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EVALUATION OF ENVIRONMENTAL SECTOR COOPERATION IN SENEGAL

FINAL REPORT

SUMMARY

MARCH 2004

PACIFIC CONSULTANTS INTERNATIONAL

PREFACE

Japan's Official Development Assistance (ODA) to Senegal can be traced back to 1980, when the Japan Overseas Cooperation Volunteers was dispatched and since then, it has been carried out for more than 20 years. The contents of ODA have covered many sectors such as education, food production increase, health, drinking water, afforestation etc.

In the implementation of ODA during the recent years, transparency and accountability of ODA to the nation are required in terms of social responsibility. Similarly in the assistance to Senegal, consistency of ODA policies of both the countries and rationality of long term development plans are also given more importance than before.

With this background, the Japanese Ministry of Foreign Affairs decided to implement this study (Program Level Evaluation) with the main objectives of compiling the lessons and recommendations for more effective and efficient implementation of future Japan's assistance, and for securing transparency and accountability of the assistance by officially announcing the results of this evaluation.

The evaluation study was carried out by the members mentioned below.

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This report was prepared under the responsibility of Pacific Consultants International, and therefore, it does not always reflect the position of Ministry of Foreign Affairs or the Government of Japan.

March 2004
Pacific Consultants International

SUMMARY

Chapter 1 Outline of the Evaluation Study

1.1 Objectives of and Proceedings of the Study

The aim of this study is to objectively evaluate Japan's ODA projects carried out in Senegal in the "Environmental sector (desertification prevention)", and to obtain lessons and recommendations for the future similar projects, and thereby, to make an accounting to the Japanese taxpayers. The study consisted of three stages: namely, 1) Preparatory works in Japan, 2) Field study, and 3) Analysis of the study results and preparation of Final Report in Japan. This study was carried out from August 2003 to March 2004.

1.2 Targets and Methodology of the Study

In this study, Japan's ODA projects related to desertification prevention in the environmental sector of Senegal, which were carried out mainly during the fiscal years of 1996 to 2000, were targeted. In particular, the following four projects, which have similar direction and objectives, were considered.

1. Greenery Promotion Cooperation Project ("PROVERS (Programme pour la Promotion de la Verdure au Sénégal)": fiscal year 1986-98): Japan Overseas Cooperation Volunteers Scheme (Dispatches of Volunteer Team).
2. Nursery Maintenance Project ("PAPF (Project d'Aménagement de Pépinières Forestières)" 2nd: fiscal year 1994 - 97, and "PAPF" 3rd: fiscal year 1998 - 2000): Grant Aid Scheme
3. Afforestation Project in the Coastal Areas ("PRL (Project de Reboisement de la Zone du Littoral)": fiscal year 2001 - 2005): Grant Aid Scheme (afforestation grant).
4. Integrated Rural Forestry Development Project ("PRODEFI (Project Communautaire de Développement Forestier Intégré)": fiscal year 2000 - 2005): Technical Cooperation Project Scheme.

Although these four projects were not carried out as a single program originally, these were considered as a single program in this study, since they have a common objective of "desertification prevention". In regard to the methodology of this Study, program level evaluation was made based on the evaluation framework and the development subjects tree, after conducting the review of related materials and the study reports, and interviewing the concerned organizations and personnel involved in both the countries.

1.3 Framework for Evaluation

In the evaluation framework, three viewpoints were set for evaluation (namely, "Objectives", "Process" and "Results") and then the concrete evaluation items, contents, and means to attain the information were examined.

Chapter 2 Outline of Senegal and Existing Measures in the Environmental Sector (Desertification Prevention)

2.1 Outline of Senegal

Senegal, which has an area of 200,000 km^2, is located in West Africa and most of the land area is flat. Most parts of Senegal are savanna which has become more arid, except for the alluvium area of the 4 largest rivers and the coastal area of the Atlantic Ocean from St. Louis, which is the old capital and located in the northern part, next to the neighboring country Gambia.

The climate in Senegal is divided into southern tropical region, northeast to central steppe region which is located along the southern edge of the Sahara Desert, northern dry region and central savanna region which has a long dry season.

Population increased from 3.2 million at the independence in 1960 to more than 10 million in 2000. Annual population growth rate in this period reached about 3%. Although about 70% of the population lived in the rural areas at the time of independence, the urban population has been growing rapidly in the recent years. Moreover, equal allocation of the land, based on traditional custom has been carried out in the rural areas with population pressure. On the other hand, unreclaimed area has been converted to farmland. In this situation, if more unreclaimed areas are converted to farmlands, then the water retention capacity of the soil will diminish, and the degradation of semiarid area, which barely escaped from desertification, will become more serious.

Table 2.1 Macro Indices of Senegal

	Index	1990-99	1998	2000
Gen. Index	1 Population(million)	7.33-9.28*	9.09	9.50
	2 Urban Population Rate(%)	43.5	46.0	47.4
	3 Annual Population Growth Rate(%)	2.7	2.8	2.7
Econ. Index	1 GDP (Exchange to US$ Million)	N.A.	4,666	4,752
	2 Growth rate of GDP(%)	3.20	5.70	5.10
	3 Per capita growth rate of GDP(%)	0.50	2.90	2.30
Social Index	1 HDI	N.A.	0.422	0.436
	2 Infant mortality rate (per 1,000 infants)	139	130	124
	3 Child mortality rate (per 1,000 children)	74	70	67
	4 School enrollment primary (%)	48.0	60.0	N.A.
	5 Per cap. Elect. power consum.(Kw)	95	111	114
Nat. Environ. Index	1 Forest area (x1,000km^2)	67	N.A.	62
	2 Afforestation area (x1,000ha)	14.5	12.1	14.8
	3 Annual deforestation rate (%)	0.70	0.70	0.70
	4 Per capita CO^2 emmision (m^3)	0.4	0.4	0.4
	5 Charcoal Production (kg)	N.A.	366,369	468,180

Source:
WB Rapport Annuel, WB Data Book 2001, WB Atlas 2002, Little Green Data Book 2002, PNUD Rapport sur Developpement Humain au Senegal
*:population in1990 and 1999

When comparing the condition of forestry between 1965 and 1994, it is noted that forest disappearance has been occurring severely even in the middle and lower basin of the Gambia River located in the southern tropical region.

In regard to the socio-economic conditions, Senegal has always maintained an economic growth rate of above 5% since 1995. Half of the population lives below the poverty line, and 26% of the population lives under absolute poverty with less than $1 per day, and most of these people live in rural areas.

2.2 Outline of Senegal's Environmental Sector (Desertification Prevention)

In Senegal, a very hot and strong wind namely '*harmattan*' blows from northeast to southwest, and brings sands to Senegal from Sahara desert (9.37 million km^2). Every year, a large part of the area along the southern edge of Sahara desert is converted to desert and is expanding towards the southern direction.

Presently, the area affected by desertification covers about 70% of all arid areas in the world (except the areas already deserted), and the areas cover one fourth of the world land area. According to the study of the United Nations Environment Program (UNEP), the desertification area is expanding at a

pace of about 60,000 km^2 per year, and it is predicted that the area will become about 3 times as large as the present desert area in the future.

From 1968 to 1973, serious droughts ravaged the Sahel region (8 counties belong to Sahel-Sudan climate: namely, Mauritania, Senegal, Cape Verde, Gambia, Mali, Niger, Burkina Faso, and Chad), which captured the attention of the people from all over the World on desertification. On the other hand, there are also artificial causes to desertification.

To conserve the environmental diversity, the Senegalese government divided the national area into 6 eco-geographical zones, summarized the features of the natural environment and social activities in each zone, and used the information for the preparation of Plans of Natural Environmental Preservation and National Development Policy. In the forest sector, national land was divided into 20 regions based in the basic study conducted in 1981, and the forest development plan is summarized below.

Table 2.2 Characteristics and Development Policy According to Geographic Eco-zones of Senegal

No.	Zone	Characteristics	Major Problems	Solution	Development plan	Note
1	**Senegal river basin** (Long and narrow area in Senegal river left bank) 9,653Km^2	1. Senegal river basin 2. Fertile soil and water resource 3. Dry and high temperature region 4. Frequent occurrence region of sandstorm 5. Large-scale agricultural form of	1. Decreasing rainfall (About 200mm.) 2. Dry, salt damage and defective drain 3. Damage of moving sand 4. Land ruined by hot wind (corrosion) 5. Necessity of large-scale land	1. Installation of irrigation (drain) system 2. Introduction of irrigation agriculture 3. Installation of shelterbelt 4. Enforcing forest management 5. Implementation of management on land	1. Maintenance of irrigation division 2. Support of agroforestry introduction 3. Implementation of large-scale afforestation 4. Examination and implementation of proper management system 5. Implementation of proper environmental education system	Planned green belt
2	**Niayes region** (Long and narrow basin area between Dakar Saint-Louis) 2,167Km^2	1. Dakar to Saint-Louis coastline 2. Fertile soil and ground water source 3. Dry and high temperature region 4. Movement of sand hill 5. Small-scale agriculture for vegetable production	1. Region of very narrow width 2. Damage because of movement of sand hill 3. Difficult access by the national road 4. Agricultural damage by hot wind and sandstorm 5. Environmentally damaged area by mining development	1. Fixation of sadhill 2. Installation of shelterbelt 3. Installation of access road 4. Tree planting around vegetable garden 5. Environmental recovery after mining development	1. Fixation of sand hill with afforestation and facilities 2. Installation of shelterbelt 3. Installation of eastern and western access road 4. Afforestation of home garden 5. Implementation of environmental recovery after mining is developed	Main agricultural production region in the Dakar northern coastline
3	**Peanut basin region** (Development zone for peanut production) 571,417Km^2	1. Dry area 2. Nearer to a water source 3. Exclusive land of peanut production 4. Extreme deforestation 5. Large-scale agriculture of peanut production	1. Low fertile area 2. Oxidation of soil 3. Salt damage of ground water 4. Damage of weathering erosion 5. Problem of flood control	1. Fertility improvement of land 2. Prevention of soil oxidation 3. Prevention of salt damage by ground water 4. Installation of shelterbelt 5. Establishment of flood control facilities	1. Fertility improvement by pasturing 2. Soil improvement by planting Acacia. 3. Head of river development of fresh water 4. Installation of shelterbelt 5. Establishment of flood control facilities	Monoculture Peanut production region
4	**Forest pasture region** (Vast pastural zone) 51,417Km^2	1. Dry area 2. Lack of water resource 3. Severe environmental condition 4. Delay of social development 5. Low population density	1. Recovery of degraded forest area 2. Development and management of village *Terroir* 3. The salt damage of ground water 4. Damage of weathering erosion 5. Problem of flood control	1. Recovery of degraded forest area 2. Development and management of village *Terroir* 3. Prevention of the salt damage by groundwater 4. Installation of shelterbelt 5. Establishment of flood control facilities	1. Implementation of real maintenance of degraded forest 2. Development division and implementation of village *Terroir* 3. Fresh water source development 4. Installation of shelterbelt 5. Establishment of flood control facilities	Typical desertification zone in Senegal
5	**The Middle East and Southwest region** (Niokolo forest region) 48,462Km^2	1. Moderate climate 2. Forest region (east) 3. Necessity of social development 4. Regional agricultural development 5. Comparatively high population density	1. Incompleteness of sustainable forest management system 2. Incompleteness of management system of water resource 3. Forest fire 4. Recovery of local variety 5. Environmentally damaged area by mining development	1. Implementation of sustainable forest management system 2. Implementation of water resource management 3. Prevention system of forest fire 4. Recovery of local variety 5. Environmental recovery after mining development	1. Implementation of sustainable forest management system 2. Implementation of water storage system 3. Setting up the post watching of forest fires 4. Research and recovery plans of local 5. Implementation of environmental recovery after mining is developed	Largest national park in Senegal, Niokolo national park
6	**Casamance region** (Main region in the southern part) 27,974Km^2	1. Moderate climate 2. Fertile soil and water resource 3. The most suitable region of agriculture 4. Instability of public peace 5. High population density	1. Protection of forest from illegal deforestation 2. The salt damage and oxidation of water source and low ground 3. Degradation of rice fields 4. Degradation of mangrove area 5. Problem of public peace	1. Proper forest conservation system 2. Flood control and soil improvement 3. Improvement of mangrove and rice field 4. Balance between agricultural development and environment 5. Public peace measures	1. Introduction of proper forest conservation system 2. Flood control and soil improvement plan 3. Improvement of mangrove and rice field 4. Balance between agricultural development and environment 5. Measures of discussion between each agency	Most suitable natural environmental zone in Senegal. Political instability because of independent movement

Source: Programme d'action national de lutte contre la desertification, 1998

Table 2.3 Classification of Forest Development Planning Zone

Zone	Characteristics of zone	Issue of forest development	Note	Zone	Feature of zone	Issue of forest development	Note
Zone1 (Southwest)	* Coastal mangrove area * Existence of sand hill along the coast	* Conservation of mangrove vegetation, resource development of fish breeding * Fixation of sand hill	Mangrove area in southern part of Senegal	**Zone11 (west)**	* Urbanized area * The front of desertification * (Vicinity of Dakar city)	* Supply of charcoal and construction materials by afforestation in a suitable area * Afforestation of shelterbelt and tree lining in Cup Vert peninsula	(Existence of Thies city)
Zone 2 (Southwest)	* High density residence and village * Suitable agriculture and forestry area because of moderate climate and fertile soil. * (Existence of Ziguinchor city of Casamance Region)	* Utilization of forest resource, and conservation of natural resource. * Development of village forestry with profitability * Introduction of national plan of charcoal production	The west Casamance	**Zone 12 (west)**	* Area where a lot of sand hills exist * Damage from moving sand through out the year * Niayes region which is suitable for agriculture	* Maintenance, conservation, and reinforcement of forest around city * Fixation of sand hill * Conservation of the environment in Niayes region	Niayes area
Zone 3 (Southwest)	* Many residents and village area * Suitable agriculture and forestry area because of moderate climate and fertile soil. * (Existence of Korda city of Casamance Region)	* Limitation of overexploitation and forest dvelopment * Development of rural community forest * Introduction of national plan of charcoal production	The east Casamance	**Zone 13 (Middle East part)**	* Severe (dry) natural environment * Lack of water source * Northern part area between Louga and Linguere	* Clarification and development limitation of suitable area for forest nomadism * Additional income improvement of pasturalist by rubber tree growing * Setting up the pastoral area for sheep from the peanut basin	Pasturing zone
Zone 4 (Southeast)	* Border problem with Guinea * Area where a lot of forests exist	* Limitation of overexploitation and balanced utilization of forest resource * Afforestation in Famele ironworks area and charcoal supply to high density area		**Zone 14 (Middle East part)**	* Mainly pasture area * The eastern and northern part area of Linguere	* Harmonizing with the pasturing activity as forest nomadism area * Additional income improvement of pasturalists by rubber tree growing * Paying attention to the change of the ecosystem by nomadism and forest development	Pasturing zone
Zone 5 (Southeast)	* Existence of national park between Niokolo-Kopa * Representative forest area in the country	* Conservation of Niokolo national park	Niokolo park area	**Zone 15 (Middle East part)**	* Area between west Zone14 and east Zone16 * Almost barren area	* Same as Zone14. * Higher possibility of deterioration in the future; Necessity of countermeasures	Pasturing zone
Zone 6 (Midwest)	* Vast middle area Existence of Tambacounda state * capital * Suitable development area for commercial forest, because of geographical and social conditions of a location. * Suitable development area for agroforestry	* Maintenance of natural system, forest development by the village and the rural * Afforestation development and establishment of system of self-support of charcoal * Introduction of national plan of charcoal material production * Agricultural land development as a precondition for forest conservation	Center part in Senegal	**Zone 16 (Middle East part)**	* Deserted area * Defectiveness of the infrastructure and deterioration of vegetation.	* Conservation of seasonal plant resource for pasturing and scarce forest resource * Construction limitation of roads and wells and conservation of natural ecosystem	Pasturing zone
Zone 7 (Midwest)	* Village area in the vicinity of Kaolack * Necessity of agricultural development from the salt	* Afforestation and conservation of a present forest for the cashew nut productions * Afforestation and charcoal supply by individual and village community		**Zone 17 (Senegal river basin)**	* Interior of Senegal * Farmland in narrow basin * (Matam vicinity along border with Mali)	* Settling afforestation of eucalyptus and extension of irrigated agriculture * Supply of construction and charcoal material in the area * Afforestation to develop the irrigated agriculture * Conservation and preservation of natural forest	Greenbelt area
Zone 8 (Midwest)	* Mangrove zone * The salt damaged area in soil water and river source	* Fish breeding development and conservation of ecology of mangrove * Afforestation for the charcoal supply to the cities such as Kaolack.	Mangrove area along Fimela coast	**Zone 18 (Senegal river basin)**	* Interior of Senegal * Farmland in narrow basin * (Bkel vicinity along border with Mali)	* Reproduction of Acacia Nilocica forest through the effect of irrigated agriculture and improvement of water retention capacity of Awareness of importance of afforestation in irrigated area	Greenbelt area
Zone 9 (west)	* Dry area * (Existence of Diourbel city)	* Self-support in the area of charcoal and construction materials * Coexistence of conservation of forest resource and livestock industry	Diourbel dry	**Zone 19 (Senegalese river basin)**	* Deserted area * Development area of large scale agriculture	* Afforestation along the national road in the river basin and around villages to contribute to the desertification prevention	Greenbelt area
Zone 10 (west)	* Severe natural environment and dry area * (Existence of Louga city)	* Almost the same as Zone9. * Proper agricultural development, and conservation and harmony of natural resource	Louga dry area	**Zone 20 (Senegal river basin)**	* The downstream basin area of Senegal river * Conservation of natural environment	* Promotion of afforestation for the charcoal material supply to the Saint-Louis city. * Conservation and utilization of unreclaimed forest	Greenbelt area

Source: Enquêtes et analyses détaillées sur l'état des ressources forestières (1981)

2.3 Existing Measures in the Environmental Sector (Desertification Prevention) in Senegal

(1) Upper Level Plan in the Environmental Sector of Senegal

The 9th Economic and Social Development Plan (Plan d'orientation pour le développement économique et social: PODES) is the major national plan of the Government of Senegal. In this plan, it is pointed out that "Continuing the rational management of environmental resource for sustainable development" is the long-term goal of the plan. In addition, the actual conditions of the poverty, analysis of the background, and the strategy for reduction of poverty are elaborated in the Poverty Reduction Strategy Paper (PRSP).

The three upper level plans of the national environment and forestry sector are mentioned below.

1. Senegal Forest Action Plan (Programme d'action forestier du Sénégal; PAFS)
2. National Environmental Action Plan (Plan national d'action pour l'environnment; PNAE)
3. National Action Plan to Combat Desertification (Programme d'action national de lutte contre la désertification; PAN/LCD)

Moreover, the international treaty UNCCD (United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa), and NEPAD (New Partnership for Africa's Development) are also related to Senegal's environmental

sector (desertification prevention).

Further, Forest Law (Code forestier), Environmental Law (Code de l'environment), Law on National Land (Loi sur le domaine national, 1964), and Law on Decentralization (Administrative Area Development law, 1972, Decentralization law, 1996) are related to the implementation of various plans.

(2) Implementation System in Senegal's Environmental Sector (Desertification Prevention)

This program is implemented mainly by the Directorate of Water, Forest, Hunting and Soil Conservation of the Ministry of Environment and Health. The organization, staff, and budget are as follows:

1) Organization: In regard to natural environment, the Ministry of Environment and Health consists of the following Directorates: Directorate of Environment, Directorate of Water, Forest, Hunting, and Soil Conservation (Department of Forestry), and Directorate of National Parks. Directorate of Forestry includes Afforestation and Soil Conservation Division, Forest Conservation Division, and so on. Forest Division of each Region, which manages the local forests, is organized under the Directorate of Forestry.

2) Staff: The total number of staff of the Directorate of Forestry and the local divisions of the Ministry of Environment and Health is about 500. Nevertheless, the number of local staff, especially the forest inspectors, are considered to be in shortfall. Because of this reason, the activities of the local divisions are limited.

3) Budget: The expenditure of the organization which include the Directorate of Forestry and the local divisions increased from about 747 million CFA francs (franc de la Communauté Financière Africaine) in 1997 to about 949 million CFA francs in 2001. Total personnel cost including both permanent and temporary staff accounts for most of the budget, which is estimated as approximately 80% of the total cost. The maintenance cost of the machinery and equipment is 6%, and campaign cost for extension of technology is about 5%.

Chapter 3 Japan's Assistance Policy on Environmental Sector (Desertification Prevention) and the Present Situation of Assistance to Senegal

3.1 Japan's Assistance Policy on Environmental Sector (Desertification Prevention)

Since the second half of 1960s when the catastrophic droughts occurred frequently in the Sahel region, the international community has recognized that the desertification is one of the most important global issues. However, the extent of the crisis and the difference of the stances of each donor resulted in poor outcome for desertification prevention.

UNCCD came into effect in 1996, incorporated lessons from past experience, and declared the importance of the participation of the people and communities in the area as a principle. The countries affected by desertification are each obliged to establish a National Action Plan of desertification prevention. In addition, each donor is obliged to report on how the issues have been tackled so far. The Government of Japan signed this Convention in 1994 and ratified it in 1998.

"Action for global issues" such as the environmental issue is one of the important points in ODA Charter which was approved by the Cabinet council in June 1992. ("Action for global issues" such as

the environmental issue is also one of the important issues in new ODA Charter which was established in August 2003.)

In addition, "Environmental Conservation" is one of the most important subjects in the 'Medium Term Policy' of ODA, which was established in August 1999. This policy reveals the positive cooperation in various sector measures, including environmental conservation and sustainable forest management.

Further, the Government of Japan published "Initiative for Sustainable Development toward the 21st Century (ISD)" at the time of United Nations General Assembly Special Session (UNGASS) in June 1997. "Natural Environmental Conservation" including progressing of sustainable forest management and strengthening of cooperation for desertification prevention is one of the action plans in the ISD. ("Natural environmental prevention" is also one of the most important sectors in "Environmental Conservation Initiative for Sustainable Development (EcoISD)" which was revised from ISD in August 2002.)

3.2 Situation of Japan's Assistance to Senegal

"Tokyo International Conference on African Development (TICAD)", which formulated the assistance framework for the African countries, was held three times in Tokyo by the support of the Government of Japan.

Japan's first assistance to Senegal can be traced back to October 1980, when the first JOCV members were dispatched. A country-wise aid policy for Senegal was gradually adjusted and the present policy was established through the dispatch of the study team for economic cooperation named as Kikuchi mission in March 1995. Succeeding negotiations on policy adjustments, and projects confirmation study were made in June 2000. According to the record of Japan's ODA, Senegal is an important recipient of the bilateral aid. The present country-wise aid policy on Senegal shows three important areas mentioned below.

(1) Improvement of the basis of fundamental human life such as Water, Fundamental education, and Fundamental health care
(2) Environment (desertification prevention)
(3) Agriculture and fisheries

The relationship between the global assistance trend and the Japan's ODA policy in the environmental sector (desertification prevention) is shown in the following figure focusing on the assistance to African countries, especially Senegal.

The details of inputs and the results on the four projects related to environmental sector (desertification prevention) assisted by the Government of Japan are shown in the succeeding table.

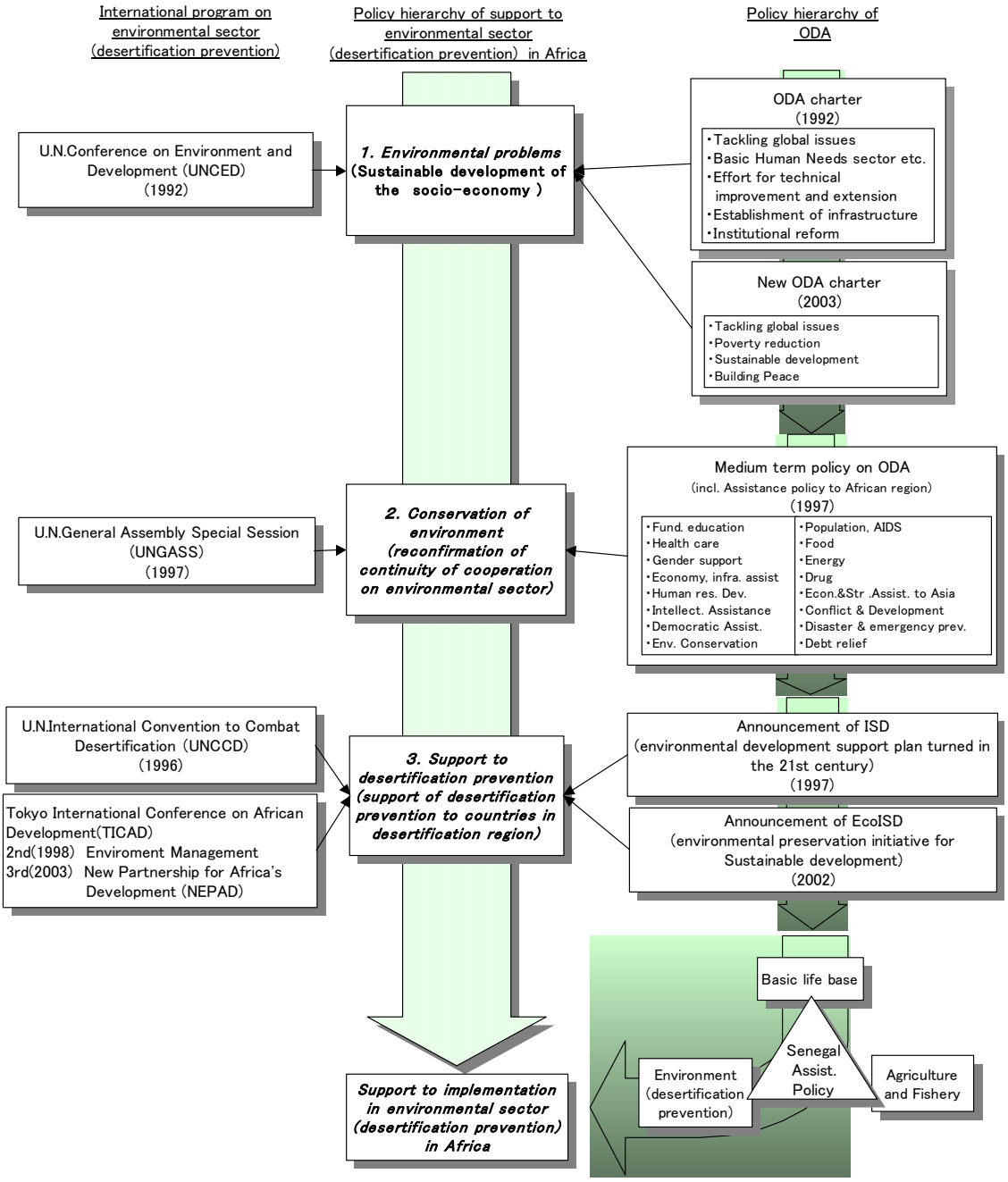

Fig. 3.1 Framework of Japan's Assistance to the African countries in the Environmental Sector (Desertification Prevention)

Table 3.1 Inputs and Results of the Projects* Related to the Environmental Sector (Desertification Prevention) in Senegal

	Project name	Green Promotion Cooperation Project (Programmed pour la Promotion de la Verdure au Sénégal; PROVERS)	Nursery Maintenance Project (Project d'Aménagement de Pépinières Forestières; PAPF)(2nd and 3rd)	Project of Afforestation in Coastal Areas (Project de Reboisement de la Zone du Littoral; PRL)	Integrated Rural Forestry Development Project (Project Communautaire de Développement Forestier Intégré; PRODEFI)
	Assistance Type	JOCV	Grant Aid scheme	Grant Aid scheme	Technical Cooperation Project
	Project Area	Three districts in Thies Department Thienaba district Pout district Tivaouane district (168 villages)	9 of 15 national nurseries (9 Regions) 2nd Project Area: Hann, Louga, Ngabou, Matam, Nioro 3rd Project Area: Linguere, Kaffrine, Tambacounda, Kedougou	Area along the northern part of the coast in Thies Region	Villages around the national nursery in Dakar, Kaolack, and Fatick Regions
Input	Fiscal year of cooperation (period)	Phase I : '86-'92; Phase II: '93- '98	95 -'97 / 99 - '00	'01-'05	00/01-'05/01
Input	Project Objectives	To promote green environment, and to educate the local residents and residents' organization through technological transfer and extension of technology and to enhance the standard of living of rural people through these activities.	To maintain and to strengthen the public management nursery for sustainable production and to supply qualified seedling in order to enlarge the participatory afforestation project, and to provide guidance, training and diffusion of seedling and afforestation technology to the local residents.	To conserve the suitable land for vegetables production, by the developing forest for fixing sand hill in the coastal Niayes region, and thereby, the project is expected to contribute to improve the standard of living of local residents.	Starting of sustainable natural management activities by residents themselves and preparation of extension model
Input	Program Objectives	*Establishment and support of seedling production and afforestation activity by seminar method *Guidance of resident's nursery *Establishment and guidance of Agroforestry *Advise on vegetable and fruit tree production *Making video educational material *Spread of improved cooking stove *Support of female group activity	*nursery maintenance: 5 places / 4 places *seedling production: 800,000/year / 750,000/year	*Aafforestation for sand hill fixing :About 700ha *Preventing fence for wind:688km *1 place nursery maintenance (seedling production:2,295,000)	*Collection of base line data related to natural and social economic conditions *Complete training plan of farm volunteers *Promotion of farmer volunteer *Monitoring of above activity *Introduction of regional resource *Improvement of management and coordination ability of C/P
Input	Input of human resources	<phase I > '86-'92: Expert : 1 person ; JOCV : 23 persons Phase II '93-'98 Expert: 1person; JOCV: 23persons C/P training : 14 persons	None (Plan, design, and construction managements by consultant (7 persons))	None (Plan, design, and construction managements by consultant (9 persons))	・Long-term expert: 6 persons ・Short-term expert: 4 persons ・C/P training : 6 persons
Input	Input of equipment	Water supply Facilities (pump, pipe, and others) Nursery maintenance machinery and materials, Agricultural machinery and implements, vehicles, audiovisual machinery and materials.	Capital for below (Facilities maintenance, seedling facilities, management facilities, Water supply facilities, machinery and materials, vehicle, seedling tools, and training material)	Capital for below (Nursery management facilities, seedling machinery and materials, vehicles, and seeds)	Vehicles, computer, and the educational machinery and materials
Output	Activity of Japan (expert and JOCV)	*Maintenance and technical guidance of public nursery *Technical guidance concerning afforestation, nursery, vegetable, fruit tree, agroforestry, and improved cooking stove *Making of video teaching material	*None	*None	*Base line data collection *Completing training program *Training to PRODEFI member
Output	Activity of Senegal (c/p,etc.,)	*Technical guidance concerning afforestation, nursery, vegetable, fruit tree, agroforestry, and improved cooking stove	*Extension of afforestation activities and guidance to residents	*Awareness training on soil conservation for residents	*Base line data collection *Preparation of training program *Training to farmer volunteers
Output	Execution of technology transfer etc.	*Maintenance and technical guidance of public nursery *Technical guidance concerning afforestation, nursery, vegetable, fruit tree, Agroforestry, and improved cooking stove	*Management and guidance by expert *The technology transfer to C/P (seminar etc.) is none.	*Awareness training about soil conservation for residents *Wage payment for local resident work	*Training to PRODEFI members *Training to farmer volunteers - 20 times
Output	Participation and activity of residents	*Afforestation *Nursery preparation *Growing vegetable and fruit trees *Preparing agroforestry *Making improved cooking stove	*About 40% of the produced nursery is distributed to the village resident for afforestation.	*Local afforestation committee: Two committees	*32 Resident (woman, man and woman) group
Output	Result of afforestation	*People's forest: about 382 ha *Shelterbelt: About73 km *Preparing of agroforestry garden: 3ha	*Production in 5 nurseries in the second term (1998-2002): Total about 9.2 million seedlings : (about 6,000 ha can be afforested.) *Production in 4 nurseries in the third term (2000-2002): Total about 3.1million seedlings (about 2,000 ha can be afforested.)	*Present: 468 ha (Filao: 355 ha and Eucalyptus: 113 ha) Survival rate: About 70%. *Windbreak: 466 km *Fence: 46.92 km	*Afforestation about 95,000; 101.09 ha; 36.42 km; The survival rate: About 90%
Output	Influence on resident life	*In the part of area, where extension activities were successfully carried out, people sell firewood and produce vegetable and fruits.	*2nd nursery: Seedling distribution to the resident for forest environmental improvement. (Increasing about 2,400 ha) *3rd Nursery: Seedling distribution to the resident for forest environmental improvement. (Increasing about 640 ha)	*Earning the cash by employment.	*Provided milling machine, well, nursery, multi purpose facilities and so on; Practical use of the local resource is promoted.
Output	Overall results	*The machinery and materials provided to government nursery are practical used. *Judging by the present situation, seedling production and afforestation activities do not continue in a part of the villages of the extension activities, although growing vegetables and fruit trees continue.	*Although production of seedling has increased, the relation is not clear between production increase and afforestation activity. *In a part of nurseries, management guidance and afforestation result study were done by JICA expert and afforestation is done through the extension work of the forest division staff.	*The maintenance of nursery, plantation work, Sand prevention measures, preventive fence of domestic animal invasion are done as scheduled. Fixation of sand hill and life improvement is unknown at present.	*Provided facilities and the machinery are used. *The effect of training is uncertain at the present stage. However, there are residents who have a strong interest.

Note: Projects carried out between the fiscal years of 1996 to 2000

Chapter 4 Program Level Evaluation in the Environmental Sector (Desertification Prevention)

Japan's assistance program environmental sector (Desertification prevention) in Senegal was evaluated from the three viewpoints:; "Objectives", "Process", and "Results". The formulated Development Subjects Tree was used as a tool for the evaluation of "Objectives".

4.1 Formulation of Development Subjects Tree

In consideration of the ODA Charter, the medium-term policy on ODA, and the country-wise aid policy for Senegal, Japan's assistance policy in the environmental sector (desertification prevention) and the three development issues were extracted and the 'development subjects tree' was formulated. The development goals and the development issues of Senegal side related to environmental sector (desertification prevention) were confirmed through the examination of related plans, and the 'development subjects tree' was formulated.

4.2 Evaluation of "Objective"

The program including four projects was confirmed to be consistent with the Japanese development issue. Japan's assistance policy for the environmental sector (desertification prevention) such as "desertification prevention and improvement of the standard of living of the people by the promotion of sustainable forest management" was confirmed to be the objective of the program. The assistance policy as well as the program was consistent to the upper level policy and plans such as ODA Charter and so on. On the other hand, comparing the development subjects tree for Senegal from Japan, the objective of the program was also consistent with Senegal's development goal. It was confirmed that the program including the four projects is a measure corresponding to Senegal's development subjects and is also consistent with the needs and priority in Senegal's environmental sector (desertification prevention) issues.

Comparing with other donors, the direction of the program was confirmed to be consistent, since the program has a similarity with the other donor activities and approaches. On the other hand, the trends of the donors such UNDP and the Netherlands seem to be different.

4.3 Evaluation of "Process"

The plan and implementation process of the program in Senegal was evaluated based on the appropriateness and efficiency.

(1) Appropriateness of the Planning Process

The historical background of Greenery Promotion Cooperation Project (PROVERS), which was the first project of the program, was examined and appropriateness of the timing of introducing it to Senegal was confirmed, since the program was started at the time when increasing international attention was made on the subject of desertification. Although the four projects were formulated separately, these projects were considered to be formulated efficiently because the targeted project area was the same and the sequence was never interrupted. Adoption of the precedent project's experience to the next one was confirmed. Although the program was overlapped with the programs of other donors, the linkage with other donors was not strong.

(2) Appropriateness and Efficiency of the Implementation Process

The implementation process was appropriate, because each project followed the prescribed sequence for each scheme, such as application of request, dispatch of study teams, and deliberations with the recipient government. The process was also efficient, because the coordination was carried out very well between Senegal and Japan. The process from the application request to implementation decision making was made smoothly and in a short time. Although some projects needed a longer time to implement, the process was also appropriate since the discussion was made carefully between Senegal and Japan.

In this program, the series of projects was coordinated properly with each other, starting from the Greenery Promotion Cooperation Project (PROVERS) through Nursery Maintenance Project (PAPF) to Integrated Rural Forestry Development Project (PRODEFI) and Project of Afforestation in Coastal Areas (PRL). The dispatched JICA experts who supported Nursery Maintenance Project significantly contributed to the coordination among the projects that had different schemes. However the coordination was made only during the project formulation, and was not seen in the process afterwards.

4.4 Evaluation of "Result"

4.4.1 Effectiveness

(1) Evaluation based on Indicators Related to Environmental Sector (Desertification Prevention)

In this study, it was not possible to judge whether the program has contributed to the improvement of local forest environment and the forest management system. It was found that the planted area has increased significantly after the completion of the maintenance of nursery by the project. However, the effect of the increase of planted area to change of the total forest area could not be confirmed because of non-availability of follow-up data.

A lot of activities related to technical transfer were carried out in every project. According to the results of the questionnaire survey to the residents related to the projects, it was found that the training was effective for the technical transfer. However, the same kind of questionnaire survey to the counterparts was not carried out in this study, and therefore, it could not be evaluated whether technical transfer to the counterparts was carried out effectively. In addition, various technical manuals related to desertification prevention were prepared in each project. In the Greenery Promotion Cooperation Project, Integrated Village Forest Development Project, and Project of Afforestation in Coastal Areas, the effectiveness of sand protection was confirmed. In the Niayes area, which is the target area of Project of Afforestation in Coastal Area, improvement of residential environment and favorable impact on vegetables production were observed.

As mentioned above, although some data and information were not available, it can be concluded that the program as a whole was effective in achieving most of the goals of the program.

(2) Evaluation of the Achievement of Goals based on the Beneficiaries Viewpoint

According to the results of the questionnaire survey to the local residents of the project area, about half of the respondents answered that their income has increased and the living conditions have improved. The results show that the program has contributed to the improvement of standard of living. From the questionnaire survey, it was also revealed that the training in the program contributed to allow local

people to obtain new knowledge and technology. Therefore, from the viewpoint of the local residents who are the beneficiaries, it can be concluded that the program has made an effective contribution to achieve the goal.

4.4.2 Impact

This section discusses how the program affects the policies and plans related to environmental sector of Senegal for Japan.

Although the effect on the Senegal's Economic and Social Development Plan could not be confirmed, the effect was observed on the Senegal's Forest Development Plan. In particular reference to the natural resource management, the Senegalese government has set a three stage basic approach: namely, (1) sufficient and qualified nursery seedling production, (2) development of participatory afforestation project, and (3) realization of sustainable natural resource management by residents themselves. The program accelerated the progress from stage 1 to stage 2 through nursery maintenance. For the evolution to stage 3, the program is expected to bring positive impact on this basic approach in the near future because of ongoing development of the natural resource management model. On the other hand, information could not be obtained to consider the effect of the program of other donors and the sense of ownership of the personnel involved on the Senegal side.

Based on the above discussion, it can be said that the program had a significant impact on the progress of the basic approach on natural resource management. However, it has no significant impact in regard to the assistance of other donors in the same sector, Japan's assistance policy on Sahel countries, or ownership of the implementers in the projects.

4.4.3 Sustainability

It was examined whether the Senegalese government implemented and continuously managed the desertification prevention by themselves after completion of the program. It was found out that the implementation system (budget and personnel) of the Senegal side is still weak. In addition, it was found that the sustainability is weak based on the facts that the staff concerned in the projects and the local people expressed their strong will for the continuation of Japan's assistance, and the Senegalese environmental sector largely depends on the donors in the area of budget distribution.

Chapter 5 Conclusions, Lessons Learned and Recommendations

The conclusions derived from the study are as follows:

1. In regard to the **relevance of the program from the viewpoint of "Objectives" evaluation**, it was confirmed that the objective of the program is consistent with related policies of both governments, which was clarified based on comparison of the development subjects trees of both countries and interview survey of the related personnel of the program.

2. In regard to the **appropriateness of planning process from the viewpoint of "Process" evaluation**, it was confirmed that the program is effective, because of coordination in planning process of four projects and practical use of precedent projects experience. In addition, there were JICA experts between the projects who acted as a link and coordinated the projects.

3. In regard to the **appropriateness of implementation process**, it was confirmed from the field survey that a close coordination was established between Senegal and Japan and the program was implemented effectively.

4. From the start of the cooperation of the program to the present Integrated Rural Forestry Development Project (PRODEFI), it was concluded that each project has contributed to achieving a single overall goal, and as a result, these projects evolved into one program, and thus improved the **efficiency of implementation process** by supporting each other.

5. **Examination of the effectiveness from the viewpoint of "Results" evaluation** are as follows:

    1) As for forestry infrastructure development, 12 of the 15 national nurseries in the country have been reconstructed. The number of seedling production in 2001 doubled as compared to the previous year, and the planted area also doubled.

    2) Afforestation project in the Coastal Area prevents sand flying and has contributed to socio-economic stability of the Niayes Area, which is one of eco-geographical zones in Senegal where 80% of the country's vegetables are produced.

    3) In the Integrated Rural Forestry Development, the technical transfer in agricultural and forestry sector was supported and participatory extension model was examined for the village people.

    4) According to the results of the questionnaire survey of the residents in the project area, the program has helped to improve the standard of living of the people, especially in regard to decreasing of sand flows, increase in agricultural income, and acquiring of new agricultural technology.

    5) On the other hand, the poor coordination among the four projects in the program was observed, and also poor administrative system and insufficient budget for maintenance were observed on the Senegal side.

6. In regard to **impact of the "Results" evaluation of the program**, it was considered to contribute a small but positive impact on the National Environmental Action Plan and Forest Action Plan.

7. On the other hand, the program has not affected the cooperation of other donors and Japan's assistance policy to the Sahel countries, except that American Peace Corps volunteers showed some interest in the program.

8. There is a big gap concerning the sense of ownership between government officials and residents. The sustainability remains doubtful, because the subjects in governmental implementation system such as budget, personnel etc., are still weak in regard to the self development of Government of Senegal and the residents in the projects areas have strongly expected the assistance to be continued.

The following lessons and recommendations are obtained from the study.

1. Although the program was not coordinated from the beginning, the JICA experts contributed to linking the projects as a coordinator. In order to keep close coordination and partnership, introduction of an expert as a coordinator or a coordinating organization to the program is desirable.

2. In the environmental sector, Japan should consider an effective utilization of project approach in coordination with other donors through donor meetings and the sharing of information.

3. In order to solve the subjects of the 'desertification prevention', a wider perspective is needed, and not only in the forest related sector, but also other sectors should be considered.

4. Since the seedling production facilities have already been established, it is necessary to promote afforestation by residents on a large scale. Hence, it is necessary to examine the possibility of applying the extension model of Integrated Rural Forestry Development Project to the northern part of Senegal.

5. In order to improve the sustainability, the methodology of direct assistance to the local government and the residents should be sought. In particular, it will be meaningful to determine the possibility of aid coordination with other donors and direct assistance to rural residents in consideration of the decentralization process.

6. Although data from each project was collected, it was difficult to exactly understand the results and the impact of the program, because the macro indicators related to afforestation have not been properly collected and recorded until now. Therefore, continuous measurement and recording of basic data needs to be carried out immediately. Simultaneously, the social indicators related to the improvement of standard of living should also be properly recorded and maintained.