

Contribution to USAID/Senegal life-of-strategic objective assessment of the impact of natural resource management activities

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Introduction

This report contributes to the USAID/Senegal life-of-strategic objective assessment of the impact of the seven agriculture and natural resource activities under strategic objective 2 (SO2) in the period 1992-1998. Since 1962, USAID has supported programs in natural resource management in Senegal, however, it recently terminated its environmental SO2, “Increased crop productivity through improved natural resources management in zones of reliable rainfall.” For the period 1998-2006, the mission has recast SO2 as “More effective, democratic, and accountable local management of services and resources in targeted areas.”

The majority of this report analyzes the *Projet de Reboisement du Sénégal* (Senegal Reforestation Project (SRP)), based mainly on field work in November and December 1998. Following that, the report provides observations on the follow up project to SRP, the Community Based Natural Resource Management (CBNRM) project, on the USGS EROS Data Center environmental monitoring effort, and on the 1998 Knowledge, Attitudes, and Practices Survey.

Senegal Reforestation Project

Project description

The Senegal Reforestation Project (SRP), USAID no. 685-0283, officially operated from December 18, 1987 to March 31 1995. Through USAID, the Government of Senegal signed a host country contract with the Southeast Consortium for International Development (SECID). Virginia Polytechnic Institute and State University served as lead institution and Louis Berger International, Inc. served as subcontractor. Originally allocated \$10 million for an original project completion date of September 30, 1993, USAID/Senegal eventually increased total obligations to \$14 million and extended the project to March 31, 1995. Senegalese government officials from the *Direction des Eaux, Forêts, Chasses et de la Conservation des Sols* (Senegal Forest Service)

formed the majority of the project staff, with Americans serving in three permanent positions and as short-term consultants.

The project consisted of the six components listed in Table 1. Activities covered the entire country. Over an eight year period, the project produced the quantitative results listed in Table 2.

Methods

Because the matching grant component was the significant field activity of SRP, the present assessment concentrated on an assessment of the long-term status of matching grant plantations. The USAID/Senegal mission file only contained the list of matching grant plantations from 1988 while the mission library only had the list of plantations from 1992, so these formed the basis for a stratified random sample. The sample covered the five central regions of the country, Diourbel, Fatick, Kaolack, Louga, and Thiès. These regions contain the majority of the nation’s population and form the Peanut Basin, an agricultural area that

Table 1. Components of the Senegal Reforestation Project.

Matching grants	Signed contracts with individuals and groups that gave cash payments for plantations that maintained a 45% survival rate at the end of nine months.
Roadside planting	Signed contracts with small enterprises that payed the establishment costs of plantings along roads in urban areas.
Private sector	Wrote marketing studies and much of the text of the new Senegal Forest Code
Training	Sent Senegalese personnel for study and conferences in the U.S. and third countries. Hosted local training seminars for Senegalese.
Media	Promoted project activities on television, radio, and in the newspapers. Conducted other public relations activities that distributed posters, T-shirts, and other promotional items
Test program	Composed resource management plans for three <i>communautés rurales</i> in preparation for the follow-up project, CBNRM.

Table 2. Quantitative results of the Senegal Reforestation Project (n.r. = nor reported).

component	result	1988	1989	1990	1991	1992	1993	1994	total
matching grants	grants	48	244	350	611	744	948	0	2945
	hectares	60	376	455	818	974	1106	0	3789
roadside planting	km	20.2	9.9	14.5	41.6	49	0	0	135
	trees	4667	1494	3192	8717	12 684	0	0	30 754
private sector	studies	1	2	3	5	0	1	4	16
training	people	62	107	144	320	275	212	236	1356
	person-months	15.5	84.3	133	238.3	122.5	70.5	46.3	710
media	productions	24	29	17	89	69	50	41	319
test program	grants						93	n.r.	93
	hectares						85	n.r.	85
construction	office building	1							1
short-term tech. asst.	consultancies	8	9	9	11	4	1	3	45
	person-months	10	11	10	13	9	3	4	60

traditionally has dominated the Senegal economy. The sample could not include other regions due to security concerns and lack of funds.

Within the list of plantations for each region, I used computer-generated random numbers to select two plantations, one from 1988 and one from 1992, that had achieved a nine-month survival rate of at least 45%, gaining a cash payment from SRP. Because of my long field experience in the *Région de Louga*, in that region I chose two sites in villages that I had never visited.

At each plantation, I counted all live trees, inspected tree growth, and examined signs of ecological impact. In addition, I conducted a semi-structured interview with the person who planted the trees or led the group that planted the trees. We discussed the socio-economic impacts of the activity and the cash payment that the project had given.

For the other project components, I mainly reviewed available project documents. In addition, long discussions with CBNRM staff provided additional insights into the SRP test program component that served as a transition to the CBNRM. The CBNRM staff interviewed included Massamba Diop (*Chef de Division Études et Recherches*), Kent Elbow (technical advisor in natural resources planning), Keith Moore (consultant on indicators from Virginia Tech), and Papa Sarr (*Chef de Division Aménagement et Gestion des Terroirs* and former SRP private sector coordinator).

Results

The average long-term survival rate fell from the average nine-month survival rate an average of 24%, as shown in Table 3, from 59% to 36%. Survival rates of the 1988 plantations fell farther (from 55% to 26%) than the 1992 plantations (68% to 57%). Plantations in the *Region de Diourbel* showed the worst survival, probably due to a combination of more arid conditions and higher population density. Survival rates in the southernmost, and hence, the moistest sites, Kër Alfa and Kër Useynu Jeng, did not change.

Table 3. Plantation survival results, sorted by region, then by year.

village	Commune Rurale	Région	project	year	main species	tree plan- ted	9 month		1998		rate differ- ence
							trees survi- ving	survi- val rate	trees survi- ving	survi- val rate	
Ñangeen	Ndulo	Diourbel	none	1988	<i>Prosopis juliflora</i>	625	400	0.64	7	0.01	-0.63
Njangeen	Patar	Diourbel	project FIDA	1992	<i>Prosopis juliflora</i>	240	126	0.53	24	0.10	-0.43
Gapasel	Patar Liya	Fatick	PRE- COBA	1988	<i>Acacia holosericea</i>	950	517	0.54	175	0.18	-0.36
Kër Useynu Jeng	Kër Samba Gey	Fatick	PASA	1992	<i>Anacardium occidentale</i>	285	229	0.80	229	0.80	0.00
Sanc Ngeraan	Maka Yop	Kaolack	PARCE	1988	<i>Eucalyptus camaldulensis</i>	625	358	0.57	213	0.34	-0.23
Kër Alfa	Ganjaay	Kaolack	PRE- COBA	1992	<i>Eucalyptus camaldulensis</i>	625	440	0.70	440	0.70	0.00
Kër Sanu Jeng	Loro	Louga	PRO- BOVIL	1988	<i>Prosopis juliflora</i>	345	166	0.48	143	0.41	-0.07
Ñomdade	Caaméen	Louga	PRO- BOVIL	1992	<i>Prosopis juliflora</i>	325	190	0.58	120	0.37	-0.22
Kër Demba Ngooy	Fandeen	Thiès	PRO- VERS	1988	<i>Eucalyptus camaldulensis</i>	1250	650	0.52	450	0.36	-0.16
Jëlèk Wolof	Noto Guy Jama	Thiès	CTL-Sud	1992	<i>Mangifera indica</i>	240	185	0.77	160	0.67	-0.10
total						5510	3261	0.59	1961	0.36	-0.24

Table 4. Plantation and payment characteristics , sorted as in Table 3. The column ‘sold or used’ refers to whether people primarily sold the plantation products for cash or used the products directly for their household.

village	project	year	agro-forestry	products	sold or used	payment use	natural regeneration	constraint	payment (F CFA)
Ñangeen	none	1988	yes	none	none	group fund	natural regeneration	termites	unknown
Njangeen	project FIDA	1992	yes	none	none	distributed	plantation	termites	13 140
Gapasel	PRECOBA	1988	yes	poles	use	small credit	natural regeneration	water	40 000
Kër Useynu Jeng	PASA	1992	yes	fruit	sell	back into field	plantation	insects	36900
Sanc Ngeraan	PARCE	1988	yes	poles	use	small credit	plantation	water	unknown
Kër Alfa	PRECOBA	1992	yes	poles	use	school	plantation	water	39 600
Kër Sanu Jeng	PROBOVIL	1988	no	firewood	sell	group fund	natural regeneration	livestock	unknown
Ñomdade	PROBOVIL	1992	no	none	none	group fund	natural regeneration	livestock	17 100
Kër Demba Ngooy	PROVERS	1988	yes	poles	sell	small credit	plantation	water	137 000
Jëlëk Wolof	CTL-Sud	1992	yes	fruit	sell	back into field	plantation	insects	76 500

Overall, people used the sampled plantations for multiple uses. Notably, people farmed millet, peanuts, and black-eyed peas in eight out of ten plantations. From seven out of ten plantations, people had harvested poles, fruit, and firewood. Three of those villages mainly used the products for household needs while the rest sold the products for cash. Concerning the SRP cash payment, in only two out of ten cases did people actually use the cash as a reimbursement for actual plantations costs. In most cases, people placed the money into a community fund to finance small loans, community celebrations, and village expenditures, most notably the elementary school in Kër Alfa. When asked whether they preferred the plantation of exotic species or the natural regeneration of local species, six plantation managers preferred plantation of exotics while four plantation managers favored natural regeneration. When asked the most serious constraint to the success of the plantation, most managers identified the lack of water, with livestock, termites, and other insects also cited.

Analysis

SRP conducted a limited survey of medium-term survival rates in 1994. In their study, the survival rate of four 1988 plantations in the regions of Fatick, Kaolack, and Louga only fell from 59% to 54%, compared to a drop of 55% to 26% from 1988 to 1998 in the present survey.

The noticeable drop in survival rates over time highlights the basic problem that ecological conditions in central areas of Senegal do not favor the plantation of exotic species. *Eucalyptus camaldulensis* requires over 600 mm of water each year, but the meteorological station at Louga, for example, has recorded a mean annual rainfall in the period 1919-1993 of only 400 mm. Potential evapotranspiration at Louga is 2000 mm per year. These arid conditions mean that a plantation must be watered in the dry season of its first few years. Women expend much energy drawing water from wells 20-40 m deep just to provide their families with drinking water. Under these conditions, pouring water at the base of exotic trees borders the edge of practicality and decency.

Concerning the SRP cash payment, because people in most cases did not incur any cash costs to establish their plantations, most people did not need the payment, which SRP termed a 'reimbursement,' to realize the activity. In most areas of Senegal, other donor-funded regional projects had extensive programs in which they trained people in nursery and plantation techniques and worked with villages from the nursery preparation stage to tree planting day. The projects provided or helped the villages acquire plastic nursery sacks, seeds, shovels, and other materials. Only then did SRP arrive to offer the project the option of giving a cash payment to local people as a planting incentive. Interestingly, the word that the Wolof use for the cash payment reveals their perception of its role. Wolof use the word *neexal* meaning 'that which pleases' or 'reward.'

Moreover, in most of the villages studied, SRP arrived in the middle of a long-term intervention by one of the donor-funded regional projects. Most villages had been working with a project for a couple years, then SRP helped with a cash payment in one year and departed. The village then continued working with the original project with no cash payments involved. This calls into question the necessity of the cash payment. Long before SRP, all the other donors in Senegal had abandoned planting subsidies in favor of a participatory approach where projects encouraged local people to plant just for the intrinsic ecological and economic benefits of trees.

Concerning replication, because donor-funded reforestation projects had worked with farmers and herders in all ethnic groups across all of Senegal, spontaneous replication is not a phenomenon relevant to SRP.

Concerning impact, the superposition of SRP over other donor-funded regional projects prevents the assignment of impacts strictly to SRP. Nevertheless, wherever trees survived, they produced a positive environmental and socio-economic impact. Surviving trees protect soil from wind and water erosion, increase soil organic matter, produce favorable conditions for nitrogen fixation, and provide poles, shade, firewood, traditional medicines, and fruit.

Brief observations on other activities

Community-Based Natural Resource Management (CBNRM) project

This project has the opportunity to support comprehensive land-use management planning at the scale of the *communauté rurale*. Such a plan would start with an inventory of natural and human resources then proceed with arrangements for what resource management activities would best fit on which pieces of land, with rotation systems for agricultural fields and pastures, and with inter-village agreements to implement these systems. Unfortunately, CBNRM has only modestly approached such planning. The current management plans provide descriptions of small activities that happen to coincide geographically, but the plans do not yet integrate these into comprehensive systems of resource use. The CBNRM plans, however, do improve upon the plans derived by the SRP test program. The SRP plans generally consisted of lists of SRP cash payment activities that happened to occur in the same *communauté rurale*.

Concerning the CBNRM monitoring and evaluation system, it generally tracks quantitative results, such as hectares of intervention or km of rock bunds, more than qualitative impacts, such as increase in native seedling density soil organic matter. Producing a baseline of just two or three ecological and socio-economic indicators would allow the project and USAID to evaluate positive impacts in the future.

USGS EROS Data Center environmental monitoring

In discussions at the UN administered *Centre de Suivi Écologique* and at the *Institut des Sciences de l'Environnement* of the *Université Cheikh Anta Diop de Dakar*, Senegalese personnel remarked that they valued highly the informal technical exchanges with USGS EROS staff. This

benefit is in addition, of course, to the necessary monitoring of environmental change that the USGS EROS Data Center has undertaken.

Knowledge, Attitudes, and Practices (KAP) Survey 1998

The national KAP surveys can give results at a high administrative level, but averages by *département* or *arrondissement* cannot reveal changes in people's attitudes in the precise villages where USAID has supported activities. That would require more focused KAP surveys, such as those undertaken by CBNRM. Importantly, the interview forms should be written in the six national languages in order to provide consistent and valid survey results.

Reports reviewed

Anamosa, P. 1992. Assessment and strategy for the transition phase between the SRP and CBNRM. Senegal Reforestation Project end of tour report no. 34.

Bertelsen, M., N. Persaud, M. Ba, F.K.L. Planchon. 1997. Strategic monitoring for the CBNRM. CBNRM Summary assistance report No. 18.

Christophersen, K.A., B. Rands, A. Hadj, B. Winterbottom. 1998. USAID/Senegal Natural Resources Management "Limited Scope" Impact Assessment Report. EPIQ, Washington, DC.

Fuchs-Carsch, M. 1995. Final evaluation of the Senegal Reforestation Project. Tropical Research and Development, Inc., Gainesville, FL.

Gonzalez, P. New Directions and Old Lessons of Internationally-Financed Natural Resource Management Projects in Senegal 1960-1992. 1992. Energy and Resources Group, University of California, Berkeley, CA.

Karch, G.E., N. Dieng, D. Laframboise, and B. Shapiro. 1991. Senegal reforestation project mid-term evaluation. Chemonics, Inc., Washington, DC.

Moore, K.M. 1994. 1994 follow-up and monitoring matching grant and media components. Senegal Reforestation Project end of tour report no. 38.

Sene, P. 1991. Rapport de la mission d'appui à l'USAID/Senegal dans le cadre de la definition du projet de gestion des ressources naturelles par les communautés rurales. The Cooperative League of the USA, Ouagadougou, Burkina Faso.

Senegal Reforestation Project. 1989. Rapport de synthèse programme co-investissement 1988-1989.

Senegal Reforestation Project. 1993. Guide de terrain pour l'implantation du programme co-investissement 1993.

Senegal Reforestation Project. 1993. Rapport de synthèse programme co-investissement 1992-1993.

Senegal Reforestation Project. 1995. Final report 1987-1995.

Timberlake, J. 1992. 1991 follow-up and monitoring study matching grant and media components. Senegal Reforestation Project end of tour report no. 33.

USAID/Senegal. 1986. Project paper, Senegal Reforestation Project.

USAID/Senegal. 1991. Senegal Reforestation Project, Project paper supplement.

USAID/Senegal. 1992. Senegal Reforestation Project, Project paper supplement no. two.