “greening” with different results in terms of the diversity and density of woody biomass. In areas where the population was more actively engaged in managing the vegetative cover and where local communities had adopted “farmer managed natural regeneration”, the result was a higher density of economically more valuable species such as tamarind, baobab and a more diverse vegetative cover with *Piliostigma*, *Anogeissus* and other species. In areas where the greening was primarily the result of reforestation in state managed forests or shrub encroachment, the result was an increase in density but a reduction in diversity. And in areas where there was more passive regeneration of trees and shrubs in fallowed fields and degraded rangeland, there was a modest increase in density of shrubs such as *Combretum* and *Guiera*, but a reduction in large trees and higher valued species such as *Cordia* and *Pterocarpus*. See Fig. 5

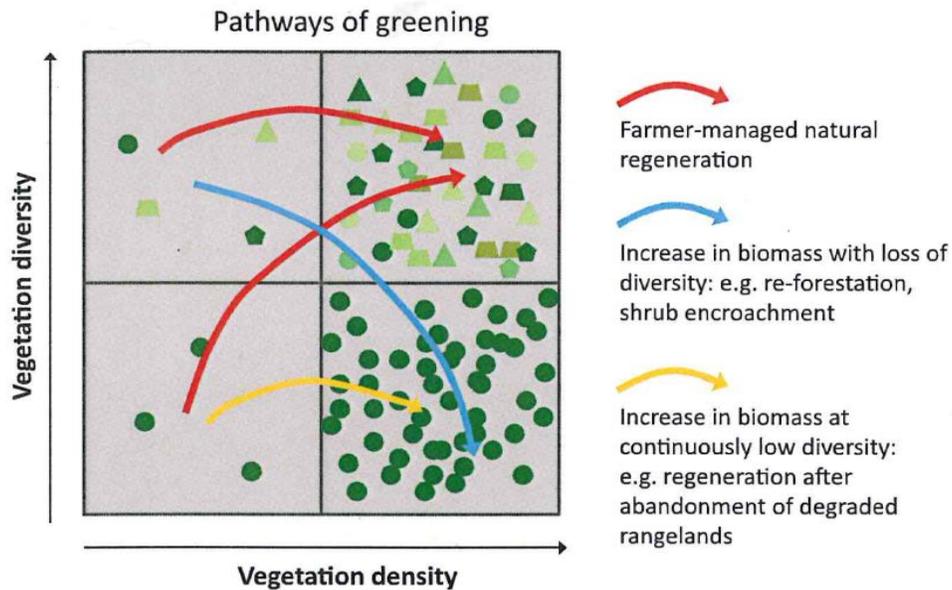


Figure 5. Conceptualized pathways of changes towards “greener” conditions

Source: Herrmann, Tappan, 2013, p. 65

It may be significant that such analysis does not seem to show improvements in land management at similar scales as that observed in Mali, Burkina Faso and Niger over the past 30 years. This may be attributed to several different factors, including the influence of strong para-statal in Senegal that promoted animal traction and mechanized agriculture, a reliance on state-subsidized mineral fertilizers, and policy directives to clear trees from fields, particularly outside of the peanut basin where *Faidherbia* agroforestry parklands were already well established. In addition, agroforestry and the restoration of tree cover in farm fields through farmer managed natural regeneration was not part of the mainstream practices promoted by agricultural extension services. Furthermore, in Senegal, the Forest Service discouraged farmers from investing in on-farm trees which could be trimmed and managed to produce a steady crop of wood and NTFPs by imposing official and unofficial permits, taxes and fines for harvesting and transporting forest products.

Additional information and insights on the dynamics of FMNR in Senegal can be gleaned from an end of project evaluation of the Food and Livelihood Enhancement initiative implemented by World Vision from 2007-2011.<sup>41</sup> This project was designed to contribute to environmentally and socially sustainable improvements in food production and household income, through training and visits, use of community facilitators, working with schools and engagement with the government and research partners to promote the adoption of FMNR. Through the work of this project, the area of FMNR increased from 742 ha in 2008 to 9124 ha by 2011, and an estimated 264, 654 trees were regenerated and 133,575 trees were planted. The evaluation team surveyed farmers about impacts of FMNR. 85% of the farmers

<sup>41</sup> C. Kabore, T. Rinaudo, et al. 2012. End of project evaluation- Senegal Food and Livelihood Enhancement Initiatives. World Vision Senegal.

observed that FMNR increased soil fertility, 62% noted reduced erosion, 59% cited increased yields, 35% saw increased wildlife, and 30% noted increased access to firewood. Farmers also noted that FMNR provided a needed response to declining soil fertility and crop yields, but that prior to the project efforts to promote FMNR, farmers risked being viewed as bad farmers if they changed their traditional practices and adopted FMNR. The study team stated that the majority of farmers clear tree, shrub and grass regrowth from their fields just prior to sowing and burn all of the collected organic matter. Traditional practices of burning crop residues regenerating damages trees in fields and must be addressed. 97% of surveyed households said they removed trees from their crop land, presumably based on past advice from agricultural extension agents.

Farmers also acknowledged that they need special permission from the Forest Service to harvest and sell regrowth of wood from trees in their own fields. It was observed that in the short term, the promotion of FMNR tends to reduce access to firewood (as resprouting trees are protected and enabled to regenerate), and reduce incomes for women and others dependent on cutting regrowth for firewood – so the project needed to work around this short term issue. Just 28% of the farmers in the project area practice restricted grazing, so in most areas, regenerating trees are vulnerable to browsing damage. In the next phase of the project, the team proposed to bring nomadic herders into the partnership and formalize their role in the protection of trees. World Vision also noted that herders could benefit from extension work in their own language showing the benefits of trees and FMNR to livestock, and how trees in field could be managed more sustainably and productively.<sup>42</sup>

### Survey of NRM Practices

USAID also invested in the organization of Knowledge Attitude Practice or KAP surveys in 1992, 1994, 1996 and 1998. These household level surveys were focused on the southern half of Senegal, and surveyed the knowledge and use of both NRM, agricultural and related practices such as seedling production, windbreaks, live-fencing, alley-cropping, protection of trees in fields, composting, check dams, and the use of improved seed, fertilizer and improved cook stoves (see figures 6-7). The data was analyzed and mapped, and made available to USAID staff to assist in impact assessments and the development of program strategies and project design. Findings from long term environmental monitoring and the KAP surveys underscored the need to reduce deforestation and support the uptake of specific NRM practices, which encouraged continued investments in E/NR programs. They also helped to inform the evolution of E/NR investments, shifting from a focus on reforestation, to CBNRM and to other complementary projects focused on the integration of NRM into agriculture, and on facilitation of decentralized NRM through projects such as DGL-Felo and Wula Nafaa.

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<sup>42</sup> Pers. Comm., Tony Rinaudo.

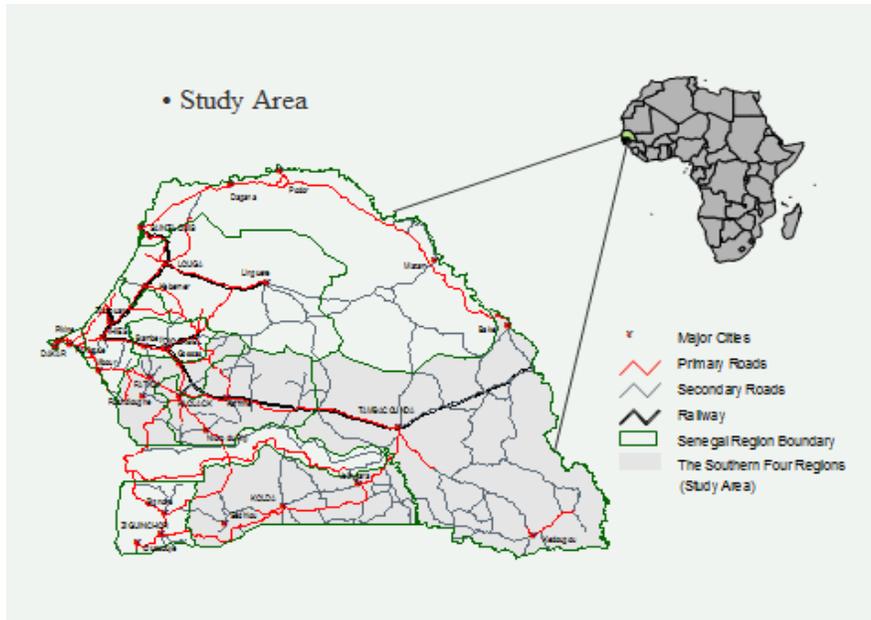


Figure 6. KAP study area in Senegal: 1992-1998

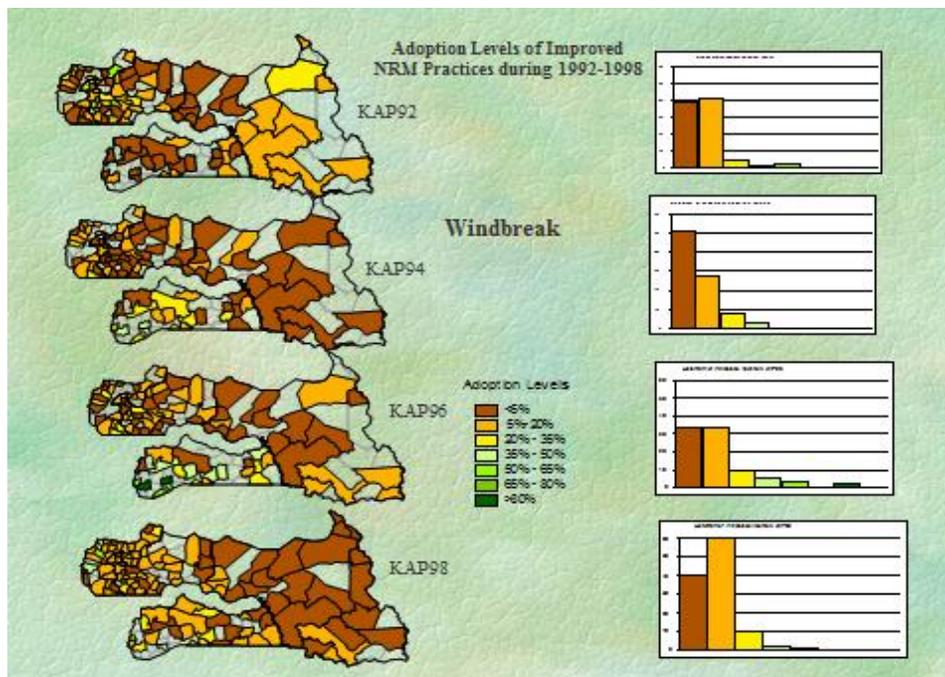


Figure 7. Sample of KAP Survey results: changes in adoption levels for windbreaks from 1992-1998

### Increased attention to decentralization and tenure security

USAID and other development assistance agencies also worked in Senegal and across the Sahel region to increase the attention given to decentralization and tenure security as key factors to be addressed in order to make progress with rural development and sustainable agriculture. With assistance from USAID and others, national institutions and government agencies and NGOs in Senegal were engaged

with the Interstate Committee for Drought Control in the Sahel (CILSS) and others in the region to reflect upon the key challenges of long term development and how they might be addressed. In 1989, a regional conference convened in Segou, Mali, reached consensus on principles and strategies to guide economic development in the region. This included a number of strategic orientations that are still relevant decades later:

- Invest in ecological rehabilitation
- Support a sense of responsibility in local communities
- Encourage decentralized management
- Strengthen tenure rights
- Increase the availability of funds at the local level through savings and rural credit
- Involve and integrate women
- Emphasize information and training
- Review population policies

Ten years after the “Rencontre de Segou”, USAID organized stocktaking teams across the Sahel to review progress and experience in following the main orientations adopted in Segou. With USAID assistance, a regional workshop was convened in Koudougou, Burkina Faso in 1999 to provide a forum for Sahelian experts in various domains of NRM to share lessons learned and their assessment of progress and needs.<sup>43</sup> The experts noted numerous examples of progress, including testing and promotion of decentralized, participatory approaches, preparation of legislation to increase tenure security, support for village organizations, rural finance and dissemination of NRM techniques. To a degree, each of these areas of progress were being addressed in the evolving portfolio of E/NR projects in Senegal during the 1980’s and 1990’s.

### **NRM Stocktaking**

However, serious problems and challenges remained in Senegal and across the Sahel in terms of addressing chronic rural poverty, slowing and reversing ecosystem degradation and consistent application of democratic principles in the operations of grassroots organizations. In 1999, the Koudougou workshop participants identified several areas for continued action, including:

- Effective decentralization of NRM and increased efforts to clarify the rights and obligations of community based organizations and the transfer of authority and competence to local levels
- Increase the contribution of NRM to the economy and to improving the standard of living of rural populations by improving access to markets and to credit, and promotion of NR based enterprises
- Increase the contribution of internal resources to NRM financing by strengthening mechanisms to mobilize local resources and to ensure equitable distribution of benefits among actors
- Ensure better monitoring and evaluation of the impact of NRM programs, to determine changes in the condition of resources and provide for information sharing through networks

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<sup>43</sup> See NRM in the Sahel – Where are We? Natural Resources Mangement in the Sahel: taking stock of experiences, lessons and perspectives. USAID/EPIQ/IRG 1999. On [www.frameweb.org](http://www.frameweb.org) and [www.cilss.org](http://www.cilss.org)

Through USAID support for stocktaking of lessons learned, field surveys of farmer innovations, stakeholder workshops, and strategic assessments of E/NR activities and opportunities, USAID NRM specialists and consultant teams were able to provide guidance and inform the design of USAID programs and project designs during the 1990's and more recently. The NWP discussion paper itself, prepared in 2002, was a product of these efforts, and it directly influenced the E/NR portfolio in Senegal, notably through the implementation of Wula Nafaa, as evidenced by the references to NWP in the descriptions of the project approach and rationale. By the time the Wula Nafaa project was launched in 2003, there was also a growing awareness of the need to shift from non-sustainable, extractive use of natural resources that provided additional, significant sources of income for rural communities. This awareness led to a commitment to increase investment in the improved management of natural resource based production systems for a range of forest and non-timber forest products, such as charcoal, timber, baobab fruit, gums, fruits, edible leaves, fibers, honey and other products that were exploited in rural areas.

### Recognition of Environmental Income

Beginning in the late 1990's, research was carried out in Senegal by IUCN and ISRA to assess the contribution of wild plants and animals to human welfare. This research revealed that non-timber forest products (NTFP) in the regions of Tambacounda and Kolda contributed annually approximately 1.6 to 3.1 billion fCFA (about \$2.9-\$5.6 million) to national income.<sup>44</sup> This estimate does not include the economic value of fuelwood, charcoal and building materials derived from forests (estimated to be about 31.6 billion fCFA in 2000), as these products are largely accounted for in national statistics. The economic contribution of freshwater fisheries in two of three major fishing areas surveyed amounted to 9.2 billion fCFA per year. According to the IUCN research team, the total annual value added from all non-timber wild plants, animals and freshwater fisheries was estimated to range from 14 to 25 billion fCFA (\$25-\$45 million). The IUCN surveys indicated that non-timber wild plants, game and freshwater fish are mainly produced for sale with a small proportion destined for home consumption. The study team concluded that these "wild" products were especially important for poor households, and contributed up to 50% of their annual cash income.

Small scale artisanal fisheries accounts for three quarters of the fisheries catch in West Africa and nearly 90% of the catch in Senegal. Over 600 million poor people keep livestock as a key asset for their livelihoods. The rural poor are highly dependent on the productivity of these natural ecosystems and managed natural resources. These systems are often dependent on the local management regimes developed for "common property resources" and can be over-exploited and depleted if common property management systems are undermined. And as later demonstrated by the experience of Wula Nafaa in Senegal, modest efforts aimed at reinforcing and improving these management systems, and in increasing the productivity and value added for producers engaged in utilizing these resources can have a significant impact on rural incomes and in the security of these natural resource-based livelihoods.

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<sup>44</sup> UDRSS/VALEURS, 2002. The Economic Value of Wild Resources in Senegal: a preliminary evaluation of non-timber forest products, game and fishwater fisheries. Projet Valorisation des Espèces pour une Utilisation durable des Ressources Sauvages au Senegal. US dollar equivalent values based on exchange rate of 550 fCFA=\$1.00

In addition to the economic contribution of these wild resources, the IUCN survey teams also assessed the sustainability of NTFP harvesting. Recorded sales of many NTFPs rose in the late 1990's, apparently due in part to the devaluation of the CFA franc in 1994 and increased competitiveness of local wild products in the market compared to imports and industrial substitutes.<sup>45</sup> In 2001, local producers expressed concern over the apparent decline in maad, baobab, nete and tamarind.<sup>46</sup> Interviews with producers and traders also suggested that the collection of laalo mbep gum<sup>47</sup> and other natural products was being made more difficult as a result of bush fires, drought, rudimentary tapping techniques and the poor regeneration of harvested trees. Conventional methods of gathering honey from wild bee hives also appeared to be particularly damaging because of the destruction of bee colonies and uncontrolled bush fires.

Analysis by the Wula Nafaa project in 2003-2004 revealed the economic importance of numerous natural product-based value chains that constitute sources of environmental income.<sup>48</sup> The largest percentage of revenue to the Tambacounda region from non-timber forest products (NTFPs) came from mbep gum (79%), followed by baobab (8%) and honey (4%). In the Kolda region, the main sources of revenue from NTFPs were from palm oil (42%), honey (29%), baobab (9%) and tamarin (8%). On the one hand, this data confirms the economic contributions of these and other NTFPs to the income of local households and to the regional and national economy. And it also helps to explain why the Government of Senegal has continued to affirm state ownership of all such "natural products", and is able to generate considerable revenues from taxes collected on the sale of these products. It also reveals why the Forest Service has been reluctant to devolve management rights and enable local communities to become major actors in capturing revenue from hunting and charcoal. See table 1.

**Table 1. Estimated Revenue from NTFPs, Tourism and Forest Products, 2003**

<i>Product – Value Chain</i>	<i>Tambacounda region (millions fCFA)</i>	<i>Kolda region (millions fCFA)</i>	<i>Total Revenues from 2 regions (millions fCFA)</i>	<i>Estimated total revenues (US dollars)<sup>49</sup></i>
Mbep gum	567.9	2.8	570.7	\$1,037,636
Honey and wax	30.6	137.7	168.3	\$306,000
Baobab	54.1	41.4	95.5	\$173,636
Palm Oil	-	201.0	201.0	\$365,454
Tamarin	7.4	36.2	43.6	\$79,272
<b>All NTFPs</b>	<b>718.8</b>	<b>471.7</b>	<b>1190.5</b>	<b>\$2,164,545</b>
Hunting - Tourism	1062.2	210.0	1272.2	\$2,313,091
Charcoal via Forest Service	591.4	908.6	1500.0	\$2,727,273

<sup>45</sup> See UDRSS/VALEURS, 2002.

<sup>46</sup> *Saba senegalensis, Adansonia digitata, Parkia biglobosa, Tamarindus indica*. Cited in UDRSS/VALEURS, 2002.

<sup>47</sup> Karaya gum extracted from the Sterculia tree.

<sup>48</sup> Astou Sene, C. Ndione, 2004. Analyse Financiere des filieres des produits naturels et agricoles dans le Senegal Oriental. Programme Gestion des Ressources Naturelles. Annex 4 – Regional Incomes

<sup>49</sup> Estimated annual revenue, with exchange rate of 550 fCFA =- \$1.00

Community charcoal	15.7	10.0	25.7	\$46,727
Wen – hardwood	378.0	-	378.0	\$687,272

In 2005, the World Resources Institute documented the importance of this “environmental income” and associated ecosystem services as a major component of household income for the rural poor in a number of developing countries.<sup>50</sup> Environmental income was based on an estimate of the value in cash or in kind derived from ecosystem goods and services. This included income from “wild” or uncultivated natural ecosystems such as capture fisheries, harvested forest products, grazed grasslands and hunted bushmeat. It also included income from agro-ecosystems managed by small holders, such as cropland, pastures, orchards, home gardens and fish ponds. As cited in *World Resources 2005*, the World Bank estimated that 90% of the more than one billion people living on less than one dollar/day depend on forests for a portion of their household income; on average, one fifth of their income of the rural poor is derived from wood, fodder, thatch and other products harvested from forests. In Zimbabwe, such environmental income accounted for 67% of household income (see figure 8).

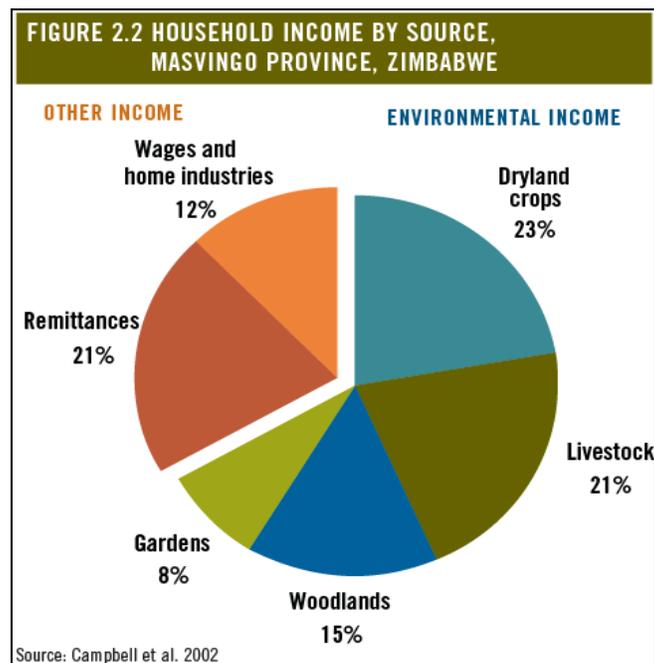


Figure 8. Household income by source, Zimbabwe (from *World Resources 2005*, p. 39)

## Nature Wealth and Power

In preparation for the World Summit on Sustainable Development in Johannesburg in 2002, USAID prepared a discussion paper that looked back on 20 years of support for rural development – and looked

<sup>50</sup> World Resources 2005 – The Wealth of the Poor: managing ecosystems to fight poverty. UNDP, UNEP, World Bank, WRI. Washington, D.C. 2005

forward with reflections about practical “best bets” to revitalize rural Africa.<sup>51</sup> This discussion paper on “Nature Wealth and Power” (NWP) reviewed many country programs and projects to distill the experience of USAID and others in working to conserve and manage *nature* and natural resources as a source of *wealth* and *power*, and as a key means to improve and secure rural livelihoods and to sustain economic development. NWP was written to highlight the importance of natural resources as a source of income for rural households; the report noted that “land, minerals, forests, wildlife and water are central to the livelihoods of 70% of the population in Africa”. Furthermore, NWP noted that “access and control over resources is the major governance issue, especially for rural people”, and “NRM is central to good governance and increasing enfranchisement of rural peoples”. To the extent that rural communities were still mired in poverty, disenfranchised in decision-making processes and with their livelihoods made insecure by mismanagement of natural resources, it was to a great extent because of the limitations of many technical approaches to NRM and poorly integrated rural development projects.

The paper underscored the critical importance for interventions aimed at improving the management of natural resources to deliberately focus on securing access and control over natural resources in ways that supported good governance, a devolution of rights and authorities to resource users and more equitable benefit sharing. A number of important principles and action recommendations were identified from carefully researched case studies. This discussion paper was prepared to inform decision-makers interested in more effective and efficient investments in rural development by highlighting the interdependent relationships between (a) sound natural resources management, (b) economic growth and poverty alleviation, and (c) empowerment and enfranchisement.<sup>52</sup>

The cases presented in NWP all pointed to the importance of *integrating* support for NRM, enterprise development and governance for more sustainable and effective rural development strategies. In each case, the lessons from the field experience were clear: rural people needed the rights to benefit from natural resources, in order to capitalize on the economic benefits and to provide a clear incentive for continued investment in the protection and improved management of natural resources. This logic was borne out and emerged as a central condition of successful efforts to manage natural forests, wildlife, fisheries as well as trees on farms. As documented in the NWP and related reports, in countries such as Mali, Namibia, Madagascar and Bangladesh where the NWP principles and “best practices” have been applied, the results have been impressive, with simultaneous progress in restoring the productivity of natural resources and conserving biodiversity, along with increased contributions to local incomes and economic growth and the emergence of more democratic expressions of good governance.<sup>53</sup>

## Principles and recommendations for Nature in NWP

With respect to “nature”, the NWP discussion paper did not attempt to provide a comprehensive review of NRM methods or detailed analysis of the most promising techniques to increase the productivity of

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<sup>51</sup> See *Nature, Wealth and Power: Emerging Best Practice for Revitalizing Rural Africa*. USAID in collaboration with CIFOR, Winrock, WRI, IRG. Washington, D.C. 2002.

<sup>52</sup> For more information, see *USAID’s Legacy in Agriculture: Integrating Natural Resources Management into Agricultural Practices and Livelihoods*. Working Paper prepared by R. Winterbottom, WRI, June, 2011.

<sup>53</sup> See NWP case studies, and *World Resources 2008: Roots of Resilience – Growing the Wealth of the Poor*. WRI, UNDP, UNEP, World Bank.

specific natural resources, such as wildlife, fisheries or forests. Rather, NWP outlined a number of key principles and “action recommendations” for improving the effectiveness of rural development interventions.<sup>54</sup> These included:

- Improve information and knowledge management systems, including support for the development of networks, better use of monitoring and evaluation systems, increased access to information and promotion of linkages between research and extension
- Promote local land use planning and appropriate resource tenure systems, by negotiation of limits on use, participation of user groups, optimal integration of agriculture and NRM and promotion of an ecosystem vision
- Foster social learning, innovation and adaptive management, by encouraging social learning, experimentation
- Build capacity and invest in human resources through staff training and local capacity building
- Promote cost-effective technical advisory and intermediary services by working with skilled partners, facilitating farmer-to-farmer and group approaches, striving for cost-effectiveness and promoting new approaches to organizing knowledge support

A number of the recommended actions highlighted in NWP take account of the evolution in USAID’s E/NR investments in Senegal and are consistent with lessons learned from those investments. As discussed more fully in the next section of this report, NWP notes that sound natural resource management is knowledge intensive – and information collection and use should be efficient, coupled with local, participatory monitoring, be responsive to decision needs and linked to decision-making processes. NWP also noted the value of science in supporting interventions, while observing that science should not be used to set management objectives – as that was more properly a social process. And NWP stressed the importance of capitalizing on field experience and on building on both positive and negative experiences.

In capitalizing on what works, it is important to note the achievement of unexpected outcomes as well as desired objectives, and impacts that occur during the life of the project and afterwards. For example, over the past few years in Senegal, a process of project led promotion of particular practices by Wula Nafaa, World Vision and others, along with support for local innovation and adaptation, has contributed to recent progress in the spread of conservation farming and farmer managed natural regeneration.<sup>55</sup> This is similar to what occurred in the Yatenga region of Burkina Faso in the 1980’s, when foresters experimented with water harvesting techniques in order to improve the survival rates of planted trees. With the close involvement of local populations in participatory action research, farmers then adapted and applied the water harvesting techniques to improve crop yields. As the effectiveness of the innovative practices became apparent, more and more farmers adopted the improved practices.<sup>56</sup>

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<sup>54</sup> NWP 2.0 is currently under preparation, with new case study material and an updated framework of key principles and recommendations that takes account of lessons learned since 2002.

<sup>55</sup> Also known as “*régénération naturelle assistée*” or RNA. For more information, see Les Cahiers du GREP, Mai, 2013. RNA : Pour reverdir les terres de cultures. Groupe Recherche Environnement et Presse, Sénégal.

<sup>56</sup> Obasanjo, Olusegun and Hans d’Orville, ed. 1992. The Challenges of Agricultural Production and Food Security in Africa. P 133. See also: Wright, P. and E. G. Bonkougou. 1985. Soil and water conservation as a starting point for

These and other examples reveal how farmers learn new ideas from the demonstration effect and innovations by other farmers as much as from formal research institutions and government extension services.

### Investing in Tomorrow's Forest

By 2002, in addition to the NWP discussion paper, a companion volume on “Investing in Tomorrow’s Forests” (ITF) was prepared with leadership and technical support from USAID’s Africa Bureau. This report highlighted the benefits of working with multiple actors to address governance and economic incentives in tandem with measures aimed at improving the management of forests and trees outside of the forest, to achieve multiple objectives.<sup>57</sup> Country level field visits and workshop discussions with forestry officials and stakeholders from Senegal and other West African countries identified a number of enabling conditions for investment in sound forest management to capitalize on and scale up the successes noted in the emerging forests of tomorrow – private, dynamic, innovative, self-financed, market driven, co-managed, decentralized, integrated, diverse, poverty reducing, providing environmental services and other benefits.<sup>58</sup> As noted in the report:

The assumption that Africa is awash in a sea of rampant degradation and the perception of environmental crisis has often driven investments. Yet, the catastrophe predicted in the 1970’s has not materialized. Important experience has been gained and lessons learned in the past 25 years about economic and governance rationales for investing in the sector. Although some areas face degradation as a real and serious problem, in numerous promising cases, forests are being managed more effectively and more profitably than they were 30 years ago. The challenge to investors will be to support these promising cases and promote new approaches, thereby allowing the forestry sector to achieve its potential in spreading environmental, economic and governance benefits across the African landscape.<sup>59</sup>

At this point, Senegal was well positioned to move ahead in designing and implementing a new generation of E/NR projects based on the NWP framework and taking into account the ITF vision and recommendations to revitalize forestry in West Africa. The earlier generation of E/NR projects had focused on the provision of technical support by government services and NGOs to slow or reverse the degradation and loss of forests and other natural resources. The NWP and ITF papers helped to underscore the need to integrate attention to governance issues in NRM, as well as the wealth creating capacity of natural capital. NWP in particular noted the critical importance of securing access and rights to manage resources so that rural populations had more incentives to make better use of natural capital and to invest in sustainable increases in natural resource based incomes.

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rural forestry: The Oxfam project in Ouahigouya, Burkina Faso. *Rural Africana* 23/24; and Younger, S. D. and E. G. Bonkougou. 1989. Burkina Faso: The Projet AgroForestier. A case study of agricultural research and extension. In: *Successful Development in Africa. Case Studies of Projects, Programs and Policies*. Washington D.C.: World Bank, pp. 11-26.

<sup>57</sup> USAID, CILSS. 2002. *Investing in Tomorrow's Forests: Toward an Action Agenda for Revitalizing Forestry in West Africa*.

<sup>58</sup> *Investing in Tomorrow's Forests*, 2002, p. 29.

<sup>59</sup> *Investing in Tomorrow's Forests*, 2002, p. 6.

As the CBNRM project completed its final phase in 2003, the Forest Service and USAID/Senegal considered the scope and strategic focus of a follow on activity. The publication of the NWP and ITF papers was timely. In addition, the design of the follow up activities to CBNRM was informed by a series of country-level impact assessments, field studies and analysis of available survey data (such as the KAP studies carried out in the 1990's) aimed at capturing the results and lessons learned from the series of E/NR projects.<sup>60</sup> As noted above, these assessments and NRM “stocktaking” exercises in Senegal and in other countries that were carried out with the assistance of the Africa Bureau and the FRAME knowledge management project played a central role in organizing the Koudougou regional workshop and in preparing the NWP and ITF discussion papers, as well as the design and launching of the Wula Nafaa project.

## The Wula Nafaa project

### Objective, strategy and organization

The Wula Nafaa project was launched in 2003 to address something of a paradox: many of the poorest households in rural Senegal were located in the more heavily wooded eastern and southern regions where the natural resource endowment was relatively richer in comparison to the extensively farmed soils of the peanut basin in western and central Senegal, and the drier rangelands and more marginal agricultural lands in northern Senegal. Wula Nafaa began as an effort to develop the non-traditional agricultural crops and natural resource based enterprises that appeared to have significant potential to reduce rural poverty. Thus the Agriculture / Natural Resource project became known locally as Wula Nafaa, or the value (richness, economic interest) of the “bush”.<sup>61</sup>

Throughout the life of both the first and second phases of Wula Nafaa, its strategic premise has been that improvements in local governance that served to clarify and reinforce the rights and authorities of local communities and resource user groups and enabled them to increase their share of income and other benefits derived from the sustainable use and improved management of natural resources would in the end contribute to restoring and increasing the productivity of those resources in tandem with poverty reduction. In short, people need the rights to benefit from natural resources, to reinforce their efforts to protect, manage and boost their incomes derived from these natural resources. The ultimate success of any application of the NWP framework is therefore tied to *simultaneously* achieving increases in local income and other socio-economic benefits (Wealth), in ways that are linked to more secure rights and more transparent and accountable decision-making and equitable benefit sharing (Power), in

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<sup>60</sup> See stocktaking reports prepared for USAID / Senegal through the USAID EPIQ program. Kjell A. Christophersen Barry Rands, Amadou Hadj, B. Winterbottom. May 1998 Senegal NRM Limited Impact Assessment.

<sup>61</sup> The bush or “la brousse” is a term used to refer to the woodlands, pastures and other natural resources found in rural landscapes, outside of the villages and adjacent cropland. The bush has traditionally been a primary source of firewood, charcoal, poles, high value hardwoods, pasture and fodder, wild fruits, seeds and nuts, gums and resins, edible leaves, medicinal plants and numerous other products harvested and used for local consumption and sold in local and regional markets.

order to provide for both the means and the incentives to invest in environmental conservation and improved natural resource management (Nature).

From the standpoint of USAID, the project was designed to increase agricultural production and improve the decentralized management of natural resources, in ways that contributed to local incomes as well as biodiversity conservation. For the locally elected officials and regional leadership of the Government of Senegal, Wula Nafaa was appreciated as an effort to contribute to sustainable local development and poverty reduction by empowering local communities and increasing revenues for local beneficiaries. For the Ministry of Environment and Forest Service, they wanted to implement Wula Nafaa in much the same manner as the SRP and CBNRM projects, with a continuation of institutional and technical support to build upon earlier reforestation, forest management and community based land use planning and NRM interventions; they were not particularly keen to have Wula Nafaa serve as a means to undermine their authority over collection of forest product revenues or to devolve rights for managing forests and other natural resources to local communities.

Funding for the first phase (2003-2008) of Wula Nafaa totaled \$12 million and during the second phase (2009-2014) an additional \$22 million in funding was allocated by USAID/Senegal. The first phase of Wula Nafaa was organized to implement project activities in three inter-related components:

- Community Benefits: designed to identify potentially marketable AG/NR products and increase significantly the revenues and volume of production of a growing number of natural resource based and non-traditional agricultural enterprises
- Rights and Responsibilities: designed to increase the number of rural communities that have undertaken community led activities and developed local agreements to increase the productivity of NR, and to increase the number of communities engaged in implementing formal co-management and community based NRM plans
- Policy: designed to support assessments and foster increased consultation on policy issues and enabling conditions for CBNRM, reduce the regulatory and administrative barriers and support the development of needed tools and information systems for sustainable resource use

During the first phase of Wula Nafaa, the Community Benefits component focused its efforts on the organization of producer groups to develop selected NR-based enterprises, including gum, baobab, fonio, cashew, charcoal and several other products. At the same time, the Rights and Resources component initiated a process to increase the participation of communities in the co-management of classified forests, and in the demarcation and management of community forests and protected areas. The Policy component focused on the completion of baseline assessments, and on the organization of series of local, regional and national consultations and roundtables on a range of policy issues related to the sustainable use and improved management of NR. The project was initially based in Tambacounda, and gradually extended its range of operations to Kedougou and Kolda in 2003-2005, and to Ziguinchor and other areas of southeastern Senegal in 2005-2007.

In 2008, a second phase of Wula Nafaa got underway. In addition to building upon and consolidating the NR-based enterprise development, forest co-management and community based NRM activities, it

extended the project activities to a number of targeted areas in central Senegal (Fatick) and Casamance (Sedhiou) including sites for community based management of fisheries and irrigated agriculture as well as conservation farming. During the second phase, in keeping with a new emphasis by USAID on food security and “Feed the Future” program investments, Wula Nafaa included new activities related to water supply and food security, and broadened its scope of interventions to include irrigated rice and gardening as well as fisheries. With the shift towards specific households engaged in wider range of activities, project support for NRM and governance activities were reduced and interventions for some NTFPs such as gum mbep were scaled back. As the project shifted to provide certain services such as improved water supplies, and to promote certain techniques such as conservation farming, the linkages and alignment between NRM, governance and some subsector income-generating activities were sometimes less apparent. The NWP approach to work on fisheries was also made more difficult when project interventions in the Casamance were scaled back, and when Wula Nafaa team was tasked with boosting incomes and developing fisheries based enterprises, while the Nature – Power components of fisheries management were assigned to a different project implemented by the University of Rhode Island.<sup>62</sup> In retrospect, the Wula Nafaa project could have maintained its focus on scaling up community based forest management, natural resource based enterprise development and landscape level land use planning and sustainable land management, and a complementary Feed the Future project could have increased support for crop production and fisheries – with both projects making use of the NWP framework to integrate support for wealth, governance and NRM aspects.

## Approach and Tools of Wula Nafaa

### Community based facilitators

As a project designed to promote and support community based NRM, empowerment of rural communities and the strengthening of rural producer groups engaged in the development of NR-based enterprises, a key element in the approach of Wula Nafaa was the recruitment, training and fielding of more than 30 facilitators during the life of the project. This was particularly important as Wula Nafaa was working with relatively informal natural product value chains with less involvement of commercial service providers than commercially important agricultural value chains. There was a need to organize rural producers and natural resource based enterprise groups, and to raise awareness among them of the potential economic benefits to be gained from strengthened natural product value chains, as a means to encourage their engagement in the improved management of these resources.

While the CBNRM project in Senegal and other E/NR projects had often relied on networks of extension agents recruited by the government and supported by the project, in the case of Wula Nafaa, CLUSA ensured that the facilitators were particularly effective agents of knowledge transfer and empowerment. These men and women were recruited locally, fluent in local languages, vetted by the local communities in the region where they were assigned, and trained in participatory approaches. They were provided with facilitation and enterprise development skills, motorcycles and other logistical and technical support. CLUSA, as a major implementing partner for Wula Nafaa with long experience in working with cooperatives and enterprise development, took the lead in supporting and managing the

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<sup>62</sup> Pers comm., Brook Johnson.

facilitators. The facilitators served as the major interface between local communities, the team of project technical specialists, and key stakeholders including national and local government authorities and private sector operators. As a project that was fundamentally about improved community level organization, empowerment and devolution of management rights, increased collaboration between rural producers and government technicians and facilitated engagement in market led enterprise development, the long term success and impact of the Wula Nafaa was dependent on the effectiveness of these community-based facilitators. The facilitators also played a key role during the first phase of Wula Nafaa in integrated the community benefit / enterprise development and rights and responsibilities / NRM components of the project. And the facilitators contributed to the work of the policy component at the local level, and played an important role in monitoring and evaluation.

### **Strengthening and Training of Producer and NRM Groups**

A key role of the facilitators was to strengthen the organization of community based groups. These groups included rural community members who were active in a targeted value chain (producer groups), as well as groups organized to improve the management of targeted natural resources (NRM groups). In both cases, the groups benefitted from extensive training efforts led by facilitators. First, the facilitators were trained through training of trainers sessions. Then they would follow up in organizing local level training and capacity building on a range of topics generated through interactions with local stakeholders. A critical initial step was the identification of interested stakeholders in specific value chains, and the strengthening of community based organizations and rural producer groups. There was particular interest and demand for training related to functional literacy, accounting, improved knowledge of laws and regulations related to decentralized NRM, and all aspects of NR-based enterprise development, including measures to increase resource productivity, improve product quality, negotiate better prices and joint ventures with the private sector, improve storage and value added processing, branding and marketing as well as accounting and enterprise management.

Another important training and knowledge management activity involved the organization of cross-visits and exchange of information from other groups with shared interests and challenges. For example, the project organized visits with communities living in regions with relatively intact natural woodlands to see communities in the degraded agricultural landscapes of central Senegal, including those assisted by the GTZ PAGERNA project which had been successful in protecting and restoring the productivity of managed areas; these visits served to galvanize action in local communities in eastern Senegal. Exchange of information between Wula Nafaa and the Conservation Farming Unit (CFU) in Zambia, with its relatively extensive experience in developing and promoting the adoption of no-till, conservation agriculture enabled the project team and stakeholders to capitalize on the knowledge of the Zambia CFU.<sup>63</sup> As of late 2012, during the second phase of Wula Nafaa, some 31,000 people (with 42% women) benefitted from 2169 training events supported by the project.<sup>64</sup>

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<sup>63</sup> CLUSA was active in both Senegal through Wula Nafaa and in Zambia through other USAID funded rural and agricultural development projects, and was well positioned to facilitate the cross visits and information exchange with the Zambia CFU.

<sup>64</sup> USAID/Wula Nafaa. Conservation Farming. 2 page fiche d'information and Annual Report, 2012.

### Communication and Outreach

Wula Nafaa recruited a dedicated communications specialist, and worked closely with local radio stations, the press and other media to raise awareness of the issues being addressed by the project as well as the project accomplishments. The project staff noted that their efforts to ensure that community level meetings and project activities were well advertised and publicized contributed to transparency and helped to counter a tendency for elite capture. For example, project support for the development and use of rural radio stations such as the station in Salemata reportedly helped to increase the participation of women in Wula Nafaa supported activities.<sup>65</sup>

### Identification of Targeted Value Chains

Considerable effort in the first phase of Wula Nafaa was devoted to the analysis of the socio-economic and ecological potential of value chains that could be targeted by the project. Documentation on 45 different natural products and non-traditional agricultural value chains was examined, and the 15 most promising value chains were analyzed with respect to a number of factors, including the percentage of the population and numbers of producer groups and private sector actors engaged in harvesting and selling these products, the total revenues and volume of production, the potential for increased demand and market growth, and the potential for increased and sustainable supply.<sup>66</sup> This analysis made use of the IUCN surveys and data generated by the UDRSS/VALEURS project, as well as a series of consultations with value chain actors and market studies organized by the Wula Nafaa team. Some of top ranked value chains or subsectors initially investigated by WN and with high potential in the Tambacounda region were gum mbep, honey, baobab fruit and leaves, bamboo, shea butter (karite), netetou, bisap, fonio, madd, medicinal plants, jujube, oil palm, sesame, and moringa as well as ecotourism and charcoal. By 2006, as the project extended its activities into the Kolda region, the WN team had decided to focus on some 8 subsectors, including mbep, baobab, fonio, cashew and oil palm. As the team refined its focus on specific subsectors, more in-depth studies were carried out to guide interventions to increase the revenues of producers and the value of the forest and non-traditional agricultural products.<sup>67</sup> During the second phase, more attention was given to producers working with charcoal and cashew as well as baobab and fonio.

### Local Conventions and Land Use Plans

Within the framework of decentralization and the devolution of authority from the central administration of the State to locally elected authorities in Rural Communities, Wula Nafaa also continued the work of the DGL Felo in supporting the preparation and formal adoption of Local Conventions. These conventions or agreements consisted of locally enforceable rules governing the use of natural resources within the territory of Rural Communities. These rules typically addressed agriculture (proposing measures to reduce erosion, promote agroforestry, control burning and land clearing for cropland), livestock production (to limit over-grazing, to designate grazing reserves, promote livestock vaccination, reduce theft of livestock), and environmental management (to reduce bush fires,

<sup>65</sup> Personal communication, Jeff Povolny, Wula Nafaa Chief of Party

<sup>66</sup> Programme AG/GRN, Juin 2004. Analyze Financiere des Filières des Produits Naturels et Agricoles dans le Senegal Oriental.

<sup>67</sup> For a detailed discussion of the Community Benefits strategy and approach, see Briefing Paper: Community Benefits, AG/NRM Program prepared by Brook Johnson in November, 2006.

promote regeneration of harvested NTFPs, specify periods for collecting NTFPs, promote protection of wildlife and critical wildlife habitats, reduce wildlife-human conflicts).<sup>68</sup>

The conventions were developed through a process that assessed current land use, identified non-sustainable practices and NRM issues that needed to be addressed, and negotiated agreements on measures that could be taken to address the problems and provide for more sustainable use.<sup>69</sup>

According to the Wula Nafaa staff, the local conventions helped to avert or settle conflicts over resource use, in addition to contributing to improved resource management.<sup>70</sup>

As a critical step in enabling decentralized NRM, Wula Nafaa also supported the preparation of land use plans (*Plan d'occupation et d'affectation des sols* – POAS). These plans were based on an assessment of land and resource use and provided a framework for managing the use of different resources and land use zones within the boundaries of a Rural Community. The POAS generally incorporated the rules adopted through a Local Convention, and provided additional information to guide and support land use planning and NRM. The POAS incorporated information from a participatory mapping and zoning exercise that took account of social and economic infrastructure (education and health facilities, water supply, roads and markets) as well as environmental resources and biologically important resources (soils, water resources, forests, pastures, cropland, protected areas, critical wildlife habitat) to produce a land use/land cover map. The POAS also examined issues related to conflicts over resource use and constraints to sustainable use and improved, integrated natural resource management across the landscape of a given Rural Community (CR).

The preparation of these plans directly contributed to local initiatives to demarcate and formally establish community conservation areas, for example, in the buffer zones adjacent to the Niokolo Koba National Park. In collaboration with PROGEDE, PGIE, the Ministry of Environment, CSE and USGS, Wula Nafaa helped to demarcate and map 9 community reserves in the region of Kedougou, including several reserves established as buffer zones around the national park. The local conventions and POAS were also prepared as a foundation for the elaboration of a Forest Management Plan (*Plan d'aménagement forestier* or PAF).

### Forest Inventories and Management Plans

During the first phase of Wula Nafaa, the Forest Service was inclined to have Wula Nafaa follow the example of the World Bank PROGEDE project in supporting relatively costly forest inventories and forest management plans with detailed prescriptions for rotational harvesting of fuelwood that were prepared by Forest Service technicians working as project consultants. The project staff noted with interest the example of the GTZ PAGERNA project in facilitating the preparation of “simplified management plans” that were based on local consultations, sketch maps and management proposals developed by the local community. With assistance from the US Forest Service and others, the Wula Nafaa team organized a series of training workshops and consultative sessions to familiarize local stakeholders with the

<sup>68</sup> See for example, Convention Locale pour une gestion durable des ressources naturelles. Communaute Rurale d’Ethiolo, Region de Kedougou. Octobre 2012, elabore avec l’appui du Programme USAID Wula Nafaa.

<sup>69</sup> See Programme AG/GRN, Guide d’animation de la Convention Locale.

<sup>70</sup> Pers. comm., Abdou Sene, Wula Nafaa, Deputy COP

objectives and approaches of different types of forest inventories and forest management plans. By the end of the first phase of Wula Nafaa, an 11 step process had been developed and were documented in manuals and guidelines to support the forest management planning process.<sup>71</sup> See Annex C.

Forest Management Plans were prepared with the assistance of Wula Nafaa to engage communities in demarcating and safeguarding forest resources as part of a permanent forest estate in a targeted landscape that could then serve as a source of economic and environmental benefits.<sup>72</sup> In order to enable local communities to have role in the management of these areas and to benefit from the flow of forest products and associated revenues, the Forest Service required a plan that specified how these forests would be managed “in time and in space”. The Forest Code of Senegal stipulated that a forest management plan be composed of at least two parts: an analysis of administrative, ecological and social conditions with supporting maps, and a management plan that provided details concerning the demarcation of management units, timing of harvests and other management prescriptions. Forest Management Plans were to cover a period of 10-25 years, and needed to specify primary and secondary management objectives and maximum sustainable yield of forest products based on the regenerative capacity of the managed stands.<sup>73</sup>

In each of the forest management plans prepared with the assistance of Wula Nafaa, considerable efforts were made to document the communities living in the vicinity of the forest and associated infrastructure, and to identify the primary and secondary uses of the forest, as well as causes of degradation. For example, in the case of the Paniates forest (40,900 ha), 39 large and small villages with a population of some 15,000 people from 3 major ethnic groups were surveyed, including farmers, herders, charcoal producers, natural product harvesters, traders and others. More than 50 water bodies were noted, and used by some 32,000 cattle, sheep, goats and other livestock in the area. The plan noted the wildlife resources, the range of products harvested, and trends with resource productivity and regeneration. Fire, cutting and grazing were particularly important pressures on the forest and thought to be the main causes of degradation. (See figure 9). For example, 25% of the forest burned in 2007. (See Figure 10)

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<sup>71</sup> See USAID Programme Agriculture/GRN Wula Nafaa, 2008. Guide d'Elaboration du Plan d'Aménagement Forestier Participatif. Prepared with the assistance of the USFS/International Programs and IRG.

<sup>72</sup> Pers. comm. John Heermans, Wula Nafaa COP

<sup>73</sup> Code Forestier, Titre 1, Chapitres 1-2 cited in AG/GRN, Guide d'élaboration du plan d'aménagement forestier participatif.

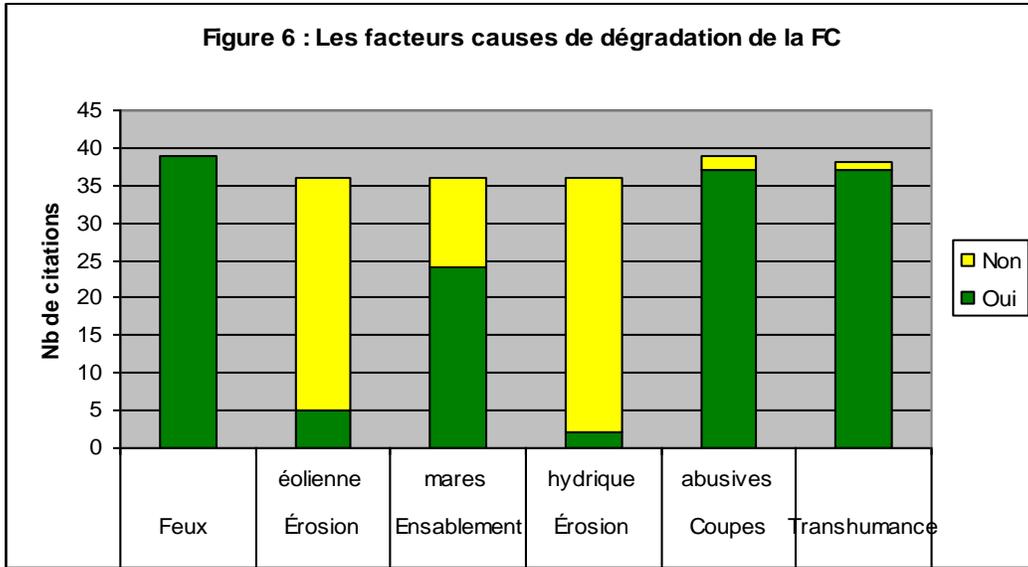


Figure 9. Relative importance of factors causing degradation of the Paniates Classified Forest

Source: Plan d'aménagement Forestier, Paniates

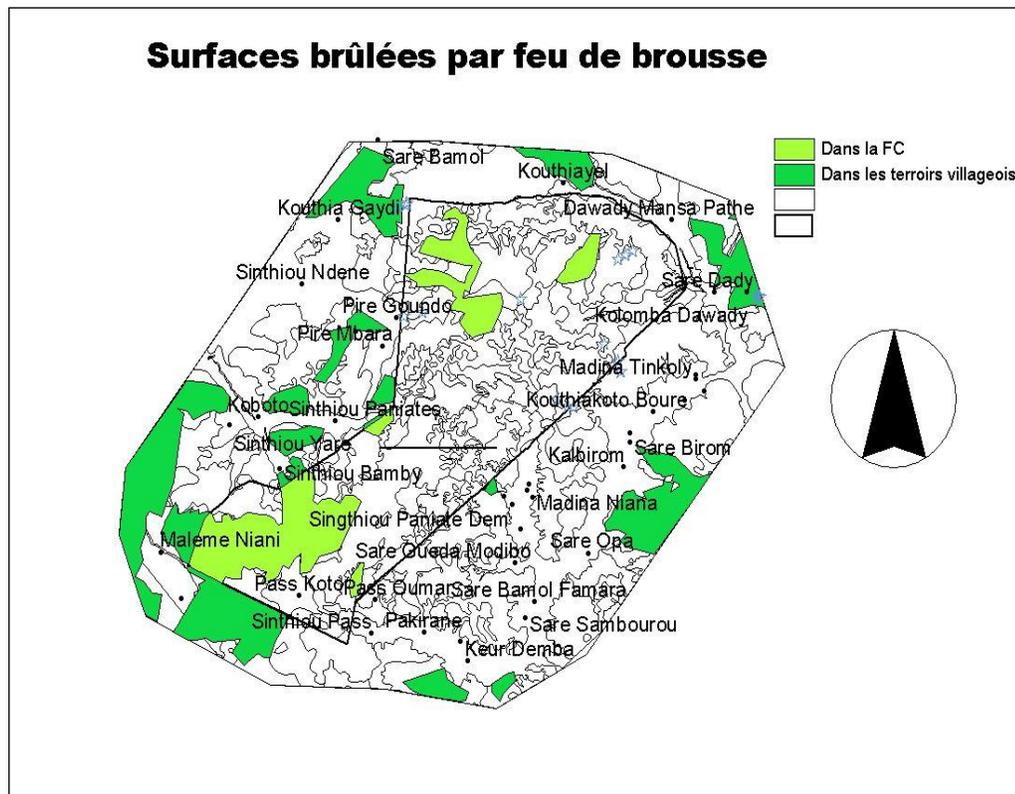


Figure 10. Area burned by bush fires in Paniates Classified Forest and adjacent areas, 2007.

Source: PAF Paniates,

Following this extensive section on “description du milieu” in the Forest Management Plans, sections of the forest management plans were typically devoted to management objectives, division of the forest for “*aménagement par série*” and administrative arrangements. It is interesting to note that the relatively standardized management prescriptions were generally oriented to production of “wood energy”, with less treatment given to resolving specific management issues, challenges and needs noted in the first part of the management plans. For example, in the case of the forest management plan for the community forest of Koulor (39,214 ha), the author noted that one of the primary motivations for establishing the community forest was to provide a grazing reserve and to ensure continued harvests of economically important NTFPs. However, the section of the plan that described the “forest potential” had relatively little information about pastures resources, and noted that the Koulor forest had a similar composition to the Missiriah/Kothiary forest, with 51 species and 84% of the volume composed of 3 species exploited for charcoal production (*Combretum* and *Terminalia*). It is not clear if a new forest inventory was carried out for the Koulor community forest. As with other co-managed classified forests, the management plan for the Koulor community forest developed in partnership with the Forest Service included a plan for rotational harvesting of *Combretum* and other fuelwood species. See Figure 11.

### La repartition des parcelles en années d'exploitation

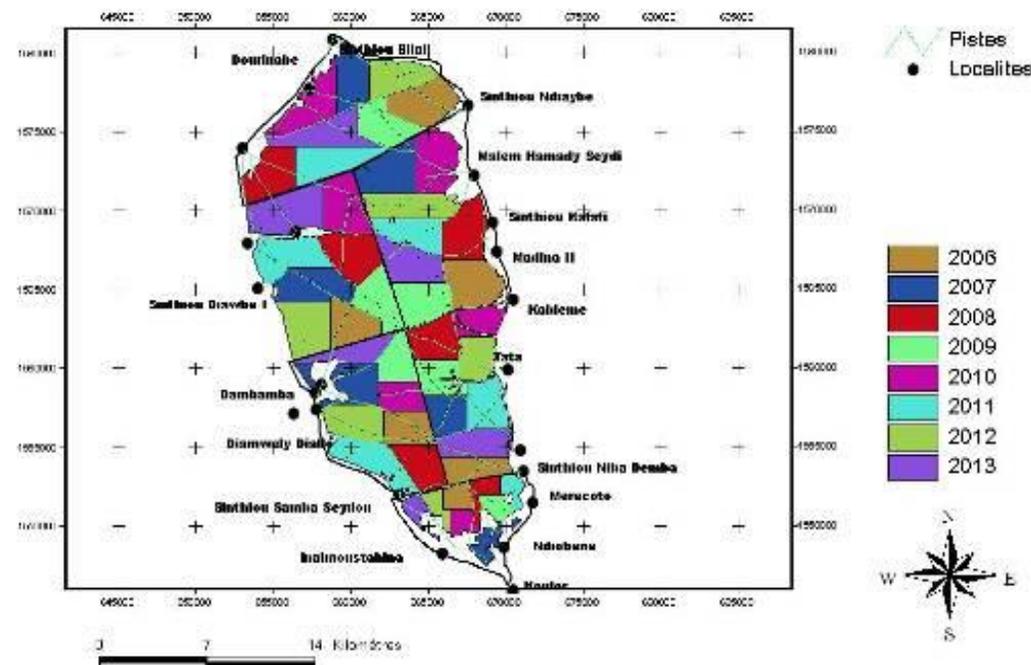


Figure 11. Distribution of parcels by year of harvesting, 2006-2013, in the Koulor Community Forest

Source: Plan d'aménagement de la forêt communautaire de Koulor, 2006.

The distribution of the cutting blocks or parcels is interesting, given the heterogeneity of the soils and vegetative types and the area of land in each of the land use / land cover categories, which included 10% of the area in cropland, degraded forest and bare soil. See Table 2 and Figure 12.

Land use / Land Cover	Area in hectares	%
foret galerie dégradée	253	0.6
savane arborée	10638	27.1
savane arbustive	17501	44.6
savane boisée	7027	17.9
sol nu	787	2.1
zone agricole	3008	7.7
<b>Total</b>	<b>39 214</b>	<b>100.0</b>

Table 2. Area of land use / land cover mapped in the Koulor Community Forest

Source: Plan d'aménagement de la forêt communautaire de Koulor, 2006.

## Carte d'occupation des sols ( FC Koulor)

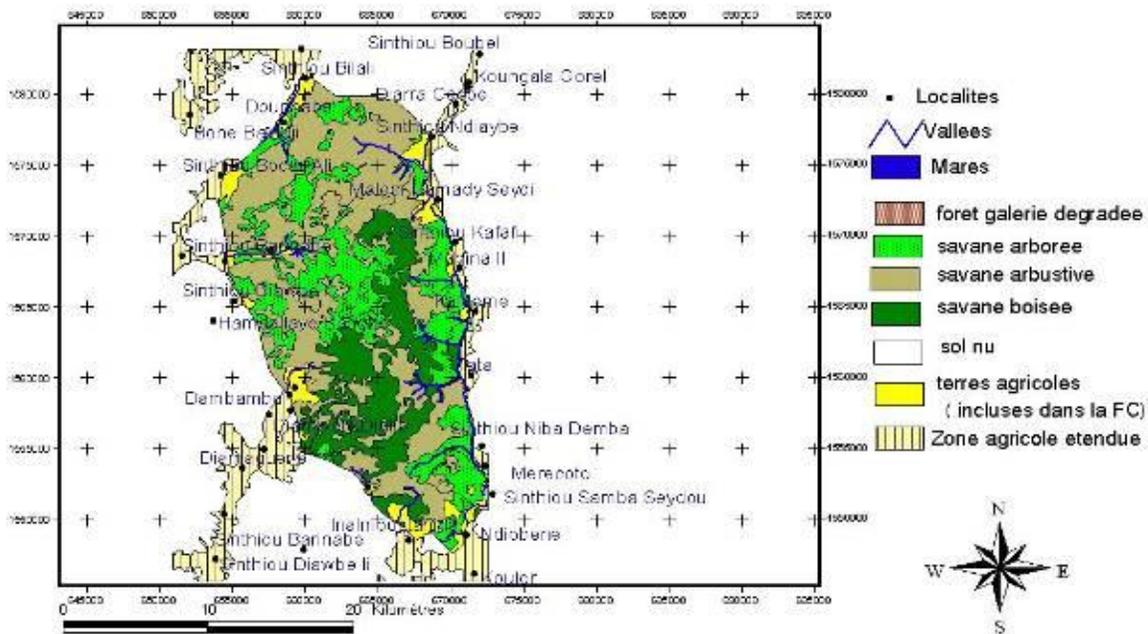


Figure 12. Map of land use / land cover in the Koulor Community Forest

Source: Plan d'aménagement de la forêt communautaire de Koulor, 2006.

While the prescriptive approach for forest management planning outlined in the Forest Code influenced to a great extent the approach followed by Wula Nafaa to support community based forest management, there has been some progress in key areas that in principle should lead to the improved conservation and increased productivity of the forests being brought under local management. These include the following basic steps to be supported and implemented as part of a process to shift from open-access woodlands susceptible to over-exploitation, degradation and conversion, to managed forest landscapes. Although more evidence of the ultimate impact of such interventions is needed in areas where Wula Nafaa has been providing support, at this point, it seems reasonable to assume that when these steps are followed and the basic prerequisites of improved management are agreed upon, documented and followed, then the prospects for improvements in “Nature” are quite good.

- *Formal devolution of rights:* Clear and formal devolution of management authority and assignment of rights to benefit from the improved management of a designed resource
- *Landscape assessment:* Facilitation of local community leaders and other key stakeholders to assess the use and management of natural resources within a targeted landscape, with a view towards identifying critically important resources (forests, pastures, wetlands and water resources, watershed catchments, wildlife and fisheries habitat, productive agricultural land, etc.) ,
- *Demarcation of managed areas:* Agreement on the location and boundaries of the forested lands and other resources where management is to be focused and improved
- *Resource inventories:* Participatory assessment of the quality and quantity of the specific natural resources being managed
- *Management objectives:* Agreement on management objectives that recognize local priorities and take account of the natural resource capabilities and potentials
- *Address causes of degradation:* Assessment of non-sustainable practices (that need to be controlled and curtailed) and other causes and drivers of degradation of the resources targeted for management
- *Identify sustainable uses:* Agreement on the types of permitted land uses and harvesting techniques and levels of off-take that are permitted and can be sustained, and locally enforceable rules to govern resource access and use
- *Establish management organization:* Agreement on the management bodies, institutional mechanisms and key stakeholders responsible for oversight and implementation of management activities
- *Work planning and budgeting:* Development of plans to prioritize and guide activities – with special attention given to activities that can be implemented by the local community and associated management bodies with minimal dependence on external resources to protect, regenerate and increase the productivity of the managed area, and to manage fires, hunting, grazing, harvesting of forest products and other activities that could threaten the maintenance or restoration of a healthy, functioning ecosystem, and provisions for regeneration of harvested resources if uncontrolled

- *Benefit distribution*: Agreement on administrative processes to orient and ensure equitable, transparent benefit sharing and revenue distribution among producer groups and management bodies.
- *Monitoring*: Organization of resource monitoring activities to track and report on changes in resource conditions and trends, and to provide feedback and guidance for the organization of management activities

## Achievements and Outcomes

### Outcomes reported by Wula Nafaa

To some extent, the very considerable and well documented activities and associated outcomes of Wula Nafaa can be viewed as the culmination of several decades of investment in AG/NRM by USAID. Wula Nafaa took advantage of the experience gained and staff developed with the support of DGL Felo, Dyna Entreprise and the CBNRM project, and took account of lessons learned from the Senegal Reforestation Project and others. It also capitalized on earlier investments in human resources development in the Ministry of Environment and Forest Service, as well as ISRA and CSE.

During the first phase of Wula Nafaa, from 2003-2008, the project reportedly increased incomes by 80% for more than 4,000 enterprise groups engaged in the production and marketing of products with 11 market chains in 32 Rural Communities. Through the formal adoption of 20 Local Conventions, progress was made in establishing the conditions for the improved management of natural resources across an area covering some 2.6 million hectares. However, the project apparently has not been able to systematically survey and assess the extent to which natural resources have actually been conserved as a result of the adoption of these local conventions and associated PAOS and forest management plans.

The project team facilitated the development of forest management plans for three community forests covering 70,000 hectares, and co-management plans for two classified state forests covering 60,000 ha.<sup>74</sup> The project also assisted in developing the capacity of four regional units of the Forest Service established to assist with forest inventory and management planning. During the second phase of Wula Nafaa, provisions for improved management were also enabled through the preparation of plans for the Mangagoulack forest and the Dindéfelo Community Nature Reserve (which included areas previously included in hunting concessions) as well as wildlife habitat zones protected through the adoption of Local Conventions for Dar Salam and Ethiolo in the Salemata Department of the Kedougou region. Management areas including no fishing areas were also supported through the adoption of management plans for coastal fisheries and mangrove areas in Missirah and Toubacouta.<sup>75</sup>

An important element in the implementation of forest management plans with the support of Wula Nafaa has been the elaboration of the GAF - *Gestion Administrative et Financière*. According to Wula Nafaa staff, the preparation and negotiation of agreements documented in the GAF helped to increase

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<sup>74</sup> Community forests included Koulor (39,200 ha), Sita Niaoule (18,000 ha) and Sare Bidji (19,800 ha); for additional details, see Wula Nafaa Final Report 2003-2008.

<sup>75</sup> USAID Wula Nafaa Program, 2012. Annual Report October 2011 – September 2012.

the transparency and effectiveness of forest management interventions.<sup>76</sup> Through participation in the preparation of forest management and administrative plans, Rural Communities have been able to play a role in the oversight of charcoal harvesting. And as the project facilitated the participation of rural producers in the production and direct marketing of charcoal, incomes were significantly increased. When the monopoly of the charcoal cartel was broken, from 2010 to 2011, charcoals producers were able to earn twice as much per bag produced. And as the area brought under community based forest management increased, more producers became involved in charcoal production. Incomes from the sale of charcoal produced in areas assisted by Wula Nafaa rose from 68.6 million fCFA in 2009-2010 to 386.7 million fCFA (\$860,000) in 2010-2011.<sup>77</sup> The experience of Wula Nafaa in enabling community based forest management and in facilitating increased local control over charcoal production and marketing demonstrated that the demand for charcoal need not be a driver of deforestation, but could instead contribute to reducing poverty in rural areas.

Over 1000 villages and communities were engaged during the first phase of Wula Nafaa in activities aimed at protecting and increasing the productivity of targeted natural resources, including building of firebreaks, tree planting and controlling bush fires. Particular attention was given to supporting the regeneration of baobab and improved harvesting methods (less destructive tapping techniques) for *Sterculia* (gum mbep) trees. This work with local communities on the adoption of locally enforced rules, management plans and other efforts to promote the protection and regeneration of targeted resources was linked to the “valorization” of these targeted value chains and natural products, in order to increase community benefits and the level of wealth generated by these resources, to reinforce the commitment of local communities to protect and improve the management of these resources.

During the first phase of Wula Nafaa, the Policy component of the project organized 101 roundtables at the community level and 32 national level roundtables as part of a process to identify and resolve 33 targeted policy barriers to improved NRM and implementation of activities within the NWP framework. See Annex D for a listing of policy barriers and actions taken to reduce them. During the second phase, in 2011-2012, Wula Nafaa made considerable progress in promoting conservation farming and negotiated agreements with the Government to support the policy of promoting sustainable agriculture.<sup>78</sup>

Although the second phase of Wula Nafaa is still ongoing, the project has already reported many successes. In January 2013, the project team compiled 25 success stories from the period 2008-2013. During that time, the project impact indicators showed that “over 40,000 people have sustainably increased their incomes by \$36 million through the management and conservation of natural resources, and an additional 10,000 tons of primary foods and grains have been produced by rural enterprises, and over 9,900 families have increased their production of key agricultural products”. The Wula Nafaa team

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<sup>76</sup> Pers. comm. Abdou Sene, Wula Nafaa, Deputy COP

<sup>77</sup> Pers comm. John Heermans, Wula Nafaa Chief of Party

<sup>78</sup> See USAID-Wula Nafaa Program, 2012, Annual Report October 2011-September 2012.

also noted that these impacts were accomplished in association with “improved, transparent and responsive local governance by local authorities, local community organizations and small businesses”.<sup>79</sup>

The Wula Nafaa team and their approach that integrates interventions in governance and enterprise development with improved natural resources management has increased the volume and value of products generated and marketed through natural-resource based enterprises. The added income now exceeds the total investment in \$22 million in project assistance mobilized for the second phase.<sup>80</sup> As noted above, the project has achieved a major breakthrough in enabling community based organizations and local producers to engage in the production and marketing of charcoal, and 25% of the charcoal consumed in Senegal is now produced more sustainably from community managed forests. During the second phase, the Wula Nafaa project also provided significant support for the development and spread of “conservation farming” by some 10,000 farmers, resulting in increased crop yields and more resilient agricultural production (see following section for more details). The pioneering work of Wula Nafaa on conservation farming is now being carried forward through a follow-on Feed the Future program, Yaajeende, implemented by CLUSA.

### **Critical assistance provided by Wula Nafaa**

Once the first phase of the project had made initial investments in launching the project and in organizing a participatory approach with a network of well-trained, community-based facilitators who had developed a good rapport with local resource user groups and local leaders, many of the household and community level impacts and positive contributions to enterprise development were achieved by relatively low-cost interventions. The Wula Nafaa project infrastructure made it possible to facilitate a shift from disorganized and uncontrolled exploitation of natural resources, which was the norm at the start of the project, to many cases of better organized producer groups and more controlled and better managed utilization of the forests and other natural resources in the areas targeted by Wula Nafaa. A critical element was support for more transparent benefit sharing in the natural resource based enterprise development and NRM interventions of the project.

For example, the project was able to boost local incomes by enabling local producers to increase the production of collected “wild” non-timber forest products such as baobab fruit and mbep gum, oysters, shrimp and local fisheries, along with a diverse array of products from palm groves, natural forests, cultivated soils and other natural resources. Previously, local communities were mainly involved in collecting and selling pieces of baobab fruit of varying quality. With assistance from Wula Nafaa, the producer groups were better organized and used their training to improve the quality of their product (selling clean and unbroken fruit), negotiate better prices, and expand their access to other, higher valued markets. For example, the project effectively partnered with the Baobab Fruit Company to provide a linkage between the producer groups and markets for high end sales of baobab based cosmetics and other products consumed in Europe. They were also able to take advantage of new and lucrative markets for baobab seeds, and for processed baobab products like baobab fruit powder which

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<sup>79</sup> USAID/Senegal, Agriculture and Natural Resources Management Program (USAID Wula Nafaa) – Success Stories. January 2013

<sup>80</sup> Pers comm. Jeff Povolny, Wula Nafaa Chief of Party, and IRG, 2013. Wula Nafaa Success Stories.

helped at one point to generate more value for local producers as they became directly involved in value-added processing.

Wula Nafaa also intervened to help producer groups to develop and make use of improved packaging and marking that was responsive to consumer preferences. Once the effectiveness of the packaging was demonstrated and the groups learned how to access the suppliers and retailers, they could continue to make use of the packaging and boost their sales and profits. The increase in value and volume of products that Wula Nafaa made possible for the baobab value chain was repeated for mbep gum, cashew, jujube, fonio and other natural and non-traditional products. Many of these value chains have grown significantly; in the case of cashew, some 9600 tons were sold in 2011 compared to 2887 tons in 2010.

In the region of Kolda, through the assistance provided by Wula Nafaa for the community-based management of the Sare Bidji forest, community members were able to diversify their livelihoods beyond the cultivation of peanuts and gardening, by becoming directly engaged in producing and marketing charcoal from community managed forests, and significantly boosted their household income as a result. In retrospect, key interventions that contributed to this progress and related developments in community based forest management in Senegal were:

- Local participation and empowerment through training related to the legal framework and regulations governing forest management and surrounding land use and NRM practices, including provisions related to Local Conventions and Forest Management Plans,
- Mobilization of Rural Communities through the preparation of Local Conventions, assistance with land use mapping and planning, and the adoption by concerned stakeholders of locally agreed upon and enforceable rules governing access and use of resources in and around the managed forests
- Local participation in the development of management objectives for Forest Management Plans and provisions for decentralized monitoring of performance in the implementation of Forest Management Plans, including surveillance to control illegal cutting and bush fires
- Elaboration of guidelines and provision for transparent utilization and more equitable sharing of revenues related to the harvesting, use and sale of forest products
- Leveraging of policy and institutional changes to facilitate the market access of charcoal produced from community managed forests, so as to enhance the prospects for earning sufficient income to provide significant incentives to invest in sustainable use and improved management of the forest.

Wula Nafaa also helped to curtail the cutting of mangroves and promote new methods of raising and harvesting oysters on strings or “garlands” in the roots of mangroves.<sup>81</sup> These more sustainable and productive methods enabled the local groups to double their annual income, from 6 to 11 million fCFA.<sup>82</sup> Along the Casamance River, fishing had been disorganized and uncontrolled. In an area of 36 hectares near Boudhie-Balantacounda, Wula Nafaa worked with local communities to facilitate the adoption of a

<sup>81</sup> The garland technique was introduced to the Sine-Saloum delta in the 1990’s by JICA technical assistance.

<sup>82</sup> USAID/Senegal. Success story – Oyster farming ups rural incomes p 16

local convention that served to reduce the destructive fishing practices and to reinforce local monitoring and use of improved fishing practices, including the use proper net size and gear. As a result of the adoption of improved practices and locally enforceable rules, the communities noted a return of bigger fish and shrimp in greater quantities. From 2009 to 2010, local production of shrimp increased from 95,000 kg valued at 169 million fCFA to 374,000 kg valued at 300 million fCFA.<sup>83</sup>

The negotiation, adoption and local enforcement of a Local Convention also helped to govern the use of palm groves in Bamably in the Sedhiou region. The convention provides for both increased local protection of the palms from abusive cutting, and increased monitoring to promote improved pruning and nut harvesting practices to ensure a steady supply of raw materials used for making brooms, palm oil and other products that contribute to local incomes.<sup>84</sup>

The project has provided a wide range of assistance, and achievements can be linked to each form of assistance. For example, Wula Nafaa helped to facilitate increased access to commercially available credit, particularly among charcoal producer groups, which has allowed them to increase their investment in their businesses and scale up production and increase sales. Wula Nafaa has helped with authorizations needed to obtain “FRA codes” of the Ministry of Commerce that are required to expand the operations of enterprises in processing, packaging and export sales of products. And the project has also provided assistance public procurement and budgeting procedures for Rural Communities to improve local governance, as well as assistance in ensuring the transparent use of revenues from forest funds to motivate more effective surveillance of managed forests by forest rangers.<sup>85</sup>

The project has also intervened to provide access to potable water and sanitation by working with local communities and government technical services to build latrines, water towers and cisterns, and to drill wells and equip them with manual and solar powered pumps. The improved wells and increased access to clean water have directly benefitted women and contributed to improved hygiene and health.<sup>86</sup>

A key form of assistance provided by Wula Nafaa has been the provision of information, and the organization of exchange visits. A group of individuals from the Rural Community of Dindefelo was able to visit another Senegalese community that had set up a community reserve and developed an ecotourism initiative – and this visit in combination with the organization of community meetings and other facilitation by Wula Nafaa spurred the community of Dindefelo to establish a 13,000 ha reserve with a management plan. It should be noted that the Jane Goodall Institute also played and continues to play a key role in research and community advocacy for the reserve. The partnership between Wula Nafaa and the Jane Goodall Institute was a critical enabling factor for this initiative. The Reserve is directly contributing to the conservation of critical habitat for chimpanzees and helping to safeguard their populations, while also boosting local incomes through community led ecotourism ventures. Previously, the government approach to conserving wildlife in the region was to remove communities that had encroached upon the Niokolo Koba national park.

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<sup>83</sup> USAID/Senegal, Success story – Fisheries: an economic lifeline. P. 19

<sup>84</sup> USAID/Senegal, Success story- Thon saves the palm grove. P. 25

<sup>85</sup> For more information related to governance and benefit distribution, see companion report on “Power”.

<sup>86</sup> USAID/Senegal Success stories – new well promotes health in the villages. p. 27.

### Yield increases from infrastructure investments and conservation farming

The project also provided support for infrastructure development that local communities were unable to finance on their own, which contributed to higher crop yields and increased local incomes. For example, in Boly, Wula Nafaa helped to build dikes and assisted in providing mechanized plowing services and seed to enable farmers to expand the area of rice cultivation from 5 to 150 hectares. In Samecouta, rice yields were increased to 3 or 4 tons / ha through technical, financial and organizational assistance from Wula Nafaa.

During the second phase of Wula Nafaa, as interest grew in sustainable agricultural intensification, capitalizing on the potential benefits from scaling up “climate smart agriculture” and promotion of the techniques associated with “reduced-tillage” or “conservation farming” (CF), the project began working with farmers in 2009 to explore the application of CF principles and practices developed in other regions. Unlike conventional farming, which results in considerable disturbance of the soil through annual plowing of the entire field, and which generally leaves the soil bare and exposed to wind and water erosion after the harvest, CF promotes minimal or no tillage, and increased protection of the soil by leaving crop residues in place or planting of a cover crop. Over time, conventional farming practices deplete the soil of organic matter and nutrients, while CF helps to replenish soil organic matter and increases the efficiency of use of added mineral and organic nutrients.

By 2011, the area under conservation farming had increased to 4,827 ha, involving 4360 farmers,<sup>87</sup> and by 2012, the area under CF had expanded to 7,164 ha with 5,229 farmers.<sup>88</sup> In Senegal, the prescribed practices include cultivating only the rows where crops are planted (spaced 80 cm apart) and preparation of planting pits at 40 cm intervals along the line. Compost and 12 grams of fertilizer are applied to each seedbed, and an additional cover of mulch and 12 grams of urea are added 45 days later. In 2010, when rains were relatively good, average cereal yields were 2286 kg/ha; however, in 2011 when rains were poor, average yields in conventionally farmed fields were reduced by 400 kg, to 1886 kg/ha. In that same year, however, and despite the poorer rains in 2011, in fields where farmers had adopted CF, yields averaged 2634 kg/ha, an increase of 348 kgs from the average yields in 2010 in untreated fields. In Kaolack, farmers practicing CF benefitted from yield increases of 49-71% in 2011.<sup>89</sup>

Across the Sahel, in addition to conservation farming, considerable impacts on crop yields have been achieved through farmer innovation and extension of improved practices related to rainwater harvesting including zai or tassa, stone lines, half-moons, contour ridging. Farmer managed natural regeneration (FMNR or *régénération naturelle assistée* - RNA) and systematic protection and regeneration of *Faidherbia albida* and other economically valuable farm trees, nitrogen fixing legumes and agroforestry species in farm fields have also helped to replenish soil organic matter, slow rainfall runoff, increase infiltration and restore soil fertility while providing a range of other products such as fodder, firewood, edible fruits and leaves, fibers and medicines. Other organizations such as World

<sup>87</sup> USAID/Senegal Wula Nafaa Program – Annual Report Oct 2010 – Sept 2011. p. 1.

<sup>88</sup> USAID/Senegal Wula Nafaa Program – Annual Report Oct 2011 – Sept 2012. p. 1.

<sup>89</sup> USAID/Senegal – Success Story, CF: Yields defy the climate. P. 6.

Vision are having success in supporting the spread of FMNR and increased density of *Faidherbia* in farm fields.

### Summary of key activities aimed at improved NRM

Taking account of conversations with key informants, the documentation reviewed for this report and the author's experience, it seems that some of the key activities supported by Wula Nafaa to improve the management of natural resources in the landscapes targeted by Wula Nafaa were often low-cost, closely tied to issues of power and governance and dependent on successful facilitation of community participation and local empowerment. This included:

- *Convening of key stakeholders* in local communities (local leadership, authorities, resource user groups, women) to facilitate transfer of information, discussion and deliberation, with a view towards addressing non-sustainable resource use, managing conflicts, and taking advantage of opportunities to increase incomes and local benefits through improved management
- *Improved information dissemination* at the local level of detailed information, made available in local languages and conveyed to largely illiterate stakeholders, about the provisions of codes, laws, regulations, to ensure a shared understanding of legal frameworks and provisions for good governance (although there is need for much additional effort in this regard, particularly among illiterate and uneducated women who were included in project activities, in order to attenuate further the power of central authorities, technical services and local elites)
- Concerted and continuing efforts to provide *training* and to develop the capacity of local institutions (with community based organizations and rural enterprises and at the level of Rural Communities or local government) with particular attention to the most vulnerable stakeholders (illiterate and uneducated)
- *Engagement and empowerment of local communities* through a *progressive process* of land use planning, development of locally enforceable rules, demarcation of managed areas, agreement on management objectives and planning for more effective protection, regeneration and sustainable harvesting of resources and transparent administration of locally managed permits, revenues, surveillance and management activities, with due regard to ensuring full ownership of the process by local stakeholders
- The demarcation of managed areas was reinforced by support for placement of *boundary markers*, and the enforcement of *locally agreed upon rules* governing the protection and use of natural resources was reinforced by the organization of *local surveillance committees* and local recruitment of guards financed by locally managed revenues
- Community based forest management and the local collection of revenues was reinforced by *locally negotiated MOU's* between producer groups and local authorities governing charcoal production and locally organized processes to review and approve requests for harvesting of forest products (previously the sole prerogative of the Forest Service); instead of being sent to the central treasury, collected taxes associated with the harvesting of forest products were managed locally and used to carry out activities agreed upon in annual work plans for forest management operations

- Establishment of *demonstration plots* and dissemination of information about practices to increase crop yields through improved practices that capitalized on opportunities to improve rainwater harvesting and management of soil fertility as well as increased tree cover in agricultural landscapes

Prior to Wula Nafaa, the more common approaches and interventions for NRM projects were related to funding the operations of nurseries and roadside or block tree plantations, the preparations of land use plans and management plans by technical services, the organization of detailed natural resource inventories, the strengthening of central government and technical services, and the provision of equipment and allowances for guards employed by the Forest Service and Park Service. Many centrally adopted laws and regulations were not enforced, and many management plans were not implemented beyond the life of a given project because of a short of funds, staff, institutional and community support.

Although, as noted in the following section, there is relatively little evidence of the impact of Wula Nafaa on the condition of natural resources, the experience of the past decade seems to demonstrate that rural communities can be mobilized to change behaviors and will actively pursue a pathway of more sustainable use and improved management of forests, fisheries and other natural resources upon which they depend for their livelihoods and well-being when their rights are clarified and when they recognize how they stand to benefit from improved management.

## Challenges and Lessons Learned

### Forest management planning

In principle, biodiversity can be conserved by slowing the rate of deforestation, and ensuring that more areas of remaining forests and woodlands are not converted to agricultural land use. And to gain community support for maintaining forests as forests, communities need to have the rights and be empowered and enabled to benefit from a significant flow of economic as well as ecosystem benefits from these forests. And, in keeping with current policies and regulations in Senegal, a forest management plan must be prepared and approved before communities can benefit from an increased flow of economic benefits.

As noted in the companion report on Power and in this report, a number of issues and problems have emerged over the past decade with forest management planning as currently practiced – to the point where some would question the need for such a plan. There is evidence that there is minimal impact from preparing and approving a forest management plan on forest structure, biodiversity and productivity.<sup>90</sup> Furthermore, this is a risk that the requirements for forest management plans are used to counter the stated goals of devolution, empowerment and transfer of authority in the interest of

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<sup>90</sup> Wurster, 2010.

decentralized, community based management.<sup>91</sup> And most importantly, if local communities and other resources cannot be mobilized and funding sustained to implement critical elements of a management plan, then it clearly serves no purpose and cannot be expected to have an impact on forest conditions, productivity and flows of economic benefits and ecosystem services.

With a co-management plan for classified forests and a FMP for community forests, there were opportunities to increase the economic benefits that accrued to local communities, from increased and direct participation in charcoal production and other activities; without a plan approved by the Forest Service, there would not be sufficient manpower and other resources available to the Forest Service to adequately protect and manage classified forests, nor sufficient economic incentives and land use controls to prevent the conversion of community forest and pasture lands to cropland, with an attendant loss of biodiversity and ecosystem services.

A reasonable course of action could be to devolve rights (and not just transfer obligations) to local communities and decentralized, community based management bodies, and to provide support to these entities to meet agreed upon performance standards for improved management. Management plans and other elements needed for improved management could be developed with the assistance of service providers (CSO, NGO, private sector). The Forest Service would shift from a role of command and control, to oversight of the transfer and devolution of resource rights, with more emphasis given to strengthening decentralized resource management bodies. As rights are devolved and standards agreed upon, local entities would then be enabled, responsible and accountable for establishing rules and practices for improved natural resource management, rule enforcement and implementation of planned activities, including equitable benefit sharing and monitoring of resource conditions.

### **Long term sustainable financing of NRM interventions**

Wula Nafaa aimed to establish models and approaches for improved NRM that would not be dependent on long term external financing and which were cost-effective and could be sustained. A key element for sustainable financing of NRM is price differentiation of products from managed vs. unmanaged areas. The added margin from higher prices could in theory serve to offset the higher costs of improved management. Higher prices in the marketplace depend on branding and labeling, quality control, and other measures to encourage consumers to pay higher prices for these products. However, Wula Nafaa encountered difficulties in securing higher prices for targeted products; buyers of natural products were often reluctant to pay a price premium for “natural” products originating from managed areas.<sup>92</sup>

At the same time, sustainable financing for NRM can be facilitated through fiscal policies that reduce or eliminate taxes, fees, transport permits and other costs imposed on natural products, when these products originate from managed areas. In time, the combination of higher prices from consumers and reduced taxes by the government could help to create a sufficient and sustainable flow of resources to invest in measures that would increase the productivity of the managed resource, and further

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<sup>91</sup> J. Ribot, 2009. Authority over Forests: Empowerment and Subordination in Senegal’s Democratic Decentralization. *Development and Change*, 40, 105-129. J. Ribot, 2004. Waiting for Democracy: the politics of choice in natural resource decentralization. World Resources Institute, Washington, D.C. p. 56.

<sup>92</sup> Pers. comm., Brook Johnson.

contribute to the long term sustainability of financing management operations. As part of the exit strategy of Wula Nafaa, it may be useful to delve more deeply into what measures are needed in this regard.

### **Monitoring of changes in forest cover and resource condition**

As noted by the series of land use / land cover studies carried out by USGS and CSE, there are worrisome trends in resource changes that need to be monitored and addressed, and tools and techniques to assess these changes. An importance premise of Wula Nafaa was that the biggest threat to biodiversity was deforestation driven by the conversion of natural forests to agricultural land. Accordingly, the project has worked to slow deforestation by increasing the value of standing forests for local communities and to reduce the degradation of cropland through conservation farming, and to a lesser extent, through the promotion of FMNR.

The design and implementation of the first phase of Wula Nafaa was aimed at identifying the remaining areas of relatively productive and “high potential” natural forests, and leveraging increased community support for their improved protection and management through co-management of state forests and devolution of authority for community based management of unclassified forests. The project worked to reach agreements on land use (PAOS), including the designation of community forests and nature reserves, and on rules governing access and use (local conventions). A critical next step was the preparation of forest management plans, as an approved management plan was required before the national forest service would allow economic benefits to flow to local communities. Given the emphasis of USAID in demonstrating progress in bringing large areas of land under “improved management” through the signature of local conventions, on completing the lengthy process of preparing forest management plans, along with increasing the revenues of community based enterprises making use of natural products and engaged in charcoal production and marketing, less attention was given to demonstrating to what extent biodiversity was actually conserved in managed forests, or to what extent the increased level of production and flow of revenues was based on sustained yield management and increased productivity of the forest resources.

While the Wula Nafaa project reports describe activities organized to improve management, and provide data on the area covered by conventions and plans, much less information was generated from monitoring and reporting of changes in forest cover, composition, volumes and growth rates with details about changes in species and forest conditions and trends. Training and technical support was provided for initial forest inventories needed to prepare forest management plans, but time-series data is not being systematically collected to assess the impact of harvesting regimes and changes in forest condition.<sup>93</sup> And although the costs of monitoring changes in natural resource condition may seem to be unwarranted or “unsustainable”, more attention could have been given to encouraging relatively low-cost, participatory monitoring of changes in resource conditions, to inform adaptive management.

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<sup>93</sup> The reasons cited for this by key informants included the added costs, and that such information was not required or did not seem to be necessary; “success” was being measured in other ways – including completion of activities (e.g. approval of conventions, preparation of management plans) and by providing evidence of impacts on people (data on increased incomes, improved well-being, crop yields, volume of marketed products).

In principle, local communities now have greater incentives to invest in increasing the productivity of locally managed resources, although there is little information available about the extent of changes at the landscape level in the condition and productivity of natural resources like gum mbep, baobab, maad and other tree and forest resources, as well as croplands, pastures, fisheries and wildlife – within the landscapes targeted by Wula Nafaa and in adjacent areas that did not benefit from Wula Nafaa. As noted above, research investigating the effect of forest management and charcoal production on forests in Senegal indicated that production did contribute to differences in forest structure and tree species composition, and the effects of charcoal production were similar in managed and unmanaged forests.<sup>94</sup> However, this may be essentially due to the ineffective application of management activities in the areas reportedly covered by management plans.

Although Wula Nafaa has not produced landscape level assessments of changes in forest and tree cover, soil fertility or other measures of changes in the conditions of the natural resource base, the indications from specific research such as that reported by Herrman and Tappan suggest that “greening” is not as widespread in Senegal as what has been observed in Niger, Burkina Faso and Mali for the reasons already noted. This appears to be largely a function of the relatively greater emphasis outside of Senegal on activities that directly contribute to scaling up FMNR and related practices – including working with farmer innovators at the grass roots, systematically identifying and promoting needed policy, legal and institution reforms, expanded outreach and communication and investing in addressing knowledge gaps.<sup>95</sup> However, recent efforts by World Vision, IED Afrique, GREP and other partners of the African Regreening Initiative to promote FMNR in Senegal are promising.<sup>96</sup>

Senegal has benefitted from considerable investments in strengthening national institutions, such as CSE, ISRA and the Ministry of Environment. Yet, it is not clear to what extent these institutions are working to assess changes and make good use of information about the condition and trends of natural woodlands and agroforestry parklands, and the changing density, dynamics and contribution of trees on farms to soil fertility, agricultural production, food security and water supplies. What are the long term prospects for maintaining or increasing the production of baobab fruit, mbep gum, maad, vene hardwood, bamboo, and other “natural “products? While the recent focus of community based forest management and other NRM activities on developing the opportunities to increase the revenue of local government and the income of rural households is understandable and has merit, it is also important to ensure that rural communities are equipped and encouraged to give consideration to other important aspects of sustainable use and resource productivity, such as protection against over-exploitation, provision for regeneration and other measures needed to counter ecosystem degradation, contribute to restoration and monitor changes in resource conditions.

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<sup>94</sup> See Karl Wurster, 2010. Effects of Charcoal Production Management on Woodland Regeneration in Senegal.

<sup>95</sup> See Chris Reij, Building on Successes in Re-greening in the West African Sahel. June 2012. IFPRI Focus 19, Brief 6 – Scaling up in Agriculture, Rural Development and Nutrition.

<sup>96</sup> See <http://africa-regreening.blogspot.com/>

## Shifting Government priorities and approaches

In reviewing the experience and lessons learned from USAID/Senegal's investments in E/NR projects, it does appear that many of the achievements have occurred despite the focus of the central administration of the Government of Senegal on other priorities and approaches. For decades, the priority of the Forest Service and Ministry of Environment has been to support reforestation and government managed and directed forest management, including costly and donor-dependent approaches to fire control, forest inventory and forest management planning. The Ministry of Environment has been especially keen to maintain its control over significant revenue flows linked to charcoal production, hunting and exploitation of other timber, NTFPs and forest products. Similarly, the priority of the Ministry of Agriculture and agricultural development programs has been on research, extension and investment focused on modernization and mechanization, increased use of inputs, value chain strengthening and investment in infrastructure.<sup>97</sup> The priority of the Parks Department in the Ministry of Environment has been to improve biodiversity conservation by encouraging private public partnerships to develop and manage tourism infrastructure in the national parks and to reinforce protected area poaching control activities by equipping guards.

The priorities of the Ministries and departments dealing with governance and decentralization were largely focused on provisions for elections and "deconcentration" rather than true devolution of authority and empowerment of producer groups engaged in managing natural resources. The ministries and services dealing with enterprise development and the expansion of trade were largely focused on expansion of production and exports, with little regard to sustainable use and improved management of natural resources. And the ministries and national programs aimed at poverty reduction were not focused on addressing the root causes of insecure access to natural resources and inequities in benefit distribution associated with the charcoal production, state controlled game hunting, and the regulatory framework of taxes and permits that encouraged rent-seeking, corruption and reduced the income of the rural poor engaged in harvesting and marketing natural products. Since the publication of NWP in 2002, while Wula Nafaa helped to draw attention to the utility of the NWP framework in Senegal, NWP is far from being mainstreamed into development strategies and programs in Senegal.

In considering the organization and priorities of the national government of Senegal, it becomes clear that an integrated approach that is designed to address the root causes of poverty and ecosystem degradation is liable to run against the grain of most central government policies and programs. To some extent, this helps to explain some of the shortcomings of Wula Nafaa and earlier projects in achieving greater progress with sustainable use of grazing lands, and improved conservation and management of wildlife and game hunting. It also may help to explain why Senegal has been slow to capitalize on the potential benefits of scaling up agroforestry and "climate smart agriculture". To improve progress, a variety of measures can be and are being taken to promote farmer managed natural regeneration (FMNR) and other agroforestry practices, for example. These include increasing support for farmer to farmer visits to highlight the positive experiences of farmer innovators and the benefits of FMNR. Additional support could be given for well-informed dialogues about measures that could be taken to address key barriers to scaling up FMNR. Engagement of the media as well as political elites in

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<sup>97</sup> See TR&D, Senegal Agriculture Sector Retrospective Study, 1996.

the dialogue with farmers and field practitioners is particularly important. Using these approaches, it is now estimated that 5,000 to 10,000 ha of cropland are being restored each year through the application of FMNR.<sup>98</sup>

### **Learning from experiences in Namibia and Madagascar**

In comparing the experience in Senegal to other countries such as Namibia and Madagascar, a few differences become apparent. In Namibia, a critical factor in the success of the Conservancy program was the elaboration and adoption of game-changing policies and regulations that clearly devolved rights to benefit from wildlife to local communities organized into Conservancies. While numerous policy and regulatory reforms were identified and pursued in Senegal with support from Wula Nafaa and others, many changes were relatively minor, incremental and slow to be enforced and applied. For example, reforms aimed at breaking the monopoly of the charcoal cartel have been underway for more than a decade, and the Forest Service still retains significant control over the approval process for forest management plans and has resisted a shift towards performance standards in lieu of detailed technical prescriptions for management plans.

Another key difference was with respect to the investment in partnerships. In Madagascar, the Mission encouraged integration of development activities at the regional level through functional partnerships and collaboration between projects focused on health, rural roads, agriculture as well as NRM and conservation. In Namibia, the Namibia Association of CBNRM Support Organizations (NACSO) played a critical role in advocating for government support to Conservancies, and in providing needed technical assistance and other support in multiple domains such as enterprise development, resource management, training and institution strengthening. Collectively, the organizations involved in the NACSO partnership provided an important suite of tools and complementary assistance. In Senegal, after the end of project funding for Wula Nafaa facilitators and technical experts, apart from the continued engagement of interested private sector operators and government technical services, it is not clear what collaborative arrangements or partnerships are in place to carry forward with the full range of needed support.

In Namibia, over the course of multiple projects implemented in partnership and with the strong, continuing leadership of WWF, there was a continuity of goals and program focus that contributed to the longer term successful development of the national CBNRM or Conservancy program. In Senegal, despite some continuity in the two phases of Wula Nafaa, over the past 20-30 years, project objectives and approaches have shifted considerably in response to changing priorities and emphasis of USAID/Senegal and project management teams. For example, the Wula Nafaa project moved well beyond the focus of the first phase on strengthening natural resource based enterprises for selected NR and non-traditional agriculture value chains like mbep gum and fonio and improving the governance and management of targeted rural landscapes -- to provide additional assistance in the second phase related to fisheries, mangrove management, conservation farming, water supply and sanitation, agricultural infrastructure development, horticulture, assistance for rice, millet/sorghum and maize value chains,

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<sup>98</sup> See Les Cahiers du Grep, no. 7, Mai 2013, p. 10 and Pers Comm. Tony Rinaudo, World Vision. See also Africa Regreening Initiative Blog by Chris Reij, May 3, 2013. <http://africa-regreening.blogspot.com/>

chimpanzee conservation, rural radio and communication, administration and budgeting and other areas.<sup>99</sup>

The feasibility of game ranching has been demonstrated in pilot efforts in Burkina Faso, and large scale transformations have occurred in Namibia and other areas in Southern Africa through the work of the Conservancy program and assistance with community-based wildlife management. The success of Namibia's Conservancy program could be replicated in Senegal, if Senegal would adopt the necessary enabling legislation to devolve rights to benefit from wildlife to local communities, and move away from an approach which mainly benefits the hunters, private operators and government technical services, without providing significant local benefits or incentives for local communities to participate in wildlife management.

### **Reflections on USAID/Senegal's E/NR portfolio**

In looking back over the succession of USAID-funded E/NR projects in Senegal, a number of observations come to mind. With respect to firewood and charcoal, despite the concerns raised in the 1970's and 1980's, and which continue to resurface, the demand for fuelwood is most likely a less important driver of deforestation and land degradation than non-sustainable agricultural practices and continued conversion of forests to cropland. Furthermore, it is unlikely to be solved by investment in massive tree-planting programs or government-managed fuelwood plantations. Experience from many countries indicates that fuelwood shortages and price spikes along with the negative impacts of non-sustainable harvesting of fuelwood can best be avoided by addressing governance issues in the fuelwood sector. Investing less in nurseries and in state-managed fuelwood plantations, and more in agroforestry and community based forest management seems to be paying off. In Senegal, it was particularly important to leverage policy changes to break the monopoly and political influence of the charcoal cartel, and to facilitate the increased role of Rural Communities and local producer groups in the managed production and marketing of charcoal. In the case of Niger, fuelwood shortages have been eliminated largely through the increased density of trees in farmfields, following a series of interventions and changes in circumstances which contributed to the widespread adoption of agroforestry practices like "farmer-managed natural regeneration".<sup>100</sup> It is also helpful to provide assistance for more efficient charcoal production and efficient use of fuelwood by the dissemination of improved woodstoves.<sup>101</sup>

### **Attention to the role of trees and forests in sustainable landscape management**

Project support for reforestation can be useful for a demonstration effect, and in the case of food for work or cash payments, as a temporary relief and recovery activity. However, over the medium and longer term, a reasonable density and distribution of trees in agricultural landscapes and natural forest cover can be maintained when the importance of trees and forests are explicitly addressed in mainstream agriculture and rural development programs. The key policy and institutional factors that have contributed to the loss of trees on farms and in rural landscapes need to be identified and interventions supported to support the development of agroforestry, community forestry and tree-

<sup>99</sup> See USAID Wula Nafaa – NRM Program. Annual Report Oct 2009 – Sept 2010.

<sup>100</sup> See World Resources 2008 Roots of Resilience - Growing the Wealth of the Poor. WRI, Washington, D.C. 2008, and more recent publications by Chris Reij et al.

<sup>101</sup> See PAGERNA, Capitalisation des Acquis. July 2003.

based enterprises. These interventions include increased security of land tenure, clarification of resource rights including the rights to manage and harvest trees without undue interference from government regulations and permitting procedures, as well as facilitation of access to information, credit and markets. Increased recognition of the role of trees in increasing and diversifying household income, renewing soil fertility, boosting crop production and ensuring food security, protecting water supplies, and in adaptation and resilience is also important.

Project support for CBNRM as organized in Senegal is a useful but not sufficient intervention to trigger sustained, transformative change at the landscape level. A broader and more comprehensive effort is needed, including support for integrated landscape approaches that address sustainable land use, linkages between production systems and the management of inter-related ecosystem services as well as potentials for enterprise development and attention to governance and institutional issues at multiple levels. Among the root causes of ecosystem degradation and rural poverty that need to be addressed are the distortions induced by policies and institutional practices that contribute to non-sustainable land use and inequitable distribution of benefits from natural resource exploitation.

#### **Attention to wildlife, livestock and rangeland management**

While there has been progress recently in improving the management of capture fisheries and in increasing the productivity and economic benefits for rural communities engaged in fisheries-based enterprises, the succession of E/NR projects supported by USAID/Senegal, including Wula Nafaa, appear to have missed an opportunity to have a significant impact on wildlife conservation and hunting. While there were efforts to increase community benefits from tourism, the project was not able to achieve a breakthrough in revenue sharing agreements for the NKNP or to fundamentally alter the hunting concession model (functioning of *zones amodiées*). The major protected areas like the Niokolo Koba National Park have had limited success in conserving biodiversity, although there has been progress with local conservation efforts centered on community reserves.

Although livestock production and the use of grasslands and woodlands by livestock are economically and environmentally very important in the landscapes targeted by USAID and the Wula Nafaa project, little progress has been made in transitioning to improved pasture management systems. Experience in Burkina Faso and Niger revealed that the value of fodder production and other non-timber forest products could be equivalent or greater than the value of wood production from managed natural forests. However, for many years, government led forest management efforts in Senegal were focused on even-aged management of woody formations for charcoal production. As communities were given more authority in setting forest management objectives, more attention was given to management of fodder and other products and provisions for pasture reserves. However, the needs and opportunities for improving the management and increasing the productivity of most of Senegal's grazing lands have not yet been effectively addressed.

#### **Attention to climate change and resilience**

USAID/Senegal made a laudable effort to integrate NRM into agricultural production systems through the research and activities supported by the NRBAR project; however, it is not clear to what extent the research led to widespread changes in behavior and the adoption of practices which contributed to

more sustainable and resilient agricultural production. Although it was not sustained or scaled up, the KAED project demonstrated the promise of intensifying and diversifying rural production systems and agriculture based enterprise development through the mobilization and facilitation of women's groups and CBO's to adopt NRM and improved production and enterprise development practices. The project did provide important lessons learned which proved valuable for Wula Nafaa. These included a recognition of the potential of women's groups, and the importance of literacy training in CBO strengthening and success with NR-based enterprise development. And KAED also illustrated the potential benefits from intensification and diversification of rural production systems, through the integration of NRM into agriculture and the development of AG/NR-based enterprises.

More recently, Wula Nafaa has demonstrated the beneficial impacts of increased efforts to scale up the adoption of conservation farming and other practices that directly contribute to restoring soil organic matter, improved soil fertility management, erosion control and rainwater harvesting.<sup>102</sup> These interventions are particularly important and relevant as our knowledge increases about the impact of climate change and its impact on food security and vulnerability. Temperatures are warming, precipitation regimes are shifting, and extreme weather events are more common in Senegal as in many other countries, and these changes are setting the stage for more hunger and deepening poverty, unless interventions are supported to reduce and counteract the "resilience deficit".<sup>103</sup> As documented by the Wula Nafaa team, numerous farmers assisted by Wula Nafaa to adopt conservation farming have benefitted from crop increases despite rainfall fluctuations.<sup>104</sup> At this point, it would be useful to probe more deeply into what can be done to improve the policy environment and enabling conditions to trigger the large scale adoption of CF, FMNR and related improved practices.

Senegal provides a clear example of the extent to which a failure to address NWP issues in an integrated and comprehensive manner will slow progress in addressing chronic and structurally rooted rural poverty and vulnerability, inequitable benefit sharing and continued disenfranchisement of the rural poor, and associated non-sustainable use of natural resources and ecosystem degradation. And it also provides an example of the many successes that can and have been achieved by simultaneously addressing the needs and opportunities to intervene with respect to improved governance, enterprise development and natural resource management.

## Conclusions and Recommendations

### Overview of the achievements and outcomes of USAID's investments

Beginning in the 1970's, USAID began to invest in Senegal and across the Sahel to address desertification, the effects of recurrent droughts and to stimulate economic development while restoring the environment. Projects and programs have been supported over the past few decades to address a wide range of problems, and we can look back on the contributions of institutions such as CSE

<sup>102</sup> USAID/Wula Nafaa, Formation Technique et Appui en Agriculture de Conservation. Jan. 2010.

<sup>103</sup> See Tom Catterson et al. USAID Wula Nafaa Programmatic Environmental Assessment (PEA), October 2010.

<sup>104</sup> See online videos and Technical Notes on Conservation Farming, the Wula Nafaa Evaluation a mi-parcours du conservation farming champagne 2009-2010, and quarterly and annual progress reports.

to our improved understanding of environmental changes. Some mistakes have been recognized and corrected, and we are no longer investing heavily in fuelwood plantations, woodlots and roadside tree planting. We are still confronted with challenges in relation to deforestation, environmental degradation, food security, and some new issues have emerged such as resilience in the face of climate change. Visions of slowing desertification through reforestation and the establishment of “greenbelts” have shifted to include measures aimed at scaling up sustainable landscape management, FMNR and climate smart agriculture.

The overall evolution of E/NR investments seems to be quite positive, aided by periodic stocktaking assessments and the capitalization of lessons learned through such reports as the Opportunities for Sustainable Development study, NWP and ITF. In the past decade, assessments have underscored both the value and contribution of “environmental income”, and continued pressures on the resource base. Although more progress is needed, there are indicators, however, that the rural poor are securing a greater share of environmental income and are having a greater voice in land use planning and decentralized NRM, which should in time contribute to slowing degradation and boosting the productivity of natural resources.

Wula Nafaa has become an increasingly ambitious program. It was designed and launched as a project to slow deforestation and reduce rural poverty by developing natural resource based and non-traditional agriculture based small enterprises. In the first phase, it assessed progress in terms of increasing local incomes, improving environmental governance and increasing the role of local communities in managing forests. As the program continued and evolved, more attention was given to boosting agricultural production through conservation farming and to conserving biodiversity through the establishment of community reserves and promotion of ecotourism. The project also included some activities aimed at improving rural water supplies. Relatively modest efforts were also aimed at identifying needed policy reforms and to developing a framework for monitoring and evaluating the impact of the program.

Looking back on what has been achieved, while also looking forward and considering what remains to be done, it seems that many of the strategic orientations from the Segou encounter of 1989 and the Koudougou stocking workshop of 1999 (outlined above) are still relevant. This includes:

- Investing in the restoration of natural resources, the natural capital that is the “wealth of the poor”, through a rights-based, decentralized approach to NRM
- Increasing the attention given to the integration of women in NRM
- Emphasizing training and the provision of information to key stakeholders empowered to improve the management of natural resources
- Mobilization of local resources (knowledge, manpower, finances) to intensify and diversify production systems in ways that increase the resilience of local communities
- Giving more attention to monitoring and evaluation

## Progress and impacts in relation to the NWP framework for Nature

As we reflect upon lessons learned in applying the NWP framework, it is useful to review the experience of Wula Nafaa and other USAID funded AG/NRM interventions in Senegal with respect to the main findings of NWP. The NWP principles and action recommendations for Nature were grouped in five areas:

- Improve information and knowledge management systems
- Promote local land use planning and appropriate resource tenure systems
- Foster social learning, innovation and adaptive management
- Build capacity and invest in human resources
- Promote cost-effective technical advisory and intermediary services

*Improve information and knowledge management systems, including improved data and information use, and development of monitoring and evaluation systems at all levels.* Improved knowledge management, particularly in terms of farmer to farmer exchanges and networking of producer groups certainly proved useful and played a key role in the achievements of Wula Nafaa. For example, exchange visits played a role in catalyzing community actions to engage in land use planning and to adopt local conventions and improved NRM practices. And Wula Nafaa tapped into the experience of the Conservation Farming Unit in Zambia to inform their interventions to support conservation farming in Senegal.<sup>105</sup>

Wula Nafaa and other projects also made considerable efforts to develop monitoring and evaluation systems, although these systems were primarily driven by the need to provide USAID with information on indicators related to project performance monitoring, and on a relatively short term basis (quarterly and annual reports). And while there were efforts made by USGS and others to support long term environmental monitoring and assessment of behavior changes, there are considerable gaps in documenting and understanding the impact of Wula Nafaa on biodiversity conservation, wildlife and fisheries, soil fertility, rates of deforestation, sustainable landscape level management, as well as overall food security and resilience to climate change. An analysis of DHS survey data, however, does indicate a positive impact on poverty reduction at the landscape level in targeted Rural Communities.<sup>106</sup>

*Promote local land use planning and appropriate resource tenure systems.* Similarly, the promotion of local land use planning was an important element in the approach of CBNRM and Wula Nafaa. Wula Nafaa went further than the CBNRM project by accompanying the land use planning (POAS) with the negotiation of local conventions that provided an opportunity for local communities to agree on sustainable uses that were permitted, and non-sustainable uses that would not be allowed. And through the elaboration and adoption of GAF guidelines, Wula Nafaa also worked to secure the rights of local producers to be engaged in harvesting and marketing charcoal and promoted the role of Rural Communities in assuming their role in the decentralization of oversight and management of charcoal harvesting.

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<sup>105</sup> Pers Comm. Brook Johnson

<sup>106</sup> See USAID/Senegal Retrospective study, Wealth component, May 2013.

*Foster social learning, innovation and adaptive management.* This was one of the areas that appears to have received less attention. This may be a result of focusing efforts on the provision of technical assistance and support through the project to local communities to achieve specified targets and outcomes proposed to USAID in annual work plans and quarterly reports (as noted above). USAID may want to consider how to reconcile its insistence on managing for results and being accountable to USAID mandated performance indicators and targets, with a recognition of the importance of fostering learning, innovation and adaptive management.

*Build capacity and invest in human resources.* Wula Nafaa and previous projects clearly invested in building capacity and developing human resources, including the training of facilitators, community and civil society leadership, private sector service providers and government technical services. This in turn set the stage for developing and promoting cost-effective technical advisory services which were critical for transferring knowledge, development of new approaches, facilitation and empowerment. The Africare KAED project along with Wula Nafaa also made notable progress by promoting participatory approaches that addressed gender issues, working directly with women and working through the strengthening of local user groups.

*Promote cost-effective technical advisory and intermediary services.* This is another area where Wula Nafaa achieved good progress by training and fielding community based facilitators, and by supporting farmer to farmer and group approaches. Wula Nafaa engaged with the private sector and encouraged partnerships and negotiated agreements between producer groups, processing services, buyers and retailers of natural products. Wula Nafaa also invested in developing the capacity of the Forest Service to provide technical advisory services for forest management planning, although it remains to be seen how effective this strategy will be in the long term with respect to actually conserving forests and improving their management.

## Recommendations

In consideration of the foregoing, we recommend the following:

*Continue integrated support for enhancing the contribution of forests and other natural resources to rural development using the NWP framework*

1. Consolidate the achievements and continue the most critical and cost-effective activities of Wula Nafaa discussed in this report by following through with an *integrated set of interventions* to ensure that the rural poor benefit to a greater extent from “environmental income” while improving the management of natural resources and environmental governance
2. Work to *streamline the approaches* used to support community based forest management, by dealing with the most essential tasks to empower rural producers as the primary stakeholders; invest more effort in achieving additional needed reforms of Forest Service policies and regulations instead of accommodating them; enable more effective local enforcement of rules against unauthorized timber harvesting, bushfires and grazing, and facilitate the preparation *and implementation* of simplified, *performance-based* management plans, along with transparent accounting and equitable benefit distribution

*Increase the attention given to agroforestry, livestock and wildlife management*

3. Take stock of what's needed to *accelerate the scaling up* of agroforestry (FMNR) and conservation farming, building upon the positive experiences of KAED, Wula Nafaa, Yaajeende and World Vision's Food and Livelihood Enhancement Initiative; re-assess the focus and intervention strategies of Feed the Future and give more priority to activities that contribute to climate resilient farming practices
4. Give more attention to management of *livestock* production, as well as *wildlife*, by applying lessons learned from Wula Nafaa's support to community based natural resource based enterprise development and forest and fisheries management ; address the role of livestock production (and associated browsing, lopping of branches and bush fires) in the continued degradation of forests and forest lands, and capitalize on the economic importance of pasture resources in forest management; expand support for community based management of wildlife and nature reserves and strategies to increase the level of community benefit from game hunting and ecotourism activities, with due attention to needed policy and institutional reforms

*Reinforce monitoring and evaluation*

5. Reinforce and expand activities to *monitor ecosystem health and natural resource conditions* and trends; strengthen participatory monitoring as a means to inform and guide improved management and decentralized NRM while also contributing to longer term monitoring efforts, and augment community based monitoring with periodic natural resource assessments and stocktaking exercises.
6. Identify and *track local innovations* in sustainable use and improved management of natural resources, and assess key interventions that contribute to the scaling up of particularly effective improved practices and sustainable production systems
7. Make use of remote sensing, local knowledge and other evidence to re-examine the major drivers of non-sustainable use and degradation of natural resources, and to *re-assess strategic interventions* to more effectively address key drivers and contribute to transformative, sustainable progress with the full suite of NWP indicators at the landscape level

*Strengthen partnerships and networks*

8. Include as a project objective and outcome the development of a *cadre of well-trained facilitators* who can be mobilized to support community-based organizations engaged in CBNRM and sustainable landscape management activities through national NGOs and the private sector
9. Continue to *invest in training*, capacity building and knowledge management, with particular attention to impact assessment, cost-economic analysis and increased attention to governance issues as well as monitoring the effectiveness of NRM practices and NWP interventions
10. Work with concerned Ministries, CSE, the Regional Councils and other partners to establish a *locally accessible clearing house for information* related to the experience and lessons learned from Wula Nafaa and prior USAID E/NR investments and related efforts using the NWP framework.

## **Annex A: Contacts for Key Informant Interviews**

Jon Anderson, NWP manager, Engility Corporation

Tom Catterson, team leader, USAID/Senegal, Programmatic Environmental Assessment

Philip DeCosse, Food Security specialist, Engility Corporation

Sarah Durso, Wula Nafaa project manager, IRG and NCBA/CLUSA

John Heermans, former Chief of Party, Wula Nafaa

Brook Johnson, former CLUSA representative and manager of Community Benefits, Wula Nafaa

Oumou Ly, USAID/Senegal

Mike McGahuey, USAID, Bureau for Economic Growth, Education and Environment

Ceece Polansky, Independent consultant

Jeff Povolny, Chief of Party, Wula Nafaa

Tim Resch, USAID, Africa Bureau

Abdou Sene, Deputy Chief of Party, Wula Nafaa

Gray Tappan, U.S. Geological Survey

### **Senegal Retrospective Study Team**

Team leader / coordinators: Matt Edwardsen, Erik Vickstrom, Lindsay Dozoretz, USFS

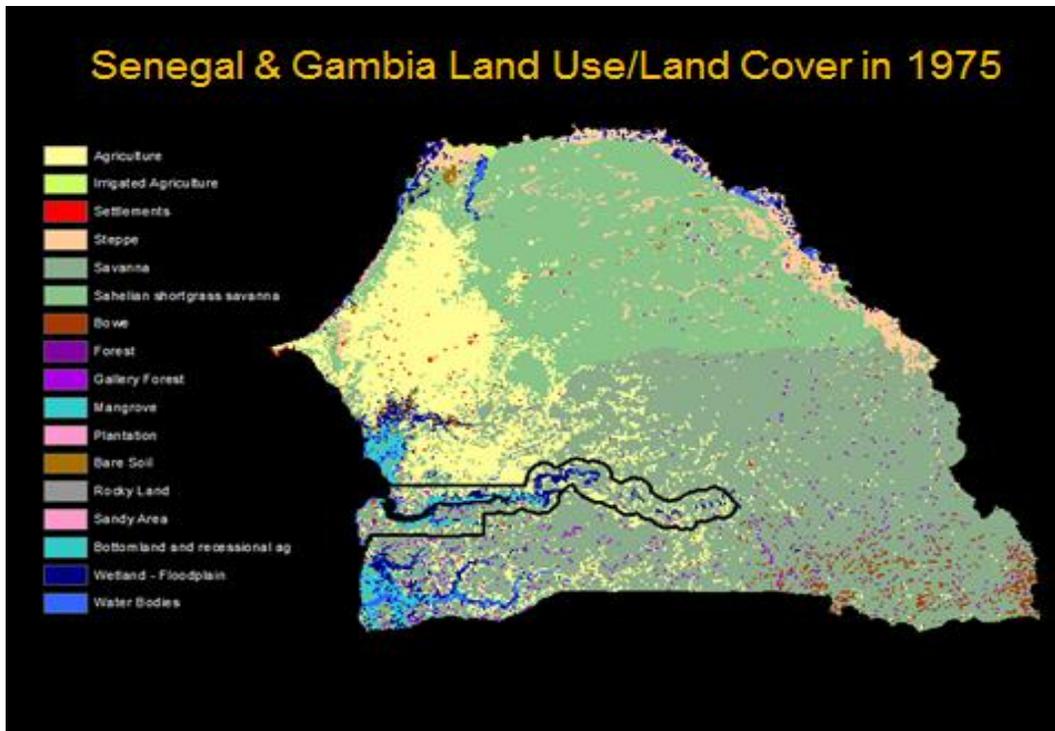
Nature: Bob Winterbottom, Erin Gary, WRI

Wealth: Bechir Rassas, consultant

Power: Anne-Gaelle Javelle, Jesse Ribot, Peter Veit, WRI

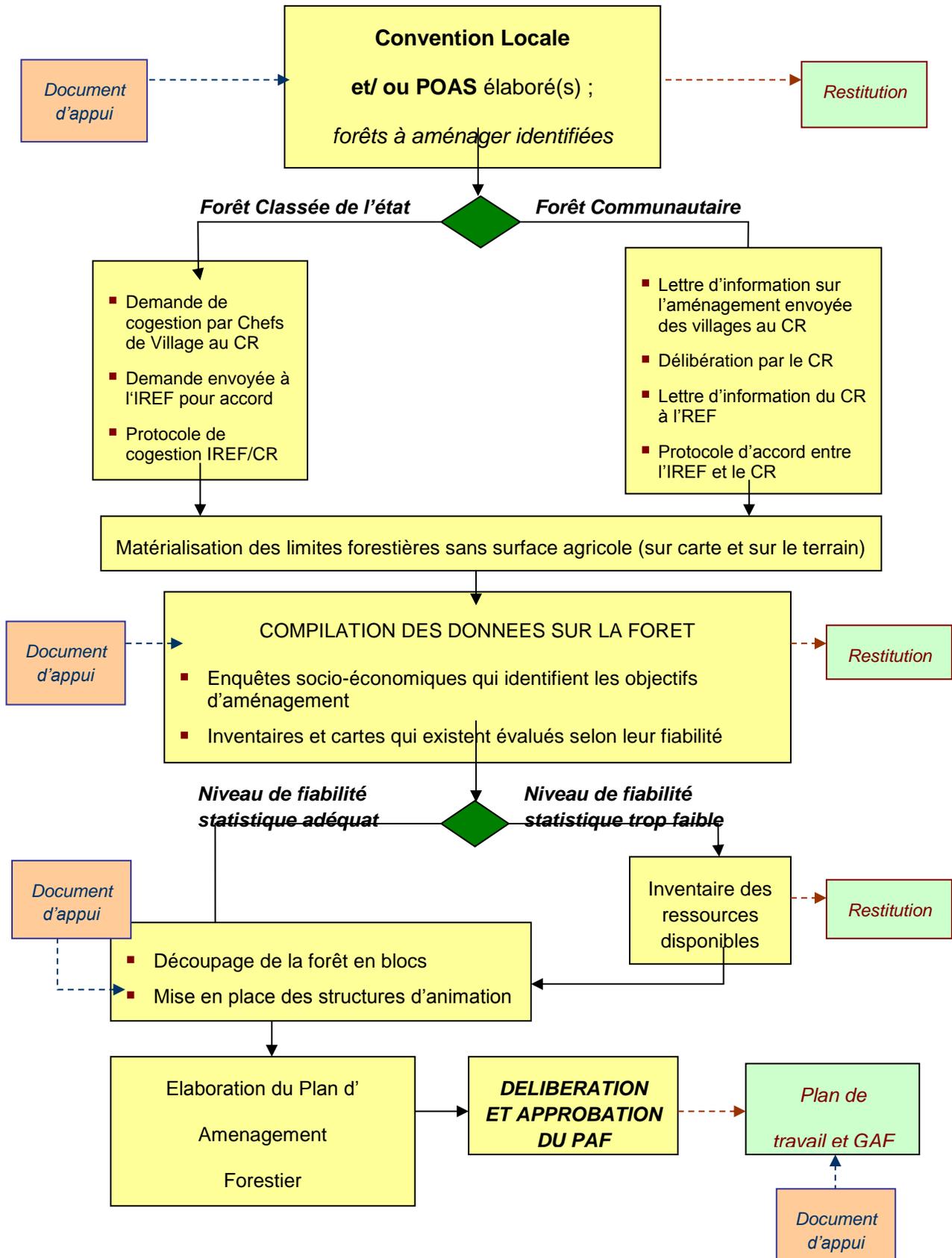
## Annex B: Changes in Land Use and Land Cover in Senegal and the Gambia 1975-2010

Source: USGS, 2013



## Annex C: Schema for Participatory Forest Management Planning Process

(source: Wula Nafaa Guide, 2008)



## Annex D: Barriers Reduced by the Wula Nafaa Policy Component<sup>107</sup>

### 2004

1. **Policy agenda lacking:** A policy agenda was developed
2. **No procedure for implementing forest management in the field:** Model workplan and pre-management plans developed for targeted forests
3. **No control over resource exploitation: mbepp gum:** Implementation in Koussanar of a tax on the sale of mbepp, adopted in the local code
4. **Marketing of certain forest products completely informal:** Definition and formalization of a system for marketing mbepp gum
5. **Lack of familiarity on laws about decentralization:** Sensitization and application of decentralization laws in the communities
6. **Difficulty applying certain parts of the Forestry Code:** Agreement signed with DEFCCS for WN assistance; establishment of the round-tables to revise certain articles; identification of problem provisions
7. **Lack of integration of herders in local planning:** Study on the laws governing migrant herding - terms of reference written and study completed
8. **No forest guard system in place:** Identification of the lack of a budget item in Rural Community budgets for the natural resource guard committees to be set up; provisions made to include them in budgets
9. **Concession-based hunting injustices:** Study on concession-based hunting done and revised to prioritize barriers
10. **Consistency among Local Codes:** Development of consistent models to use in forests, and their Sensitization

### 2005

1. **CRs not involved in planning and monitoring activities in hunting zones:** Explanatory notes and round-table discussions carried out
2. **Lack of familiarity with community rights on the part of elected officials:** 220 community members and elected officials trained in their rights and powers under the ministerial decision on hunting for 2004/2005
3. **Inappropriate hunting laws:** Round-table discussions held
4. **No receipt books available for NR product exploitation at the regional level:** Regional versions drawn up for Tambacounda and Kolda
5. **Lack of a good model of a forest management plan:** Collaborative development of a forest management plan writing manual
6. **Unfair distribution of revenues from fines collected in NR infractions:** Analysis of legal texts and report written; comparison of current situation and identification of barriers; resulting in Note de Service by the DEFCCS
7. **Negative impact of “circulation charges: that are outside the law:** Analysis of legal texts and resulting Note de Service from the DEFCCS addressed to the IREF forestry control posts
8. **Failure to consider grazing in the definition of “valorizing” natural resources:** : Analysis of legal texts and report written leading to equal access granted to herders and other land users in Local Conventions and Local Codes
9. **Local Conventions and local codes not respected:** Local Convention for Tomboronkoto tested by the sous-préfet; intervention by the Forest Service to apply the laws

### 2006

1. **Failure to publicise the new version of the hunting code:** Acknowledgment of this shortcoming made during a regional workshop on the ZIC in Tambacoundait constaté lors de l’atelier régional sur la ZIC
2. **Lack of revenues coming in to the communities from hunting concessions:** Participation in the first national workshop on concession-based hunting
3. **Lack of revenues coming to the Rural Communities from forest taxa:** Studies on sawtimber; terms of reference drawn up for new legal text on forest fiscality and taxation; study done on the subject
4. **Failure to consider the status of baobab fruit in the shell as a different product than baobab powder for taxation purposes:** Temporary solution adopted with IREF in Tamba that reduces tax on whole baobab fruit by 40% based on tonnage; protocol needed to confirm production
5. **Lack of access to charcoal market by local populations:** Forest management plan for Koulor approved and 1500 quintaux of charcoal authorized for production by locals
6. **Lack of administrative and financial procedures at the village management committee level:** TDR on

<sup>107</sup> As reported in the Final Report, AG/NRM Program – Wula Nafaa 2003-2008. Appendix 7.

the status of pastoralism, good governance, and land use carried out

## 2007

1. **Unfamiliarity with NRM laws:** Forestry Code distributed
2. **Lack of administrative and financial procedures at the village management committee level:** Reports on the status of pastoralism, good governance, and land use carried out in Missirah, Sakar, and Koulor; Training of trainers in Missirah for good governance; Forest Mgmt Plan for Koulor being implemented and included for the national quota (520 quintaux for locals); management and exploitation organizations in Koulor are functioning; the FMP for Sita Niaoulé is being implemented and included in the national quota (6000 quintaux for locals); management and exploitation structures in Sita Niaoulé are functional; ministerial decision on different dates for opening and closing of charcoal season in managed versus unmanaged forests.
3. **Lack of land use plans at the RC level:** First land use plans drawn up in Koussanar to be used as WN model
4. **No authority given to NR guards:** Study on the experiences in forest surveillance done; workshop on harmonizing approach to forest surveillance; workshop results presented in Dakar at the DEFCCS; followup presentations in Kédougou, Tamba, Sédhiou, et Kolda
5. **Quota allocation system doesn't conform to the law:** Letter from 4 Rural Communities sent to the DEFCCS requesting that managed forests be exploitable according to calculated sustainable yield in the FMP
6. **Quota allocation system doesn't conform to the law:** Charcoal produced in Saré Bidji was marketed
7. **Quota allocation system doesn't conform to the law:** Charcoal produced in Koulor was marketed
8. **Quota allocation system doesn't conform to the law:** Ministerial decision on different dates for opening and closing of charcoal season in managed versus unmanaged forests

## Annex E: List of Documents Consulted

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