AGRICULTURE AND FORESTRY IN NIGER

PRESENT SITUATION AND ISSUES FOR DEVELOPMENT

JAICAF

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Preface

This study report is the Niger version of the series of "country studies" published by the Association.

In order to contribute to the agricultural and forestry development overseas, and implement the agricultural and forestry development overseas, when various cooperation projects are planned and formulated. In the formulation and implementation of these projects, it is indispensable to precisely acknowledge the politics, economy, society, nature and culture of the country concerned, and is needed to correctly understand the issues for economic and social development of the country.

The current series of studies intend to specify the role of Japan in cooperation and its future direction concerning the subject countries, through sorting out the present situation of economy and society of the developing countries, and their issues of agriculture, forestry and food situation

In this version, among the African countries, the Republic of Niger was selected among the African countries which have increasing importance in official development assistance of Japan.

Major industry in Niger consists of traditional agriculture and livestock, and uranium mining which is an important export commodity for foreign currency earning. Almost 80% of the total population depends on the agriculture and livestock, but due to the harsh natural condition of scarce rainfall less than 150mm /year for 3quarters of the total area, food shortages and rural poverty are the perennial problems in this country. Further, decreasing forest and expanding desertification are the source of concern and the country is ranked at 174th among 177 countries on Human Development Index of UNDP 2007 Report. Thus the improvement of natural and socio-economic environment and sustainable agriculture and rural development are urgently required.

It is strongly hoped that this report will contribute to clarify the current socio-economic situation and issues to be addressed in the field of agriculture/ forestry, food and rural development. Further, the report is expected to provide basic information for the consideration of future development cooperation of Japan in these fields.

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CHAPTER I. NATIONAL ECONOMY AND AGRICULTURE/ FORESTRY

1. Structural Characteristics of Economy

1) Structure of industry

In 2005, with per-capita income of $244 per year, the Republic of Niger ranked 174th among 177countries by HDI: Human Development Index (UNDP 2007) and is considered as one of the poorest countries in the world. Major industries are agriculture (livestock and cereal production) and uranium mining which share around 40% of GDP and 80% of export earnings. About 90% of the population engage in the primary sector.

Since the independence in 1960 to 1980's, the share of the primary sector in GDP has been decreasing (Ref. Fig. I.1). This reflects the rapid development of the industrial sector owing to the opening of uranium mining.

Since 1990's, primary sector increased its GDP share gradually, but this has had not so much the positive implication, because it was due to the decline of other sectors and increased crop production to meet the demand for food of increasing population. Secondary sector based on uranium is characterized by the rapid growth in 70's, followed by stagnation later. Since 2004, international market price of uranium has been soaring but no significant change in export quantity was observed and its share in GDP is gradually declining. As for tertiary sector, the GDP share recorded peak in 80's and retain high share though stagnated. Informal sector is said to have 80% of GDP and seems to provide significant contribution to the actual economic activities of the country.

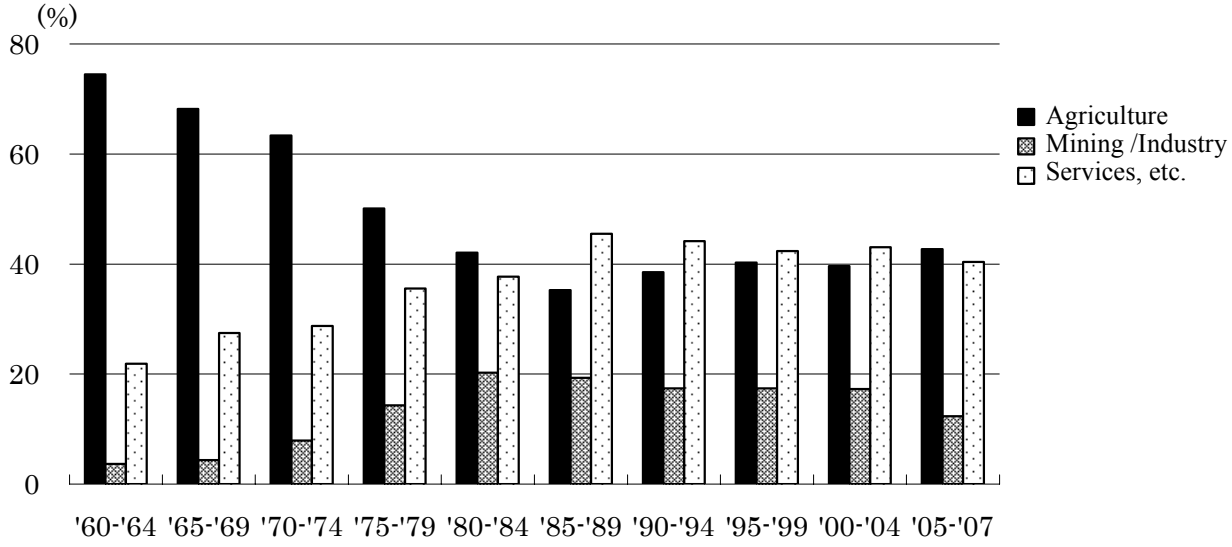


Fig. I.1 Trend of GDP Shares by Sector (1960-2007)

2) International trade

Major export commodities are, in addition to uranium, agricultural products including livestock. In the initial stage after independence, her export commodities consisted mainly of cotton and livestock

products such as meat and hides of cattle and sheep, following the pattern of the colonial days. Later in 1967, uranium deposits were discovered and then in 1977 production and export of refined uranium started. Since then, mining sector has prospered and most of the export earning depended uranium.

However, due to the hovering international market price of uranium in 1980', export of uranium had stagnated. In 1994, for a limited period just after devaluation policy taken, production had increased temporally, but again in 1999 its export turned to declining trend. Further, since 2004, due to soaring international price of uranium, its production and export has been on upward trend. In spite of unstable situation of uranium production and export as observed, there exist no major alternative export commodities to uranium as yet and uranium remains as a single important enterprise covering more than 50% of the total export earnings (Table11). From 2005, gold used for craft products has been included in export commodity in statistics. This resulted in the increase in share of mining sector in total export.

Table I.1 Export of major commodities (2005-2007) (Billon. FCFA)

	2002	2003	2004	2005	2006	2007	(%)
Uranium	62.5	65.6	70.1	78.5	79.6	142.8	69.8
Gold	-	-	-	30.0	20.0	28.3	13.8
Livestock	27.4	26.7	22.6	19.8	21.2	16.8	8.2
(Cattle)	9.3	11.1	10.3	10.3	10.5	8.7	(4.3)
(sheep)	7.8	6.4	5.2	3.3	3.8	3.9	(1.9)
Agricultural Products	17.6	16.4	11.2	16.4	14.2	8.6	4.2
(Cowpea)	2.5	1.6	2.1	1.3	1.0	0.8	(0.4)
(Onion)	13.1	12.6	8.1	13.8	11.7	6.8	(3.3)
Others	10.1	7.5	7.5	15.7	9.3	8.1	4.0

Source: INS (2005, 2008)

Major export destinations of uranium are France followed by Japan. Livestock are mostly exported to Nigeria. Additionally, onion is exported to Cote d'Ivoire and other neighboring countries (ECOWAS).

As for import commodities, food and food related items including cereals, oil and fat and processed food are dominant. According to FAO Statistics, in 21007, about $240 mil. of agricultural products were imported of which 40% were cereals headed by rice (Table1.2). Mineral products, notably petroleum follows food in import (Table1.3).

Table I.2 Export/ import of agricultural products (Million $)

	2000	2001	2002	2003	2004	2005	2006
Agr. Export Total	91.0	58.3	76.9	81.6	90.3	69.2	70.5
Agr. Import Total	115.3	146.0	171.8	189.8	218.4	257.7	238.0
Cereals	37.2	57.0	64.7	54.1	86.4	121.4	88.8
Wheat flour	8.6	11.2	12.8	13.0	9.1	11.2	9.8
Maize	2.5	1.5	2.5	2.4	10.5	7.5	4.4
Rice	24.2	39.6	47.8	37.7	56.9	94.0	63.7

Source: FAOSTAT

Table I.3 Import by commodity (1998-2002) (Million FCFA)

Commodity	1998	1999	2000	2001	2002	(%)*
Food grain and fresh food	39,495	30,100	32,931	48,969	50,522	18.8
Mineral products and petroleum	28,506	27,934	33,836	38,652	50,348	18.7
Processed food	25,483	23,436	24,944	31,652	28,754	10.7
Chemical products	23,147	18,342	23,730	21,212	25,242	9.4
Oil and Fat	14,439	16,619	13,133	15,656	19,600	7.3
Machinery and equipment (Electrics)	6,907	8,801	6,821	9,075	17,684	6.6
Transportation and traffic materials	14,777	13,925	13,582	15,356	16,235	6.0
Machine and equipment (Ex. Electric)	15,759	16,811	10,296	16,836	10,805	4.0
Non metal and non metal products	8,408	8,620	7,635	8,782	9,722	3.6
Textile and textile products	9,146	7,121	9,377	7,966	9,357	3.5

*Share in 2002
Source: CEDEAO

Trade balance of Niger has been chronically negative (Table I.4). In recent years, Niger has nearly achieved self sufficiency for pearl millet and sorghum, but in the year 2005 just after the severe draught, self-sufficiency ratio dropped to 85% (Secrétariat permanent de la SRP 2008). As the next important cereal, rice is imported from Pakistan, China, Vietnam and other Asian countries and Nigeria. From Nigeria, in addition to rice, industrial and mineral products are also imported. Dairy products are mostly from Europe, headed by France and Netherland. Sugar had been mostly from France in the past, but in recent years, import from Brazil has been gradually increasing (ECOWAS).

Table I.4 Trade balance (2001-2007) (Billion FCFA)

	2001	2002	2003	2004	2005	2006	2007
Export	119	117.5	116.1	128	164.7	143.9	205
Import	238.1	275.1	287.2	330.4	361.2	414.3	416
Balance	-119.1	-157.6	-171.1	-202.4	-196.5	-270.4	-211

Source: INS (2005, 2008 (1)

3) Constraints on the economic growth

(1) Natural condition

Most of the agricultural products in Niger are crops for self sufficiency such as pearl millet and sorghum grown under rain-fed condition. These crops cover about 70% of the total cultivated area. Other crops such as onion, cowpea and cotton, important as export commodities, are also grown under the rain-fed condition. As around 65% of the total area have less than 100mm/ year rainfall on average, cultivated area is only 3.5% of the total land area of the country. Irrigation facilities are provided to only 1.6% of the cultivated area (FAO).

Impacts of climate change in recent years in Africa are serious, particularly in Niger, as is located in the southern border of Sahara Desert. Drought and flood damages have occurred repeatedly. Most recently in 2004, minor drought caused damages to self sustaining food and cash crops production (Fig. I.2). In this year, in addition to drought, outbreak of desert locust caused damages to self sustaining cereal crops by more than 20% in some areas, leading to serious food shortages in the following year.

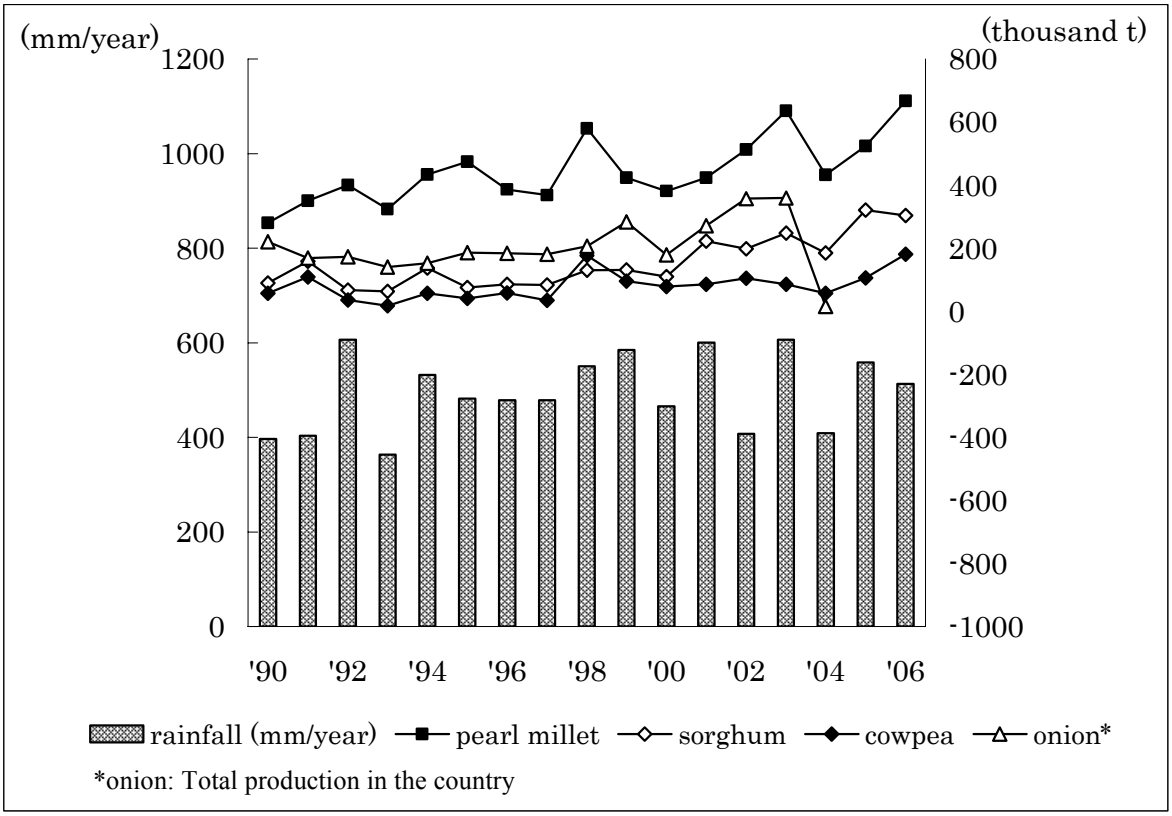


Fig. I.2 Agricultural Production and Rainfall (Maradi Region 1990-2006)

Decreasing arable land and forest by the progressive desertification are noted. The level of water flow of Niger river, the single most important river with perennial flow, has been declining and rising temperature leads to increased transpiration. Torrential downpower within a short period and seasonal wind bring disaster of soil erosion. Agriculture and livestock, which have more than 40% of GDP share, are exposed always to these risks.

(2) Geographical condition

Niger is an inland country surrounded by other countries. Distance from the capital Niamey to Cotonou, the nearest port city is about 1,000km and to Abidjan of Cote d'Ivoire is more than 1,500km. Water level of Niger river is not high enough to accommodate the navigation of big vessel, and extensive Sahara Desert hinders the transportation to the northern Africa. Therefore transportation depends mainly on upland route to the south. Compared to other coastal countries of Gulf of Guinea, naturally cost and time for commodity trade are invariably high. Agricultural products for export are mainly consumed in the region and so it is suited for land transportation. In contrast, rice and wheat flour are imported with additional inland transportation cost. Therefore market prices of these commodities are comparatively higher than in other countries.

Transportation of uranium for export and import of equipment for uranium production depends on the inland transportation. Due to road condition and others, bulk transportation seems to be difficult.

As for domestic transportation, with vast national land area of 3.4 times of Japan, development of

transportation network seems to require huge amount of investment and time. As more than half of the land areas are in desert, whether sustainable benefit is expected to meet the investment needs to be considered, taking into account the survey/investigation results on petroleum and other mineral resources deposit.

(3) Population growth

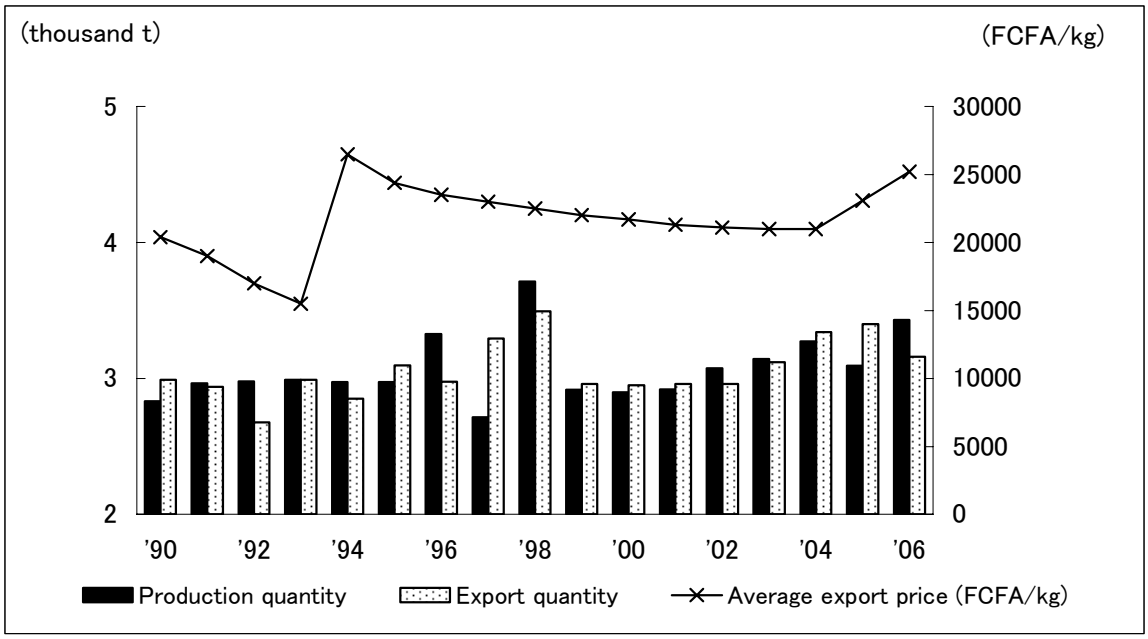
Average GDP growth rate from 2002 to 2006 was 3.9%/year and the rate of inflation in the same period was 1.9% /year. In spite of the food crisis of 2005, the performance of economic growth was quite near to the target of 4.0%. Meanwhile, population growth rate remained very high with 3.1%/year in '90s and in 2006 this has risen to 3.4%. Therefore, total population which was 8 million in 1991, is now 13 million, more than 1.6 times in 2006 (World Bank 2008). Due to this pressure of population increase, actual GDP/capita growth of 2002-2006 remains at only 0.6%/year (Secrétariat permanent de la SRP 2008).

Population growth has also resulted in the negative impact through subdivision of land by inheritance, shortened fallow period, deforestation and overgrazing, together with expanding desertification, all of these being contributing factors to deterioration of agricultural environment and stagnated economic growth. According to FAO estimate, 70,000-80,000ha of forest or pastureland are being reclaimed for farmland every year (FAO 2005).

(4) International demand/supply situation

As stated earlier, major export commodities are mineral products, notably uranium. Cotton is another important export commodity though its share in total export earning is limited. As the prices of these commodities highly depend on the demand/supply situation of the international market and fluctuate highly, the sector has fragility which cannot be solved by domestic industrial policy measures alone. Fig. I.3 shows production, export and price of uranium in recent years. Export price of uranium in '90 had been in declining trend[1], but in recent years it has been rising due to the increased international demand. Time lag between production and export is observed. This might be due to the lack of infrastructure and personnel system to quickly respond to the demand from abroad. Anyway, as production and export are controlled by overseas demand, cautious investment attitude seems to be continued.

[1] In Fig.I.3, sharp rise of price in 1994 is observed. This is due to the devaluation of the currency in that year. As the value of the currency declined to half, actual price could be said to have decreased.



Source: INS (2008)

Fig. I.3 Trends of production, Export and Price of Uranium

(5) Political situation

Since her independence, Niger has experienced repeated military coup d'etat and internal strifes. Changes of administration by 3 military coup d'etat occurred. In 1999, the President backed by army at that time was assassinated at the airport. And since the military confrontation in 1990, between the state power and nomadic tribe Tuareg a number of revolts has been occurring, showing unstable security situation in the country.

Since the inauguration of Presidency by Mamadou Tandja on January 2000, political stability has been recovered, but on February 2007, anti-government party called Niger Justice Movement (Mouvement Nigérien pour la Justice: MNJ) started revolts in various parts of the country by explosion of mine and attacks to uranium investigation facilities. In combat with state army in August 2008, many casualties were recorded. The Government has issued alert for northern area on August 2007 but since then combat remains to continue.

Revolt by MNJ this time was based on their belief that they were politically discriminated and they wanted the profit of uranium export to be returned to the northern area. As the northern area has No.2 large uranium deposits in the world, deterioration of security situation over there has serious consequence to economic growth of the country. Again, in this area he dotted Sahara Desert is the world famous tourist destination. Since revolts in this area rural inhabitants depending on the sale of handicraft have seriously hit by decrease of visitors.

4) Recent economic trend

Record low of GDP growth of 0.8% by minor drought in 2004 caused food crisis in the following year. However, since then the climate has been moderate and agricultural production has been better off.

Together with the favorable situation of mining sector, GDP growth rate of 2005-2007 recorded 5.4%/year (Table1.5). On August 2007, the Government adopted Accelerated Development and Poverty Reduction Strategy : ADPRS in which average annual GDP growth rate was set for 2008-2011 at 5.7%, though World Bank forecasts it at 5.0%, taking note of the performance of 2007 at 3.2% (World Bank2008).

As for foreign debt, taking the debt rescue measures of IMF's expanded HIPCs Initiatives applied on December 2000 as the opportunity, the Government has started action for debt issue. By obtaining loan from Poverty Reduction/Growth Facility (PRGF), the Government has tackled economic reconstruction through public finance and smooth implementation of the Poverty Reduction Strategy since 2002. This has been highly evaluated and thus in February 2004, Niger has achieved to reach Completion Point (CP) of HIPC's. Based on this performance, most of the donors, both bilateral and multilateral, agreed to give up the claim. In addition, through Multilateral Debt Relief Initiative (MDRI), IMF, African Development Bank and others gave up claims of $300 million in total. By these rescue measures, foreign debt decreased in 2006 more than 60% from the previous year of $800 million. Based on the favorable appraisal by IMF on the performance, additional PRGF has been provided in 2005 and 2008. Further in 2008, USA agreed to extend credit of Millennium Challenge Account (MCA).

Quite recently, China has extended credit of $300million for oil factory (petroleum refinery). Since 2004, in the midst of soaring international price of mineral resources led by uranium, (gold, iron ore, copper, tin, lime, coal, phosphorous etc), investment from abroad are increasing, giving a positive prospect to Niger's economy.

Table I.5 Major macro economic indicators (2001 - 2007)

	2001	2002	2003	2004	2005	2006	2007
GDP Annual growth rate (%)	7.1	3.0	4.4	-0.8	7.4	5.2	3.2
GDP growth rate per capita (%)	*	1.9	-0.1	-4.1	3.9	1.5	*
GNI per capita ($)	170	170	200	220	250	270	280
GNI PPP per capita ($)	530	530	570	570	600	630	630
Inflation rate (%)	4.0	3.0	-2.9	0.6	6.8	1.8	3.0
Debt overseas (Million $)	1587.4	1786.5	2069.9	1973.1	1979.9	805.0	*

Source: World Bank (2008), INS (2005, 2008) * lack of data

2. Target of Development and Status of Agriculture and Forestry

1) Poverty Reduction Strategy (PRS)

In 2000, Niger was approved as a country to be rescued by HIPC's Initiatives.

By this, Niger could obtain PRGF'S loan from IMF but also was required to accept a number of obligation as a precondition of this loan. One of these commitments is the formulation of the Poverty Reduction Strategic Paper (PRSP). PRSP consists of policies and programs the Government intends to implement on macro-economic, financial and social development issues, for the economic growth and poverty reduction. It also includes necessity of loan from abroad. It took 2 years for the preparation of

PRSP and on January 2002, Poverty Reduction Strategy was officially announced.

In line with the Millennium Development Goals (MDGs) of the U.N. adopted on September 2000, PRS aims to reduce ratio of poverty to 50% by the year 2015 as a primary goal of the strategy, including comprehensive issues such as stabilization of macro-economy, improved access to social services and infrastructure, improved governance, economic development led by private sector, capacity building etc. Basic principles of sector-wise strategies were also prepared in PRS and wide ranges of strategic documents have been issued. (Table I.6)

2) Accelerated Development and Poverty Reduction Strategy (ADPRS)

The Government of Niger prepared ADPRS, which was the 2nd Poverty Reduction Strategy, on August 2007. This was submitted to the Donors' Meeting at Brussels on October of that year and accepted as the sole and common framework for the development assistance by donors. The ADPRS document reviews the performances of PRS from 2002 to 2006 and indicates development goals and targets for the following 5 years. In ADPRS review, such social development indicators as, decrease in infant mortality, increased enrollment of primary school, improved access to safe drinking water were well appreciated, and decentralization, improvement of governance and monitoring of the development policies by the establishment and operation of National Statistics Institute (INS) were noted as the remarkable performance. However, review also pointed out that as economic growth highly depended on unstable agriculture that was vulnerable to climatic conditions, actual economic growth remained low and, in addition to such important sectors as education, health, drinking water and energy, new development needs for transportation, information and communication were emerging and thus delayed in achieving MDGs. As the contributing factors, insufficient economic growth, population increase, lack of fund for infrastructure and others, inefficient program implementation, lack of human resources and organizational capacity for the implementation of the development policies were raised. Further, such issues were also pointed that the opportunities for consultation were limited after adoption of PRS among concerned parties, monitoring works were concentrated to the Government, participation of citizen in monitoring were limited, official announcement of the results was not enough etc.

Based on the examination study, mid-term review was decided to be made by 5 years (2008-2012) against 3 years of the previous one, so as to actively implement poverty reduction strategy on the medium and long term perspectives, and prepared Action Plan to be closely linked and coordinated to the regional programs of MDGs and NEPAD. In the Action Plan, various indicators to be achieved in 2012 were presented and to achieve these indicators, 7 strategic guidelines were reconstructed (Table I.6). On Agriculture/Rural Development, in 1.1 (Promotion of economic growth factors with high potentials of job creation), it is elaborated in detail referring to Rural Development Strategy (SDR). However, for the implementation of the Action Plan, as 72.1% of the required fund is expected to depend on foreign resources, assistance from overseas seems to be the key for realization of the plan.

Table I.6 Comparison of the framework of PRS and ADPRS

Poverty Reduction Strategy (PRS)	Accelerated Development and Poverty Reduction Strategy（ADPRS）
Overall goal Reduce poverty ratio to 50% by 2015 Specific goals and strategic guideline 1. Ensure steady and sustainable growth 1.1. Set out a stable macro-economic framework 1.2. Ensuring sustainable growth in rural production 1.3. Taking maximum advantage of opportunities offered by the regional integration. 1.4. Improving public finance management policy 1.5. Private sector promotion 2. Developing the productive sectors 2.1. Rural sector and food security 2.2. Infrastructures, mines and energy 2.3. Private sector, tourism and handicraft 3. Ensure access to basic social services by the poors 3.1. Education 3.2. Water and Sanitation[1)] 3.3. Health HIV/ Aids 3.4. Access to safe water and sanitation 3.5. Urban development 4. Improve governance and strengthening human and institutional capacity 4.1. Improving governance 4.2. Transparency and corruption control 4.3. Strengthening human and institutional capacity 4.4. Developing Information and communication technology	Overall goal Reduce poverty ratio to 50% by 2015 Strategic goals 1. Explore dynamic, diversified, sustainable and employment-created growth 1.1. Promote economic growth with high potentials and creating job opportunity 1.2. Promote development on local basis 1.3. Strengthen macro economic framework 1.4. Strengthen global competitiveness of Nigerien economy 1.5. Participate in regional and global markets 1.6. Promote art and culture 2. Equitable access to Social services with high quality 2.1. Promote education and vocational- technical training 2.2. health improvement 2.3. Reduce undernourishment 2.4. Improve access to drinking water 2.5. Urban and Habitat development and sewage treatment 2.6. Improve access to modern energy services 2.7. Promote regular employment and income generation activities 3. Control population growth 3.1. Reproductive health, family planning･ 3.2. Countermeasures to early marriage and every possible female discrimination 3.3. Make customary of breast feeding for the health of mother and baby 3.4. Enlighten opinion leaders and communities on improving measures related to child delivery 4. Reduce inequality and strengthen social protection to vulnerable groups 4.1. Ensure gender equality 4.2. Ensure Child Protection 4.3. Support healthy growth of the youth 4.4. Develop social protection to deprived groups 4.5. Forecast the risk of natural disasters 5. Development of infrastructure 5.1. Transportation 5.2. Information communication technology 5.3. Increase energy supply 5.4. reinforce public heritage 6. Promotion governance of high quality 6.1. Strengthen political governance 6.2. Enhance the rule of law and judiciary reform 6.3. Strengthen administrative governance 6.4. Improve economic governance 6.5. Strengthen local governance 6.6. Social participation 7. Effective Implementation of the ADPRS 7.1. Improve formulation of public policy 7.2. Augmented and Effective Allocation in line with the priority set by ADPRS 7.3. Provide high quality services to the poor

	7.4. Establish monitoring/ evaluation system by rewarding rules. 7.5. Strengthen manpower, facility and organizational structure 7.6. Risk management and forecast

Note[1)] Duplication is observed with Strategy "3.4." but followed original text.
Source: Secrétariat Permanent de la SRP 2002 and 2007.

3) Rural Development Strategy（SDR）and problems to be tackled

The preparatory work of Rural Development Strategy (SDR) had started on December 2001, just in advance to the adoption of Poverty Reduction Strategy (SDR) with participatory manner by various actors involved in rural development, such as the Government, donors, producers' organizations, NGOs and others with their active discussions. Through these discussions and works, SDR was officially adopted on December 2003 by the Government.

The SDR defines outline of the strategy, general goals, strategic principles, expected results, and adds 14 sectorial programs led from the consideration on rising problems and their courses of solution. (Fig I.4)

Overall targets are shown in the form of required indicators to achieve the goals of Poverty Reduction Strategy. To achieve this, 3 specific targets are set in the form of 3 strategic principles. These principles are ①Improved access of rural inhabitants to economic activities ②Food security and conservation of environment, and ③Capacity building and strengthening organizations of rural inhabitants and extension workers. Led from these are 10 structural programs and4 priority sectors**,** all of them are introduced from either currently operational or at planning stage of the projects with support from donors. Therefore, future projects to be implemented by the Government and /or donors need to follow automatically this program.

After adoption of SDR, preparation of Action Plan for each program started in 2004 as a 3rd stage of planning operation. Planning operation of the draft Action Plan consists roughly of two parts, one for logical frame and another on collection and analysis of project information (including assessment of budget requirement for projects from now on) for Middle Term Expenditure Framework (MTEF). In 2006, Action Plan and MTEF were approved in advance, but until the end of 2007, this Action Plan was not yet operational.

ADPRS succeeded PRS, also emphasizing rural development as an engine for economic growth and specifically elaborated SDR. From now on, it seems to be a challenge that how these 14 sectorial programs (23 if sub-programs are included) will actually be implemented with the leading role of the Government.

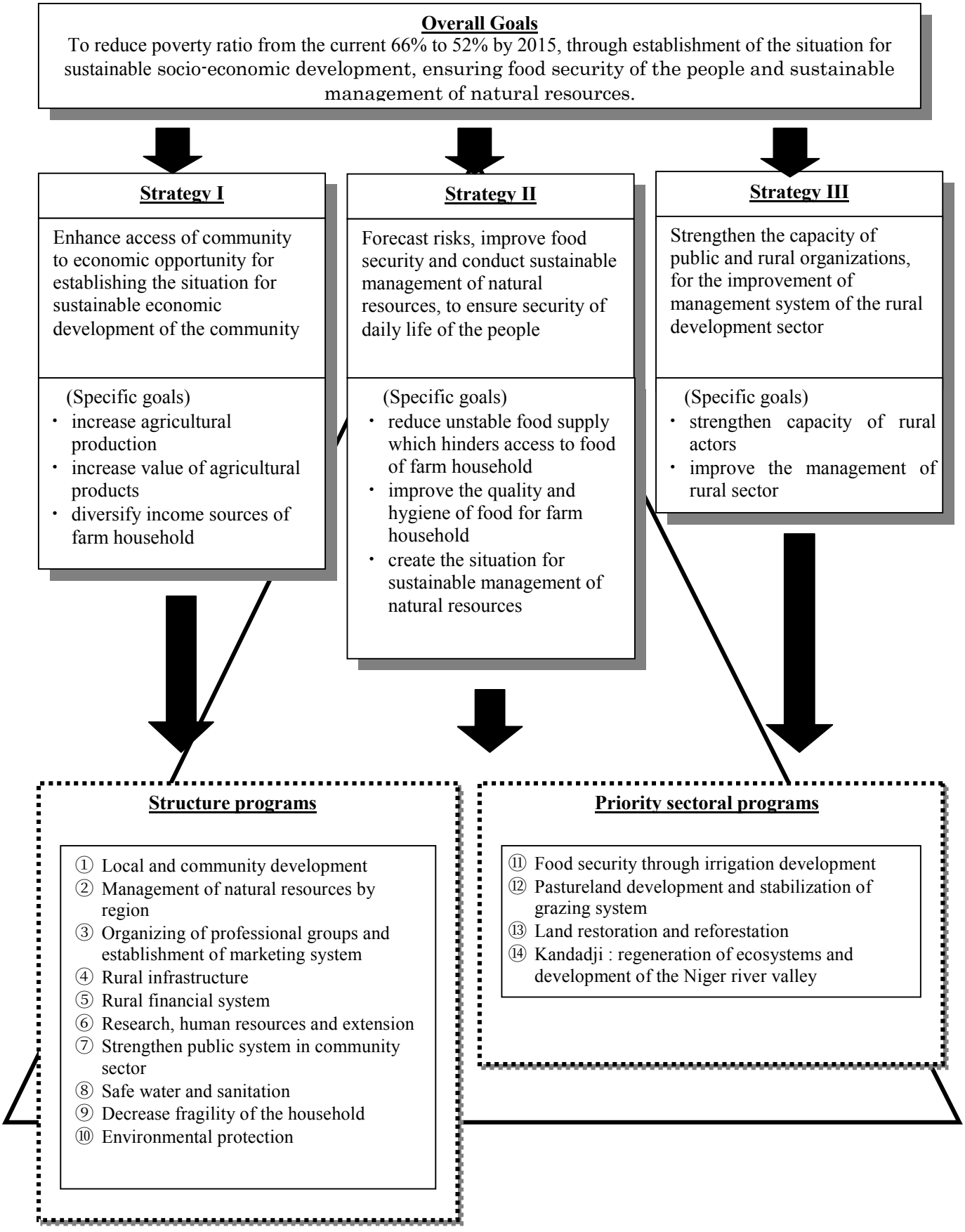


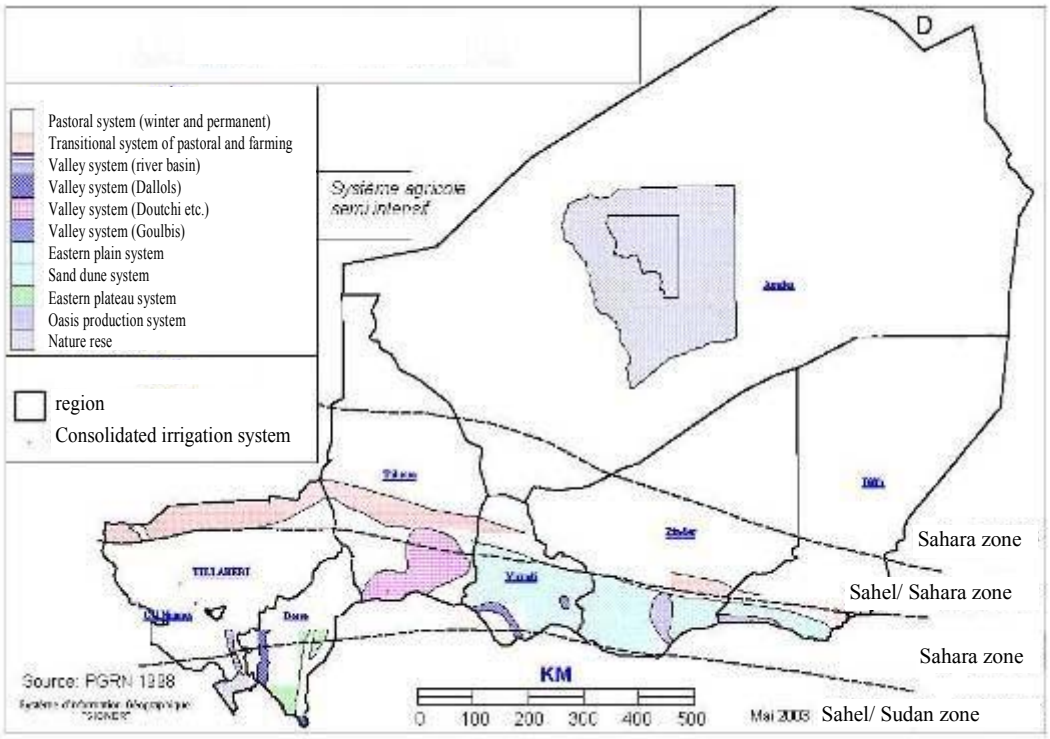
Fig. I.4 Framework of SDR

CHAPTER II. TREND OF AGRICULTURE AND FORESTRY DEVELOPMENT

1. Current Situation of Agricultural Production

1) Agricultural system

According to [Rural Development Strategy, Nov.2003], issued by the Bureau of Poverty Reduction Strategy of the Prime Minister's Office, agricultural system of Niger is classified into 5 types further subdivided into 11 categories.



Source: SDR 2003

Fig. II.1 Distribution of Agricultural System

(1) Northern Pastoral System

This system covers the whole areas of Sahara zone (rainfall less than 150mm/year) with 77% and Sahel-Sahara zone (Rainfall 150mm-350mm/year) with 12% share of total national land area, located in the northern part of the country. All of the Agadez region, most of the Diffa region, northern halves of Tahoua and Zinder regions, Northern part of Maradi region and Northern border of Tillaberi region are included in this system.

Basically limited in supply of grass for feed, nomadic activities of goats and camels are the

dominant feature of this system. Though this vast extending area has potentials for nomadism, severe natural condition and lack of water resources hinder the development of productive nomadic system.

(2) Transitional system from pastoral to sedentary farming

Located in the southern part of Sahel / Sahara zone, it had been nomadic area originally. In spite of the law enacted in 1961 to prohibit crop cultivation in areas of rainfall less than 350 mm/year, pasture land has been turned to farmland; due to increasing population. This area is vulnerable to the climate change and in addition to low productivity, has been exposed to the menace of desertification. The area of this transitional system is an important for nomadic system as a most appropriate from the viewpoint of land use. There may exist possibility to avoid friction with farmers in the south if the intensive livestock farming system is developed in this area.

(3) Rain-fed agricultural system

① Sand dune system

Annual rainfall exceeds 400mm, but sand dunes extend widely, from the northern part of the regions of Tillaberi and Dosso to the central part of Tahoua and south western part of Diffa. Nomads are limited here, as single crop of pearl millet production and intensive livestock production are popular. However, cereal production does not meet local requirement. In parallel to population increase, soil fertility is deteriorating as fallowing period is being shortened, progressing wind erosion and ponds and basins are being buried by sands.

② Eastern plain system

The system is located in the Eastern part of Sahel zone (rainfall 350-600mm, 10% of the total land area) connecting cross-wise to the south of Maradi and Zinder regions. Semi-intensive farming/ livestock system is common, with growing *Acacia albida* (*Faidherbia albida*) for agro-sylvo-pastoral system and provide more than half of cereals in the country. Though intensification of farming and shortened fallow period are going on, mixed farming of cereals with cowpea and ploughing by animal are widely observed. Fattening of cattle and sheep are widely practiced.

③ Western plateau system

This system covers the area of southern part of Tillaberi region and most of the Dosso region, where spotted bush and tiger bush are widely distributed, in the Sahel- Sudanese Climatic zone (rainfall 600mm to 800mm, 1.0％ of total land area).

Utilization of natural forest to livestock are fairly preceding compared to other area. In lowland Dallol valley (fossil valley), Ronier palm and Doum palm have been introduced while in the higher part of the plateau, fuel trees are being introduced. In areas surrounding forest, agro-sylvo-pastoral system is adopted, combining crop growing with cattle raising in the forest. Further, in the basin with available water, growing of vegetable in dry season are expanding.

In this area, in addition to the issue such as increasing number of farmers and herders and their land title, problem is arising on the ways for harmonious development and utilization of national forest resources by sedentary livestock farmers who have been living for several generations.

(4) Oasis and irrigated farming system

① Valley system

This system is semi-intensive farming one of growing vegetable in dry season using irrigation. This system is applied in various part of the country, particularly in Dallol (fossil valley), Goulubis, Maggia and Tarka of the Maradi region and Zinder region, clearly differentiating from consolidated irrigation system in the basin of Niger river and flood plain of Komadougou river which will be mentioned later. Production includes wide range of crops, such cereals as wheat and maize, root crops as cassava, potatoes and sweet potatoes, vegetables and fruits. Small scale motor-driven water pumps are used. Improved technology is relatively well defused. Rather than domestic consumption, production is more oriented to the market, including export for cash income. Double cropping might be heavy burden to soil fertility, but it seems attractive for farmers from the point of profitability. In addition to the problem of ensuring stable water resources, preservation of product, particularly of onion, is the important issue. Though this farming system is of the highest productivity in Niger, it is difficult to expand this nationwide due to the limited water resources.

② Oasis production system

This system is adopted at oases in Agadez region and Maine-Soroa district of Diffa region. Crops grown are very diverse, including cereals, vegetable, fruits and fodder crops. Crops and livestock (sheep and goat) are well combined and camels are widely used to pump up the well water.

Oases are relatively immune to climatic change and to unstable rainfall. Food security of the household is ensured through stable crop production. Oases are also the supply sources of high quality food crops and livestock products.

③ Consolidated irrigation system

In the past, this system had been introduced in various part of the country. However, practically it is now operational only for rice growing in Niger river basin. In other part of the country, more diversified crops such as sorghum, wheat, vegetable, cotton etc., were grown. Though they had potential for intensive and stable production, problems on operation and maintenance of antiquated facility and equipment and marketing of the products hindered the sustainability of the system.

(5) Other system

① Suburban system

In response to the increasing urban population (annual population growth rate '90: 5.3%, 2001: 13%, 2020: 30% estimate) demand for food is rapidly increasing. Food import (rice, palm oil, sugar, dairy products, wheat flour etc.) of Niger accounted for 47% of the total import or 226.5 billion FCFA of the total import of 56.5 billion FCFA (source: DSCN 2000). Major part of these import are consumed by urban dwellers. Responding to the growing demand of urban dwellers, production of cow milk, horse, vegetable and fruits are gaining momentum together with cereal crops in suburban system. Proximity to urban area is an advantage in transportation of cash crops and this encourages intensive cultivation. On the other hand, expanding urban area is increasing pressure on farmland.

② Nature Reserve

Niger has relatively abundant wild flora and fauna in West Africa. There exists many sanctuaries covering more than 80,000km^2 in total. Particularly in "W" National Park located from southern part of Niamey to the border with Benin and Burkina Faso and Air-Tenere Reserve of mountain-desert area of Agadez region have unique flora and fauna and are called for rational and comprehensive development including eco-tourism by local inhabitants.

Due to successive unstable rainfall and drought, isohyetal line in Niger is said to have shifted 80-100km southward compared to that of 60'. In addition to the constraints of both natural and man-made, population pressure is increasing. Under the circumstance, in what way agriculture will be developed? In the following chapter, a number of typical cases will be introduced.

2) Types of agriculture and current situation of production

(1) Rain-fed agriculture

Rain-fed agriculture in Niger is classified by their location into Sand Dune system, Eastern Plain System and Western Plateau System. However, basically Eastern Plain is the most favorable and suitable area for cultivation from the viewpoints of rainfall, topography and soil.

Historically, in parallel to the increase in population, cultivated area has been expanded gradually to the sand dune area in the north and forest on the plateau in the west. Crops grown in these areas will be observed.

① Pearl millet and sorghum

Rain-fed farming (growing such cereals as pearl millet, sorghum, maize etc., beans such as cowpea and ground nut) without any type of irrigation is the dominant feature of farming in Niger.

Statistics of millet and sorghum's combined production from 1980' until 2001 prepared by WFP shows that cultivated area for 5 year average of '80-84 was 4,099,952ha, and it increased to 7,764,696ha for 5 years average of '00-04, being 1.89 times to the former. Increase in planted area during the past 20 years was 3,664,744ha, with yearly increase at 183,237ha.

As for production, from 5 year average of '80-'84, at 1,535,70t, it increased to 2,889,775t for '00-'04 average, with yearly increase by 67,700t.

Planted area/capita and production/capita show no significant changes, as the planted area and production/capita in 5 year average of '80-'84 was at 0.7ha and 260kg respectively, while corresponding figures for '00-'04 were 0.7ha and 254 kg respectively.

Similarly, from the aggregated figures of planted area and production of pearl millet and sorghum, yield in '80-'84 was 374kg/ha and 372kg/ha in '00-'04, with no significant change.

Some reports, (for example, Report on sector-wise diagnosis on environment and desertification, Sept. 2005: MHELCD) describes that "In the past 15 years, yields of pearl millet and sorghum have declined. Pearl millet 406kg/ha→388kg/ha and sorghum 319kg/ha→ 206kg/ha. This means that increase in production is the result of increased planted area". However, WFP statistics shows no change in yields of pearl millet and sorghum. More important problem would be that, as many documents describe, for many centuries, not only for 20 years, traditional farming practices have been adopted without change, and this might have caused stagnated yield of pearl millet and sorghum. However there exists fact partly undeniable on yields in the description of the above mentioned (Report on sector-wise diagnosis on environment and desertification, Sept. 2005: MHELCD).

Table II.1 Pearl millet and sorghum (planted area, production and per capita index)

Year	Population	Pearl millet and Sorghum			
		Planted area(ha)	Production(t)	Area/capita (ha)	Production /capita (kg)
1980	5,578,000	3,840,490	1,730,780	0.7	310
1981	5,763,000	4,070,568	1,635,492	0.7	284
1982	5,954,000	4,218,384	1,651,279	0.7	277
1983	6,151,000	4,242,140	1,653,760	0.7	269
1984	6,355,000	4,128,179	1,007,538	0.6	159
Av.(80-84)		4,099,952	1,535,770	0.7	260
1985	6,565,000	4,310,931	1,774,113	0.7	270
1986	6,783,000	4,348,597	1,743,559	0.6	257
1987	7,008,000	4,359,029	1,362,777	0.6	194
1988	7,240,000	4,995,768	2,326,505	0.7	321
1989	7,480,000	5,094,042	1,754,605	0.7	235
Av.(85-89)		4,621,673	1,792,312	0.7	256
1990	7,728,000	6,942,899	2,045,960	0.9	265
1991	7,967,568	6,456,77	2,314,991	0.8	291
1992	8,214,563	7,519,314	2,171,693	0.9	264
1993	8,469,214	6,099,128	1,714,310	0.7	202
1994	8,731,760	6,950,251	2,368,538	0.8	271
Av.(90-94)		6,793,673	2,123,098	0.8	259
1995	9,002,444	7,164,356	2,034,983	0.8	226
1996	9,286,395	7,138,358	2,172,213	0.8	234
1997	9,574,274	6,386,922	1,641,530	0.7	171
1998	9,871,071	7,607,398	2,894,013	0.8	293
1999	10,177,080	7,449,871	2,772,346	0.7	272
Av.(95-99)		7,149,381	2,303,017	0.7	239
2000	10,492,569	7,306,951	2,049,890	0.7	195
2001	11,060,261	7,835,456	3,022,350	0.7	273
2002	11,403,160	7,816,590	3,236,927	0.7	284
2003	11,756,658	8,041,222	3,502,464	0.7	298
2004	12,121,114	7,823,260	2,637,242	0.6	218
Av. (00-04		7,764,696	2,889,775	0.7	254
Av.(80-04)		6,085,875	2,128,794	0.72	253

Source: Collection and analysis of secondary data.
Rapport d'analyse de la sécurité alimentaire et de la vulnérabilité au Niger, PAM, juillet 2005

Traditional rain-fed agriculture has been the culmination of ingenious wisdom of the farmers. Farmland of declined fertility by crop growing is put to fallow for several years, or 10 years, waiting for the recovery of soil fertility. Cycle of land use system includes fallow period. However, this system is now facing serious difficulty. Increased pressure on farmland due to population increase does not allow appropriate management of cycle of land use practiced in the past.

As virgin land with high soil fertility is no more available, shortening of fallow period proceeds and finally fallow period will be suspended. Therefore, yield decline could not be avoidable in the land of degraded soil fertility.

Separate method of analysis for pearl millet and sorghum, other than WFP Statistics will clarify the above. [Trend of planted area, production and yields of major crops. 1980-2001]

Direction de l'Agriculture/MDA, which seems to be the basic data for the above mentioned Report on sector-wise diagnosis on environment and desertification, Sept. 2005: MHELCD describes that, average yield in 5 years of '80-84 was 391.8kg/ha for pearl millet and 322.2kg/ha for sorghum. Corresponding figures in 5 years of'97-'01 were 393.5kg/ha and 209.6kg/ha. While yield of pearl millet remained unchanged, sorghum showed sharp yield decline of 112.6kg/ha, or 65% during this 17years.

Aggregated yield of pearl millet and sorghum make the situation of respective yield obscure by the difference of ratio of planted area of each crop. Meager increase in millet production compensates substantive decline of sorghum production.

Table II.2 Trend of planted area, production and yield of pearl millet and sorghum

Year	Pearl millet			Sorghum		
	Planted area (ha)	Production (kg)	Yield (kg/ha)	Planted area (ha)	Production (kg)	Yield (kg/ha)
1980	3,072,420	1,362,785	444	768,070	367,995	479
1981	3,088,248	1,313,842	425	982,320	321,650	327
1982	3,083,804	1,292,548	419	1,134,580	358,731	316
1983	3,135,550	1,298,345	414	1,106,590	355,415	321
1984	3,029,730	771,040	254	1,098,449	236,498	215
Av.(80-84)	3,081,950	1,207,712	391.8	1,018,002	328,058	322.2
1997	4,503,635	1,351,868	300	1,883,287	289,662	154
1998	5,366,055	2,391,282	446	2,241,343	502,731	224
1999	5,351,203	2,296,227	429	2,098,668	476,119	227
2000	5,151,395	1,679,174	326	2,155,556	370,716	172
2001	5,231,937	2,358,741	451	2,603,519	663,609	255
Av.(97-01)	5,120,845	2,015,458	393.5	2,196,475	460,567	209.6

Source: Direction de l'Agriculture/MDA

Sorghum requires more water than pearl millet and mostly grown at flood plain and areas with better access to water in southern border with Sudan. In contrast, pearl millet can be grown even in the area of rainfall less than 300mm/year, with high adaptability to dry land.

Decline of sorghum yield could be attributed not only to the effect of climatic change but also to the difficulty to find the virgin land, and decreasing fallow period in the Eastern plain area. More than 90 % of the total population live in this area.

In case of pearl millet, production started by the small population in the northern part with scarce rainfall, originally under nomadic system, and could gradually extend to the western plateau forest of favorable rain fall. Traditional land use cycle by fallow system could have been continued and thus they could avoid degradation of soil fertility and yield decline.

However, population increases rapidly. Total arable land of Niger is said to be at 1.5 million ha, around 12% of the total national land area. Cultivated area in 2003 has already surpassed 0.8 million ha and in 2006 it's getting near to 0.9 million ha. If the fallow lands are taken into

consideration, it seems that the expansion of farmland has already reached to the northern limit without any more virgin land for cultivation. Land in the northern part with scarce rainfall requires long period for the recovery of soil fertility. Furthermore, in addition to soil erosion, wind erosion, soil degradation and sand dune movement, irregular rainfall and outbreak of desert locust are the serious threat expected at least every 3 years. In future, possibility of losing fallow period will high.

Problems surrounding sorghum production in the south will be occurring to pearl millet in near future if the current situation remains to continue.

Table II.3 Trend of planted area, production and yields of cowpea, maize, groundnuts (1982-2001)

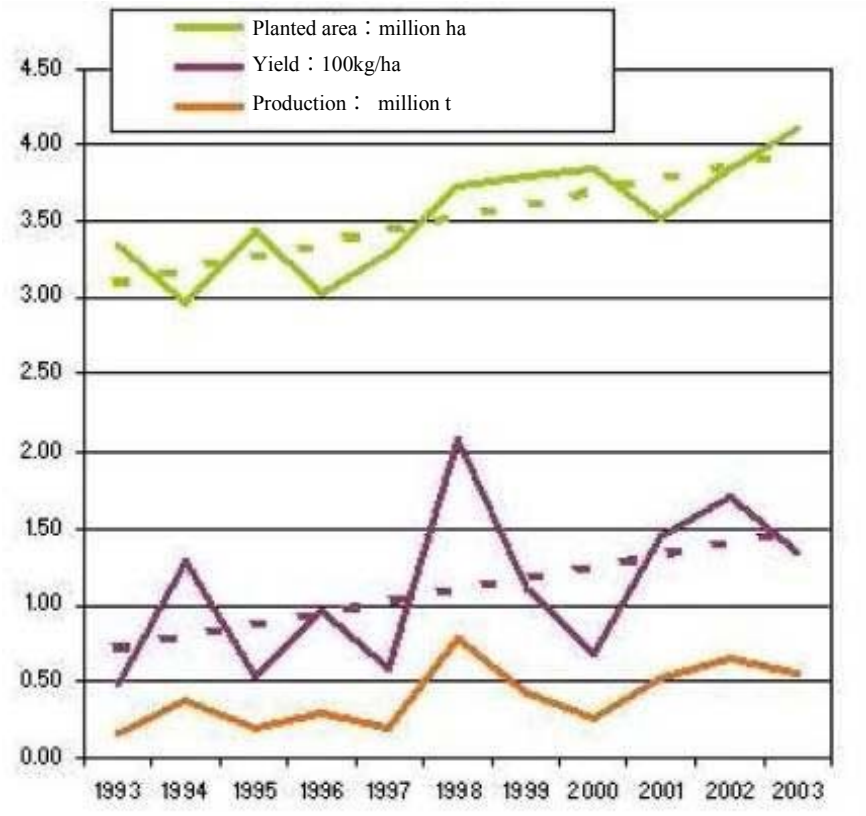
Year	Cowpea			Maize			Groundnut		
	Area ha	Production ton	Yield kg/ha	Area ha	Production ton	Yield kg/ha	Area ha	Production ton	Yield kg/ha
1982	1,427,948	281,744	197	12,545	7,280	580	190,385	87,484	460
1983	1,608,525	271,349	169	10,515	6,690	636	167,560	74,970	447
1984	1,512,739	194,843	129	10,700	7,055	659	142,600	30,800	216
1985	1,566,199	115,332	74	7,200	3,400	472	29,700	8,400	283
1986	1,590,541	292,935	184	9,400	6,100	649	118,200	54,500	461
Av.(82-86)	1,541,190	231,241	150.6	10,072	6,105	599.2	129,689	51,231	373.4
1987	1,790,809	208,768	117	14,019	7,778	555	158,244	40,427	255
1988	1,925,194	301,549	157	9,560	4,947	517	78,256	12,921	165
1989	2,209,460	320,496	145	3,035	1,977	651	59,518	25,522	429
1990	2,662,503	223,543	84	5,600	1,759	314	62,766	17,533	279
1991	2,866,153	381,207	133	1,255	946	754	103,533	39,664	383
Av.(87-91)	2,290,824	287,113	127.2	6,694	3,481	558.2	93,463	27,213	302.2
1992	3,898,409	402,319	103	2,276	974	428	175,180	57,100	326
1993	3,357,718	162,823	48	499	73	146	84,702	20,152	238
1994	2,966,418	382,578	129	2,407	1,752	728	151,036	67,433	446
1995	3,439,112	184,062	54	1,582	1,293	817	269,294	111,092	413
1996	3,041,227	295,243	97	2,302	376	163	416,055	195,970	471
Av.(92-96)	3,340,577	285,405	86.2	1,813	894	456.4	219,253	90,349	378.8
1997	3,295,570	192,453	58	2,583	3,000	1161	232,502	87,873	378
1998	3,720,167	774,630	208	5,378	5,130	954	229,719	112,136	488
1999	3,793,793	420,671	111	nd	nd	nd	250,101	103,733	415
2000	3,846,277	262,657	68	6,149	3,920	638	360,338	113,216	314
2001	3,512,464	509,469	145	8,901	2,325	261	192,321	82,006	426
Av.(97-01)	3,633,654	431,976	118.0	5,753	3,594	753.5	252,996	99,793	404.2

Source: Direction de l'Agriculture/MDA nd : no data J-64

② Cowpea

Cowpea is usually planted with major cereal crops such as pearl millet, sorghum, maize etc., using spaces between these crops. Therefore, in parallel to the increase in cereal planting, cowpea's planting area and production have been increasing year by year. Cowpea is the 3rd important crop following pearl millet and sorghum, and important cash crop such as onion. As high value cash crop, it is priced at 600,000-900,000 FCFA/t. About 80-90% of total production are exported and export value stands at 3rd following onion and livestock. Strong demand from Nigerian and other existing markets influence cowpea production both positively and negatively.

Niger and Nigeria have been the major cowpea producers in the world, but in recent years, Burkina Faso is increasing cowpea production. In general, many neighboring countries bordering with Niger are seeking the way for technical improvement by concentrating production to one specific variety. But in Niger, this sort of effort has not been taken. Judging from the statistical information, it is apparent that both planted area and yield are increasing. (Planted area of cowpea increased from1,566,200ha in 1985 to 4,000,000ha in 2003).



Source: Pini & Tarchiani 2007: 17

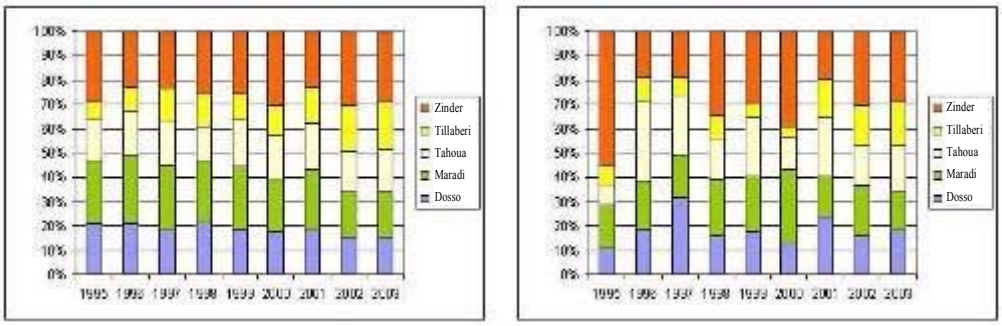
Fig. II.2 Trend of planted area, yield production of cowpea

Yield of cowpea fluctuates year by year, caused by rainfall and insect damages. According to

official report, production in 1985 was 115,000t while that in 2000 was 500,000t, perhaps depending mainly on expansion of planted area rather than yield increase.

Average annual harvested volume for home consumption and sales is estimated at 340,000t. As the domestic consumption is estimated at 80,000t (7.82kg/capita/year), around 260,000t (70%) are considered to have been exported.

Nigeria's demand for cowpea is the highest and her annual demand of cowpea is estimated at 2,400,000t. Domestic production cannot suffice the demand. Therefore, Nigeria needs to import 300,000-500,000t of cowpea every year from abroad. At the moment Nigeria is the biggest importer of Niger's cowpea, with the share of 70-80% of Niger's total export.



Source: Pini & Tarchiani 2007: 18

Fig. II.3. Trend of planted area and production of cowpea in each region 1995-2003

Production of cowpea in Niger is concentrated in 5 major agricultural regions, among which Zinder is the top producer with the share of 30%, followed by Maradi. In Zinder, 40% of the total production are from 30% of the total planted area, while in case of Maradi, 30% of the production come from 20% of the planted area. In other regions cowpea production is negligible.

Cowpea is also an important crop for food security. If the surplus is sold by the average price of 2001-2003 (178FCFA/kg), it will be able to purchase necessary food for 1.5 million people.

③ Maize

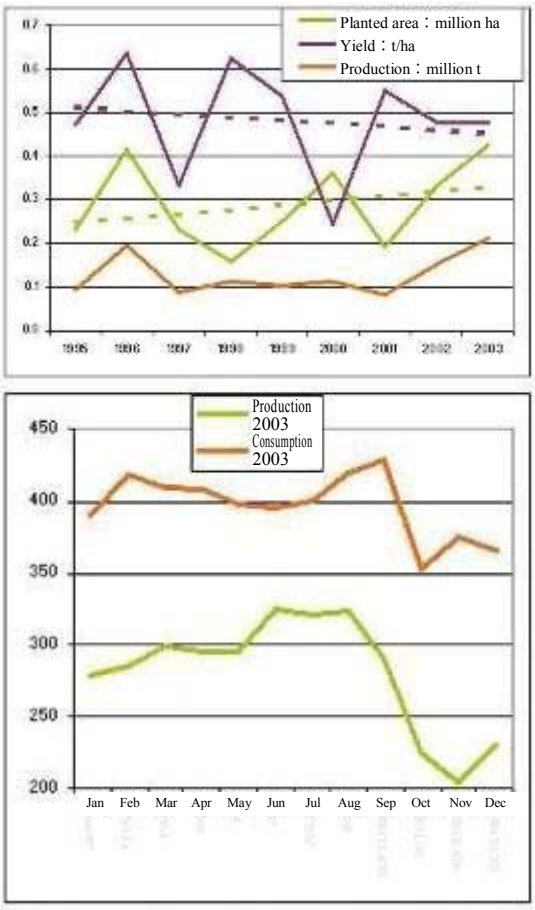
Maize is not planted widely in Niger. Its yield fluctuates widely by the years and is seen as a most unstable crop. However, it is reported that maize is also produced in oases and is an important income source of oasis farmers with such crops as cassava and date (Etude filieres agricoles et forestieres/PAGRN).

Average yearly import of maize for 1999-2004 was 37,146t, of which 20% or 7,256t were from Benin and 44% or 16,480t were from Burkina Faso, Mali and others. Domestic production was less than 10% of the total import.

④ Groundnut

Groundnut has maintained its importance as an export crop since independence in Niger.

Production had been maintained at the level of 250,000t, but in '90s it decreased to 17,000t.Severe draught in 1972-74 might have caused decrease in planted area together with the degradation of soil fertility. However, import of both groundnut and peanut butter from Nigeria might have been one of the contributing factors to the decrease in groundnut production. Since 1995 production had been recovering to the level of 100,000t, and sharp increase in production started in 2001 and it reached to 200,00t in 2003. Increased production depended on expanded area planted, though yield has been declining.



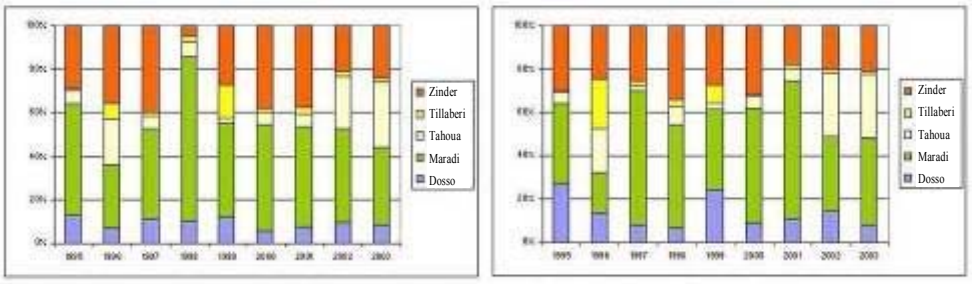
Source: Pini & Tarchiani 2007:12

Fig. II.4 Planted area, yield and production of groundnut (1995-2003)
Producer's and consumer's price movement in 2003

Major producing areas are Maradi and Zinder regions. In the past 2 years (2005-06), production in Tahoua region is also increasing. Ridging for seeding and use of donkey for ploughing are rather fresh scenery in Niger where farming operation depended traditionally on manual labor. Market price of groundnut is not stable. Usually merchant buy groundnut from farmers in September-October, just after harvest, and reserve them around 6 months waiting for highest price.

After the collapse of SONARA (Corporation for groundnut), official control of groundnut

marketing became difficult and now big traders play the leading role in the market. In the course of this development, farmers are forced to face with lower price and income.



Source: Pini & Tarchiani 2007:13

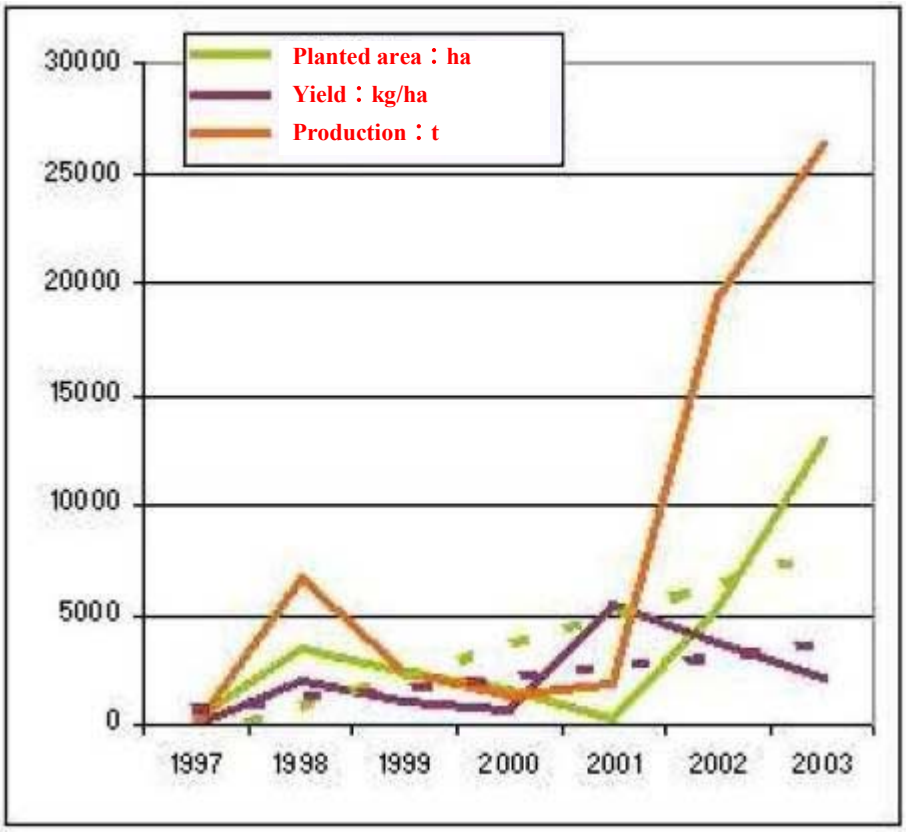
Fig. II.5 Distribution of planted area and production of ground nut by regions
Left: planted area, Right: production

Groundnut has the share of 2% of the total agricultural export. For domestic consumption are home use such as peanut oil and others, followed by animal feed. Peanut oils traditionally made by rural women in groundnut producing area as a way for cash earning. Industrial production is monopolized by Olga Co. Ltd., with capacity of45,000t at material basis without husk. In 2002, the company produced 5,000t of peanut oil and 1,500t were exported, of which 90% to Nigeria.

⑤ Tiger nut

Tiger nut is one of the rainy season crops with high market value. Mostly used for biscuit and beer brewery, particularly for beverage production. Domestic consumption is relatively limited. Almost 75% are exported to Nigeria. Then, through the hand of traders, it is exported further to Spain, the biggest buyer of tiger nut. In Spain, tiger nut is called as *Chufa,* and used as the material of drink called *archada.* Market of tiger nut in Spain is limited to Valencia and its neighboring area.

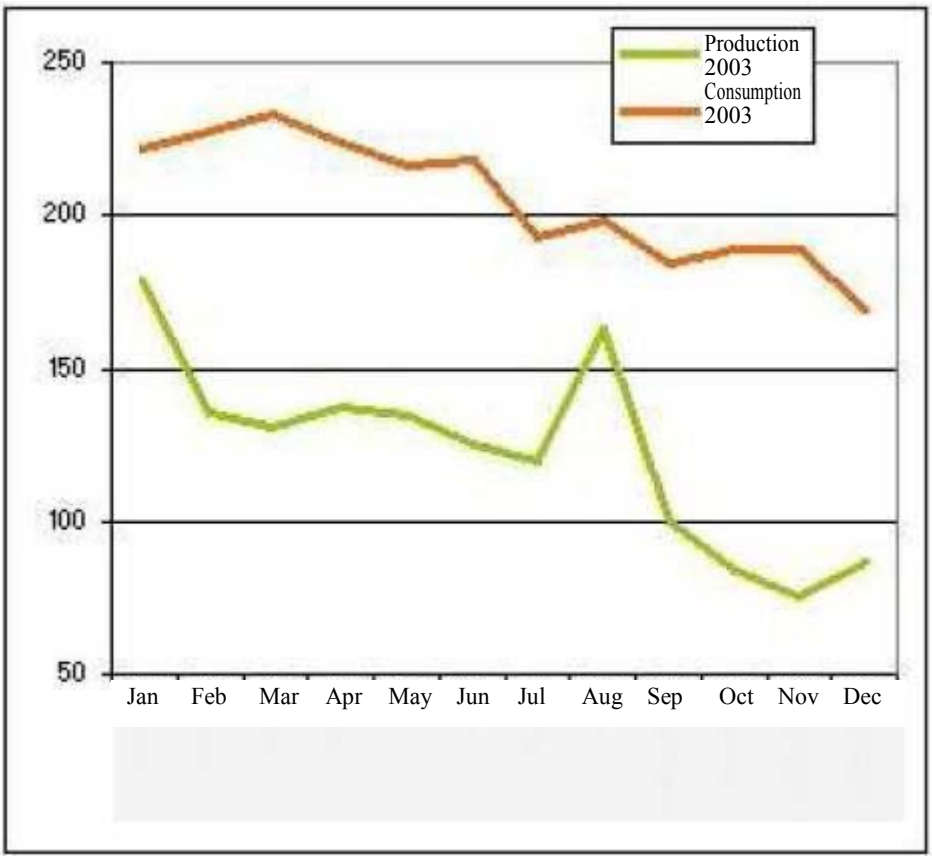
Production of tiger nut in Niger concentrates in Maradi and Zinder regions with the share of planted area 60% and 31%, and of production 65% and 37% respectively.



Source: Pini & Tarchiani 2007:27

Fig. II.6 Trend of Tiger nut: planted area, yield and production 1997-03

Production increased since 2002, mainly due to the increased planted area in Maradi region and initiation of production in Zinder region. In contrast to the expansion of planted area, yield is decreasing. Tiger nut is grown by intensive farming system using traditional varieties (both with fat and slim roots). Organic and mineral fertilizers are applied using machinery. Tiger nut is harvested after all crops and sold quickly. For a short period these are stored either at traditional warehouses or modern ones owned by middlemen. By devising method of storage, post harvest losses are reduced. Even if farmers are talented in tiger nut growing, they cannot afford to be idle, as it is the fundamental to prevent the negative impact on the land after harvest. As topsoil start to be eroded just after harvest, careful management technology to prevent soil degradation is required.



Source: Pini & Tarchiani 2007:28

Fig. II.7 Change of producers' and consumers' prices of tiger nut in 2003

Tiger nut plays an important role as a cash crop. Producers' price at 123FCFA/kg in 2002-2003 seems to be fairly high compared to the price level of self sustaining crops. By the sale of tiger nut, necessary self-sustaining crops for 85,000 persons will be secured. Due to the limited information and data on tiger nut (statistics, trade and international demand) there exist difficulties to formulate appropriate strategy for tiger nut production within the frame work of agricultural production. Inventory of stock and tracing price movement by marketing research, together with appropriate analysis of competitive power of Niger needs to be implemented. In current administration, there exists no department or division responsible to this subject.

As Maradi is the major producing area, it is advantageous for marketing and storage and, taking into account high demand in Europe, potential of tiger nut as a cash crop is considered fairly high. Profitability for both producers and exporters is high but investment to increase competitive power is required.

⑥ Bambara groundnut

Bambara groundnut is also a traditional crop in Niger. Seeds are eaten, boiled together with husk in case of fresh, or roasted. Leaves are used as feed for livestock.

In many cases, Bambara groundnut are produced in areas where groundnut growing is difficult. Its growth period is 3-5 months and in Niger it is grown in areas of rainfall at

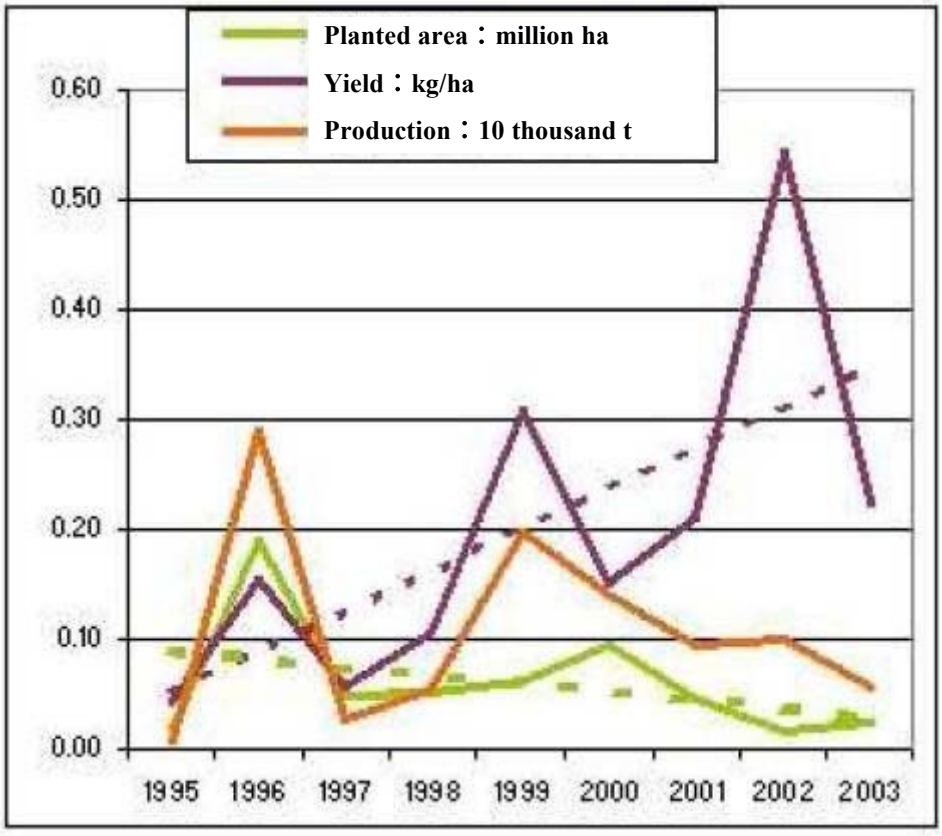
450-600mm. Better growth can be expected even in area of poor soil fertility and sandy soil. Except harvesting season, excessive soil moisture does not harm its growth. High temperature and a lot of sunshine are suitable. It is grown in direct sowing as single crop. Earth should be dug well so as to get many flowers. Usually sown relatively densely with interval of 15cm-20cm, by roots number/ha at 450,000-250,000.

Sown at the beginning of rainy season, germination start in 8-9 days. Weeding is desirable. Harvest has wide ranges from 250kg/ha to700kg/ha and there exist potential of 1,500kg/ha Weight of seeds (1000 grains) are 600g-800g and ratio of germination are 60-80%. It is relatively tough plant and suitable for reservation. Oil content is not so high as groundnut but contains high nutrition of nitrogen and protein. It contains 365 cal/100g and 23% of protein.

In Niger, Middle Eastern part and Dosso, Maradi and Zinder regions are the major producing areas, followed by Tillaberi and others with small amount.

⑦ Sesame

Though sesame is grown under rain-fed condition, more than 500mm/year rainfall is said to be required for high yield. In Niger, sesame is consumed either taken raw uncooked, roasted, or baked with sugar like cakes. Additionally, it is used as seasoning of sauces. In many other part of the world, sesame is used in making cakes, sesame oil, cosmetics and medicine. Due to the diverse uses, sesame production plays an important role, particularly for poor farmers, providing cash income and contributing to their food security.

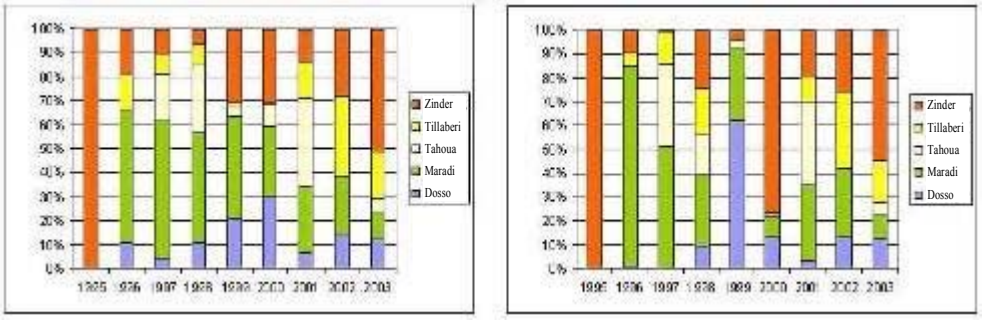


Source: Pini & Tarchiani 2007: 24

Fig. II.8　Planted area, yield and production of Sesame in Niger 1995-2003

Statistics on sesame production in Niger are limited. In 1997, production dropped from 28,000t to 7,700t. Planted area also decreased to 75%. Since then planted area did not show much change, but yield has shown increase. Judging from this, Niger is considered to have the potential to increase sesame production. Following two systems might be pointed out on sesame production in Niger.

- About 9-17% of farmland are devoted to sesame of single crop. Mainly depend on the women farmers. Yield is around 500kg/ha.
- Of the total cultivated area, about 75% are planted with sesame and cereals by mixed planting. In this case yield of sesame is less than 200kg/ha.



Source: Pini & Tarchiani 2007: 25

Planted area (left) and production (right)

Fig. II.9　Share of planted area and production of sesame by region1995-2003

Sesame is known as a crop to give no serious strain to soil. In Niger, Maradi and Zinder regions have been well known as major producing areas. In recent years, production in Tillaberi region is also increasing and in 2003, making it 2nd major producing region.

⑧ Garlic, tomato and cabbage

As important vegetable crops other than onion and pepper, such crops as garlic, tomato and cabbage will be raised. Onion is an export commodity and tomato is, in addition to domestic consumption, import commodity for urban dwellers. Demand for cabbage is very high throughout the year. In general, vegetables including these crops are suited to the dry and hot/ day and cool/ night climate conditions of Niger. High quality vegetable for consumers can be assured.

Statistical information on these vegetables is also limited, so it is difficult to know their trend of production and potentials. From 2003, Agricultural Market Information System (Système d'Information sur les Marchés Agricoles: SIMA) started to collect information on retail prices of these vegetables in various markets in the country.

Garlic has been produced originally in Agadez region as an intensive single crop. In 1998-2002, about 8 million ha had been planted with average annual production of 9,000 t.

Cooperatives of producers are organized and most of the produce has been exported to Burkina Faso, Cote d'Ivoire, Ghana and other Southern countries. Mauritania is particularly important destination (av.755t/year).

Table II.4 Production and price of garlic at Agadez region (UCMA)

Year	Production (t)	Price (FCFA)
2001	35.3	15,000
2002	44	14,200
2003	67.4	30,300

Table above is quoted from the data from (l'Union des Coopératives Maraîchères l'Air: UCMA). By sales profit of garlic shipment of UCMA, self-sustaining food demand of 1,000 persons can be satisfied. Therefore, from the view point of food security, garlic is an important crop. On continuing garlic production, advantages in two aspects are recognized. First one is that the existing domestic market has marketing capacity exceeding the volume of current export. Second is that it is easy to preserve. Priority issues to producing area are now to construct preservation facilities and expanding marketing channels.

Tomatoes and cabbages are produced in dry season mainly in outskirts of the cities. Niamey, suburbs of cities at Niger river basin, oases in the northern part and others are the major producers. In 2003, total production of tomatoes and cabbage in Ader, Doutchi and Maggia was about 21,000t-26,500t and sales amounted to 16 billion FCFA (200FCFA/kg for tomato and 140FCFA /kg for cabbage). This amount can secure food for 245,000 people for a year.

Vegetables are perishable and require to be sold quickly. Producers are not well organized

and productivity is not high enough. To overcome these problems of low productivity and perishability, it seems essential for farmers to create the opportunity to increase the access to agricultural credit. However, this possibility is very much limited. Land issue is additional problem to be considered. Though constant access to land is necessary for vegetable growers, usually they borrow the land in dry season where cereal is grown in rainy season. Therefore, vegetable growers cannot start preparation for vegetable planting until cereal harvest are completed. This situation greatly hinders expansion of vegetable growing.

Currently, vegetable production is very limited except those of cooperatives in Air district.

(2) Oases and irrigated agriculture

Oasis and irrigated agriculture will basically be classified into 3, oases and valley systems depending on spring water or underground water, and irrigation system with large scale land consolidation as seen at Niger river basin and others.

Different from the large scale consolidated irrigation, mainly devoted to rice growing, in oasis and valley systems various crops are grown for both domestic market and export to neighboring countries.

In Galmi district of Tahoua region, onions are widely grown in dry season by large or small plot with efficient irrigation management. This accounted about 58% of total agricultural export of Niger, demonstrating the role played by valley system on cash crop production.

Table II.5 Production of cash crops 2002－2005

Year	Production (t)						
	Cowpea	Ground-nut	Sesame	Tiger-nut	Bambara groundnut	Cotton	Onion
2002	654,232	153,729	9,864	19,441	14,956	8,260	5,074
2003	549,035	209,369	5,709	26,312	5,457	4,700	1,575
2004	364,757	168,225	28,649	23,214	-	27,108	291,780
2005	586,078	139,035	42,199	8,095	10,177	28,000	-

Source: MDA

Date, a major crop in oasis, and cotton, onion and pepper, major crops in valley system are taken up here for observation.

① Date (Oasis)

Wide range of crops are grown in oases for local consumption. Dates are produced at a group of oases around Bilma in the northeastern part of Agadez, Air mountain massif of the north-central valley and at oases of southern Maine-Soroa in Diffa region. These 3 groups constitute colonies of dates with more than700,000 roots. According to FAO, production in 2001 was 8,000t, but the figure from the Bureau of National Statistics and Accounting (Direction de la statistique et de la comptabilité nationale: DSCN) was 1,500t, with a big disparity between the two.

Dates have the share of 2% in agricultural export, but at the same time Niger is an importing country. Almost all (97% in 2001-2002) of exported dates were produced in Algeria. Niger plays a role of relay trade between Algeria and Nigeria on date trade.

Based on the domestic supply (production plus import) and domestic consumption (kg/capita/year), some report say that, though invisible, considerable amount of dates are exported from Algeria to Nigeria informally without appearing in statistics. It is certain that income from dates contributes much to oases economy by large share like maize and cassava.

Table II.6 Dates(fresh, dry) import 1999－2002

Year	Quantity(t)	Amount（FCFA）	Price（FCFA/kg）
1992	4,396	238,448,321	54
1993	3,561	142,135,813	40
1994	3,387	439,783,103	130
1995	4,867	236,073,558	49
1996	5,367	400,122,653	75
1997	3,969	201,945,662	51
1998	5,808	297,756,615	51
1999	9,000	555,333,791	62
2000	8,602	575,906,916	67
2001	11,623	684,732,561	59
2002	16,009	814,160,133	51
total	76,589	4,586,399,126	60

Source: DSCN(1992-2001), DGD(2002)

Table II.7 Dates export of Niger 1992－2002

Year	Quantity(t)	Amount(FCFA)	Price（FCFA/t）	Euro＊／t
1992	431	14,430,300	33,480	51
1993	21	2,091,000	99,571	152
1994	78	8,100,551	103,986	159
1995	nd	nd	nd	nd
1996	105	10,349,600	98,883	151
1997	578	42,066,088	72,766	111
1998	859	107,577,450	125,207	191
1999	2,091	370,013,660	176,955	270
2000	3,169	633,498,050	199,905	305
2001	2,678	505,357,153	188,707	288
2002	2,475	491,242,250	198,482	303
total	12,487	2,184,726,102	174,988	267

Source: DSCN(1992-2001), DGD(2002) ＊1Euro = 655.957FCFA, nd : no data

② Cotton

Cotton is mainly produced in Tahoua, Maradi and Dosso regions. First in 1956-57, cotton was introduced to Tahoua and Maradi regions and in ‘70s it spread rapidly to other regions. Of Tahoua region with share of 80% in production, major producing districts are valleys of Ader-Doutchi-Maggia, of Maradi region with 15% share, major producing districts are valleys of Goulbis and Maradi, and in Dosso region with 5% share, major producing districts are valleys of Dallol, Maouli and Foga.

Since 1980, production declined and export had been suspended. However, due to the support by the government for production and export such as free distribution of seeds, pesticides and

fertilizers, complete recovery have been achieved in 1993, attaining 2% of export share in total agricultural export.

Since 1990, promotion of cotton production and collection formerly dealt by the government were transferred to Niger Cotton Cooperatives (SCN) newly created in line with the policy direction of privatization program.

Apart from the figures in statistics, a part of the products is said to have been exported illegally to Nigeria. In addition to SCN, there is a company called Niger Joint Cotton Company (CNUCINI) supported by China. This company is operating a spinning factory. Two types of cotton production are observed, one for irrigated and consolidated condition and another for rainfed. The share of the latter in production account for 40%.

③ Onion

Onion is now Niger's important export crop to West African countries. Yield is considerably high at 30t/hand has a potential to be 60kg/ha. In general, high adaptability to any places contributes to the increase in production. Onions are grown wherever market access is available. In the belt zone connecting Ader-Doutchi-Maggia-Tarka, around 6,500ha are planted annually with production of 220,000t. People of Niger have strong expectation on this crop as production methods, techniques and market are well established and markets both of domestic and foreign are reliable.

Related statistics on onion are also limited. FAO statistics reports onion production of Niger in 2003 as 270,000t. Domestic consumption among them was 11,000t, and this is equal to 1.1kg/capita.

④ Pepper

Pepper production in Niger concentrates in Komadougou of Diffa region (more than 80% of the total production). In other parts of the country, production is mostly observed at home gardens in various parts of Zinder and Maradi regions.

Pepper is usually grown intensively in off-season (dry season) at vegetable farms equipped with irrigation facility. Similar to other vegetables, no reliable data on output is available. It is assumed that, since 2000, planted area is expanding and production is estimated to be doubled except a lean year 2002. Though yield has not dramatically increased, efforts by farmers and improved technology seem to have contributed to the increased production. Impact of pepper to national economy cannot be calculated accurately, but annual profit obtained is estimated as 4 billion FCFA. Domestic demand is estimated at 3,000t in total, by 0.3kg/capita which would be equivalent to 26% of annual production. Remaining 7,000t are exported to foreign countries.

(3) Rice cultivation

① Production and demand /supply trend

Rice production fluctuates very much year after year. However, if the situation is favorable, production will be more than 70,000t, following to major cereals of pearl millet and sorghum. In addition to the sharp increase in per capita consumption from 12kg in 1989 to 17kg in 2002, population growth was at high level of 3.4%/year. Therefore, production could cover only 1/3 of the domestic demand (Sido 2008).

Rice production system is classified into 3 types; ①Extensive traditional rice cultivation in riverside or lakeside fields, around 10,000ha in total with average yield of 0.7 t/ha. ②Intensive irrigated rice cultivation with double cropping, with total area of 8,000 ha and average yield of 4-5 t/ha. Tillaberi region occupies 88% of the area, followed by CUN Niamey (7.7%) and Dosso region (4.3%) all in Niger river basin (FUCOPRI). Daiberi, one of the irrigation schemes in Tillaberi, covering 290ha with 700 farmers, started NERICA rice production from 2007 expecting the yield of 8-9 t/ha. ③Rice cultivation in the rainy season by small scale pump irrigation, covering 1,500ha in total with the yield of 3 t/kg. In the dry season, vegetables are grown. Beside these types, FAO reports the existence of mixed farming with upland rice by slash and burn though much limited in scale.

The government is much involved in rice industry. To each of rice irrigation schemes, producing more than 80% of the national rice production, director is dispatched from National Office for Hydro-Agricultural Development (Office National des Aménagements Hydro-agricoles, ONAHA) to supervise producers' cooperatives. Rice milling and processing is exclusively dealt by Niger Rice Corporation (Le Riz du Niger SAEM: RINI), while selection of rice varieties and seeds production is handled by National Agricultural Research Institute (Institut National de la Recherche Agronomique du Niger: INRAN). Federation of Rice Producers' Cooperatives of Niger (Fédération des Unions des Coopératives des Producteurs de Riz du Niger: FUCOPRI), located in Niamey, coordinates 37 separate cooperatives with a total of 21,000 members.

Farming operations are almost exclusively dependent on manual labor except a part of that in irrigation schemes. Observing the activity of threshing operation by hitting, the post harvest loss due to scattering paddy grains seemed to be enormous. Varieties adopted 10 years ago were Gui-Chao 2, JB-4 and others, but now quite different varieties are grown in irrigation schemes, such as BG90-2, IR1529, IR54, D5237, WITA8 and WITA9, with yield on average at 5-6 t/ha. Other certified varieties for extension include WAS4-B-B9-1-4-TGR48 and Kogoni91-1 (Gambiaka). In 2007, 2 NERICA varieties (N-L-49 and N-L-39) were chosen for extension. In 2008, these are scheduled to be registered by Nomination Committee.

The processing of rice is responsible for RINI which has 3 large scale rice mills in the country. According to the presentation given on the occasion of visit to RINI on Oct. 2008, milling capacity of Niamey factory was 6,000 t/year, that of Tillaberi factory, the biggest one, was 15,000t/year and of Kollo factory was 4,000 t/year. In case of Niamey factory, as daily capacity of milling was told to be 23t/day, working days per year is considered as 260 days.

Anyway, total capacity of 3 factories cannot meet the requirements of domestic consumption. In practice, around half of the total rice production is consumed by producing farmers as their home consumption and remaining half is sold to RINI or to private dealers such as SSL, Sotagri and Beidou Ibrahim.

Recent trend of demand/supply shows that, while demand is sharply increasing, domestic production remains rather stagnant, with increasing dependence on importation and assistance from abroad.

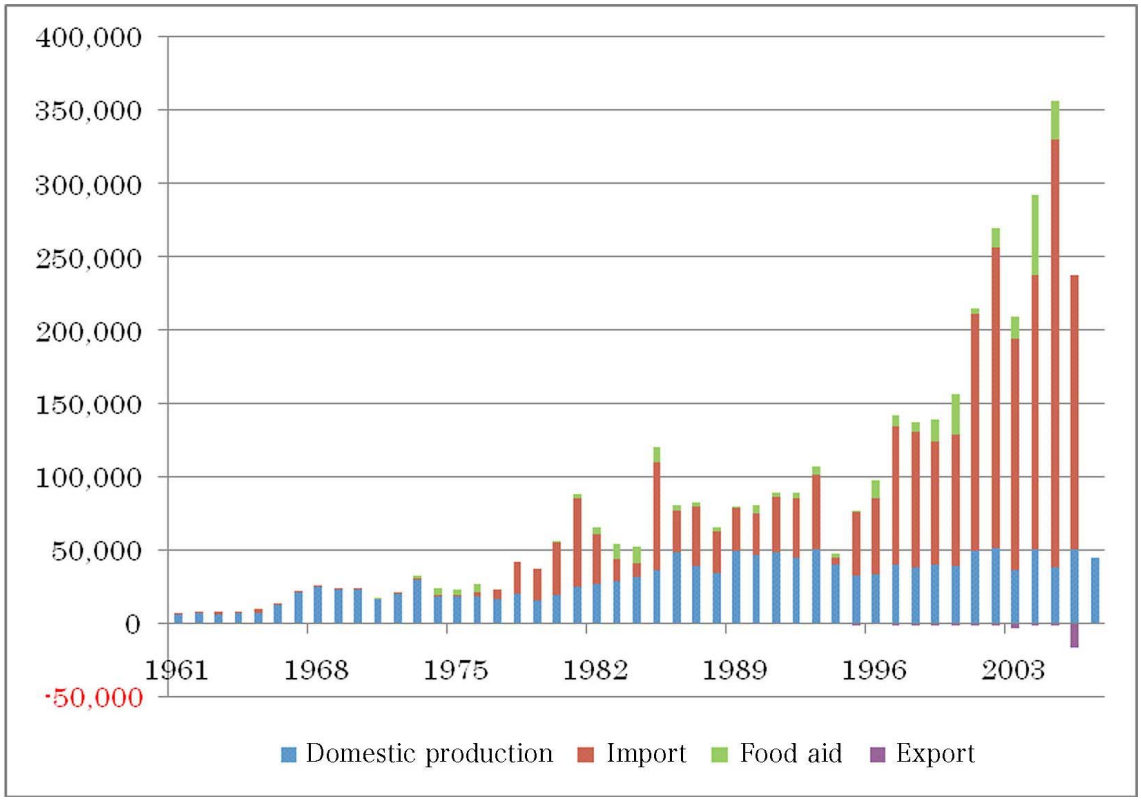


Fig. II.10 Demand/supply trend of rice (milled rice)

Note 1: Various types of rice (paddy, brown rice, milled and broken rice) are converted to milled rice (conversion factor from paddy to milled rice is 0.65).
Note 2: No data for 2007 import, 2006 /2007 food aid, 1961～1993 and 2007 export
Source: FAOSTAT

② Problems of rice production

As the problems faced in rice production, such issues are raised. (1) Low temperature for irrigated rice farming in the dry season, (2) Inappropriate maintenance of irrigation facility, (3) Unstable supply of input materials, (4) Lack of implements particularly for post harvest operation, (5) Inefficient management of farmers' organization, (6) Competing various farming operations, (7) Comprehensive issues related to policies on demand/supply, transportation and marketing, and (8)Support to research and extension etc (FAO).

Major issues to be tackled in the field of research are: (1) resistance to pests and diseases, low yields, inferior rice quality in the dry season, limited number of varieties, (2) plant protection

against pests/diseases (stem borer, diamondback moth, rice blast, rice yellow mottle virus, brown spot, nematode), birds, water hyacinth etc., (3) lack of soil map required for soil and water management, and concerned information on soil characteristics and micro nutrients, (4) lack of technical information on fertilizer application and nursery-bed management in the dry season and insufficient cropping calendar, (5) difficulty of coexistence of upland crops and irrigated farming in the rainy season, and lack of research on cropping system including rice.

Table II.8 shows the trend of rice planted area, yield and production since 1980（Cabinet). It is noted that while the yield before '80s remained at 2.0 t/ha, it has reached now to 3.5 t/ha. This might show the technological progress of rice cultivation in Niger. However in '90s, planted area had often declined greatly and in early half of the '90s, yield often remained less than 1.0 t/ha, showing unstable factors of rice production in Niger.

Table II.8 Yearly change of planted area (ha), yield (kg/ha) and production (ton) of rice (paddy) (1980-2001)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Area	20,060	20,670	20,234	22,160	12,284	20,585	27,645	24,802	17,555	22,535
Yield	1,490	1,884	2,037	2,022	2,518	2,754	2,730	2,477	3,011	3,415
Production	29,892	38,945	41,220	44,798	48,548	56,694	75,782	61,428	52,864	76,95
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Area	10,226	5,134	14,523	6,060	7,828	20,648	44,787	17,882	14,898	15,078
Yield	962	1,147	1,417	1,489	70	2,472	1,857	4,127	3,935	4,111
Production	9,838	5,889	20,576	9,025	550	51,045	83,188	73,810	58,628	61,989
	2000	2001	2002	2003	2004	2005	2006	2007		
Area	18,245	24,625	23,853	18,710	23,383	15,110	21,136	22,435		
Yield	3,313	3,048	3,352	3,045	3,340	3,964	3,708	3,120		
Production	60,453	75,074	79,949	56,980	78,099	59,902	78,377	70,000		

Source: 1980-2001 from [Direction de l'Agriculture, MDA（SDR）]
2002-2007 from [Direction des Statistiques, MDA]

For the realization of SDR, the report has been prepared by the committee consisting of members from various Ministries. The report points out the followings as the constraints for development of rice production

1) Compensation for landowners on new land development
2) Difficulty of establishing clear prospect on agricultural investment
3) High input and energy costs reduce the competitive power of the agricultural product and weaken the management capacity of cooperatives, leading to the difficulty on operation and maintenance of irrigation facilities.
4) Low profitability due to small scale (0.25-1.0 ha) rice farming
5) Competition with rice imported or donated as assistance

Further, problems of water demand/supply will remain unsolved, as limited progress is seen for water resource development. Extension officers who have been working on irrigated rice growing are now facing the problem of how to tackle the issues on improving traditional low input technologies.

2. Theme and Target for Agricultural Development

Prospect of agricultural development on food doesn't look so bright as clearly shown in the preceding description. Severe natural conditions, particularly low and erratic rainfall together with high temperature accelerates the aridity of Niger. Sahel-Sudanese zone where highest rainfall can be expected in the country (600-800mm/year) covers only 1 % of the total national land area, followed by Sahel zone (350-600mm/year) of 10%, Sahara-Sahel zone (150-350mm) of 12% and all of the remaining 77% are covered by Desert (less than 150mm). Therefore, this is not considered suitable environment for agriculture. However, foundation of national economy deeply depend on the economic activities of the rural people, and though Niger cannot be considered as genuine agricultural country, agriculture continues to remain as the country's core industry.

1) Theme of agricultural development

Rural economy of Niger exposes diverse features responding to the potential productivity of each area. Family farm is an universal pattern of farm management and traditional technologies of low productivity are adopted. Here, outline of the issues related to harmful birds and insects and use of agro-chemicals for their eradication, problems on crop production and basic unit of production will be described.

(1) Insect and bird damages and use of agro- chemicals

In addition to the severe climatic condition, damages by insects and birds have been extremely serious in Niger. In developed countries, laws to control the use of agricultural chemical are strictly observed, but in Niger, agricultural chemicals are considered indispensable at present. This is due to the tremendous damages by insects and birds. Rough estimate in 2007 shows that damaged area as 229,521 ha, and chemical applied area was about 63.44% or 145,617ha. About 67,678 litres of chemical had been sprayed.

(2) Theme for major crops production

As stated, major crops include subsistent crops such as pearl millet, sorghum, rice, fonio and maize, and cash crops such as cowpea, groundnut, Bambara groundnut, sesame, roselle, tiger nut and cotton. Average size of farmland of rain-fed area is 5-6ha/family. Here, extensive cultivation is practised manualy and yield is naturally low and fluctuates year by year.

Infertility of soil and shortening of fallow period, together with inappropriate land reclamation encourage soil erosion by water and wind and hinder recovery of soil fertility. According to the statistics, only 4% of the total rain-fed area are fertilised properly. Irrigated agriculture are conducted in very small scale as a production unit. Irrigated farmland is partitioned to 0.25-0.5ha/ household. Size of the partitionon seems to have been decided not

from the productivity but from the respect for traditional inheritance system. Malfunctoioning and difficulty of operation and management of facilities etc. constitute hindering factors for sustainable agriculture.

(3) Basic unit of agricultural production

Basi unit of agricultural production in Niger is defined as a community based on family/household, be it large or small. The community consits of family with female and youth, and is led by the chief. This community constitutes a basic unit and play an important role on keeping balance of production and consumption.

Concentration of power to chief as mentioned might be risky, but it also enhances human bondages among the members of community. Traditional values and social custom of respect for seniors in Niger also contributes to enhance the chief's grasp of economic power and his decision to encourage the incresed individual freedom and harmonious growth of the community. Average yearly income/ houserhold is said to be not more than 35,000FCFA. This level of income does not allow for investment on production and others.

In rural Niger, some changes are occurring on relationship between families of crop production and livestock production. Traditionally, many herders come to the crop filed in dry season after harvest to use the crop residue for livestock, while providing fertilizers by animal excreta to the cropland, contributing to the recovery of soil fertility.Such collaborative relationship are not seen now, in paraellel to the development of livestock production in the south and expansion of cultivated land in the north.

2) Targets established recently by the Ministry of Agricultural Development

The Ministry of Agricultural Development has prepared the latest version of targets in [Agricultural Production Final Report 2007-08]. In the report, aiming at food security, themes related to accelerated rural development and energy resources, both for short and long term basis are emphasized as follows ; (MDA 2008).

Shor term Target

- Improve food supply system with high quality,
- Establish promotion system of agricultural production,
- Secure surplus to food deficit area.

Longterm Target

- Establish legal and administrative systems including rural custom laws,
- Reconstruction of agricultural marketing system,
- Review of the current status and importsance of agriculture in the national economy.

3. Support System for Agricultural Production

1) Law and regulation on land and rural areas

After the devastative drought in 1984 in Sahel, the Governmemnt of Niger had recognized that the land and other natural reources managent depended too much on central government so far, and it was not the effective option. Major problems confronted are the following.

- Increased conflicts between farmers and herders on the access to natural resources
- Reduced land for nomadic herders due to expansion of cropland by increased population
- Discouraged tree planting in cause of insufficient traditional law system, which disturbs the land borrowing farmers willing to plant trees
- Continued grasp of power by chiefs on land owners

In 1986, under the administration of the President Kountche the government intended to establish comprehensive legal system and rules to upgrade the administrative function on socio-cultural problems related to natural resources management including land. Seven years later, on March 2nd 1993, Ordinance No. 93-015 was promulgated providing basic guideline on Law on Rural Affairs.

This includes ;

① Assurance of right on land for local dwellers
② Management of farmland and their systematic utilization
③ Promotion of better practice on natural resources management and conservation
④ Presentation of the guideline for natural resources utilization

Administrative system the Govenment intended to prepare in the law for rural affairs are divided to that of national and local levels. At the national level, National Committee was established with permanent secretariat. At the local level, land committees are organized at provincial, district and village levels respectively. Objectives of the law for rural affairs are same as the above 4.

It is clearly stated that, basically all land, either reclaimed or not, belong to the state. At the same time, it recognizes the existence of traditional authority. This might be raher unique judging from the common understanding of modern state. However, these strategies reflect the respct for traditional system and the intention to harmonize the traditional one to the new approach. This startegy is calling attention from neighboring African countries as a practical and rational one for land issues.[Preparation Committee of Law for Rural Affairs] has the role to inform public widely the existence of this law and the committee.

Under the permanent secretariat of National Committee, 8 Regional Committes with permanent secretariat are created. These committeees deal with formulation of detailed schemes for preparation of rules on land and supervise the activitie of lower branch committes. In 36 departments, 265 communes and 15,000 villages, these committees are organized respectively, dealing with actual procedures for application of the law.

Key to the success of the preparation of the Law for Rural Affairs depends on the executing capacity of these local committees. Because, local land committes play the actual role on recording and management of land title and guaranttee the individual right on land. However, the local land committes are not entitled to solve the conflicts on land, thus the committes are seriously suffered with legal contradiction.

In short, it might be said that the efforts of the Government of Niger on preparation of laws and rules on land and natural resources management has not yet solved the problems, but created new problems. It is said that the efforts by respective administration did not focus the issues on management of land and natural resources, the common asset of the state seriously, but too much biased by political speculation. One researcher, taking note of this, presents the lessons as follows;

- Review of the current traditional rural law and regulation is required.Whether local land committees are well functioning, and appropriate solutions for the respective case of conflicts at the village level are provided, need to be clarified.
- To know the good and bad points of the case of conflict solution. By doing so, to summarize all the interests on land and natural resources management, paving the way for legalization and harmonization with transparency.
- To analyse cases of conflicts on land and natural resource management caused by rural development project and to maintain better coordination among concerned ministries/agencies, donor countries and agencies and NGOs toward the future development.
- Current rules and regulations applied be recognized practically, and establishing the system of all the land plots to be registered if the rural residents want to do so.
- To analyse and to put in order the current situation of interested parties on land, for a smooth introduction of land register sysatem.
- In advance to the introduction of register system mentioned above, solutions to the expected problems need to be considered. Again, to consider the viability of the system to solve these problems.

2) Agricultural credit system

National Agricultural Credit Fund (Caisse Nationale de Crédit Agricole: CNCA) was established in 1968 as an independent financial organization to provide the fund to Agricultural Credit (Crédit Agricole: CA) for its management of investment fund. Supply of the agricultural credit, processing of credit requests and financial management of cooperatives were the major functions of CNCA.

CNCA provides neccessary fund to UNCC for the collection of agricultural products such as pearl millet and sorghum, and procurement of input such as seeds and fertilizers. In addition, CNCA provided fund to OPVN and SONARA for their revolving fund and fund for covering

deficit.

Though it is an independent organization officially, CNCA has maintained strong tie with UNCC, thus the relation with final clients (user of the credit) has become distant. Provision of the credit was made through malfunctioning cooperatives and, as a result the recovery rate of the credit remained low, leading to the functional disorder of CNCA.

In 1980's almost 80% of CNCA loan were provided for public organizations or projects on agriculture other than individual farmers.

In 1984, 72% of the of loans disbursed by CNCA were not repaid and among them 58% were judged as not collectable. With the abolition of UNCC, CNCA had actually collapsed though it remains only by name.

Though existing financial system in Niger is very poor, but among the countries of West African Economic and Monetary Union (Union Economique et Monétaire Ouest-Africaine: UEMOA) in 2003, Niger had 8 private financial organizations including CNCA, 4 insurance companies, 164 micro-finance groups and postal services organization. A number of them could maintain the rquired level of capital holdings set by the Central Banks in West African countries (BCEAO), but the situation was really critical. 3 financial insititutions were already judged by the Government to be restructured and were put under government control. These were, Niger Credit Bank (BCN), Community Common Fund (CPCT) and Niger Credit Company (CDN). Restrucure plan of BCN completed in 2003 and protection and management by BCEAO was terminated on June 2003. In finance sector, about 2/3 of the total fund are held by two banks. Partly due to the small economic scale of formal sector, financial services to private sector is very much limited, and concentrated mainly to retailing and mining. New investment to the financial and credit system is also limited. Total fund owned by financial institutions are less than 6% of GDP. Between 1988-1992, 4 financial institution had collasped. These are a major bank, Food Development Bank (BDRN) and 3 private institutions, Niger International Industrial and Commerce Bank (BCI-N), Commercial Credit Bank (BCC) and Niger Islam Bank (BIN).

At the stage of 2003, financial institutions well performing in the area of food are, Niger Commercial Bank managed by Libya-Arab Republic Foreign Investment Bank, Niger Branch of African International Bank (35% of capital from Belgian companies), Niger Islam Commercial Investment Bank (33% of capital from Islam Development Bank), Niger Branch of Bank of America, Eco Bank Niger (Affliated to City Bank) and CNCA. However, most of their local branches in the country are not functioning satisfactorily.

On the above context, CNCA can narrowly play a part of its role mainly depending on the cooperation projects by foreign donors for their micro-finance activities. But these projects are limited in number.

3) Farmers organizations , agriculture cooperatives

During the days of Kountche administration, Communities for Development (Société de

Développement: SD) were organized in 1983. The vitality of the youth, which covered more than 60% of the total population at that time were intended to be mobilized, through participation in Samariya (traditional village youth groups) to farmers' cooperatives, together with the representatives of other social.-vocational groups (labor union, professional group, women's association, tribe etc.) at various local levels to organize the Communities for Development for the organized development activities under the banner of consultation and participation. However, this did not continue for a long time.

Cooperative system of Niger consisted of 4 organizations, namely, Niger Federation of CreditUnions (Union Nigérienne de Crédit et de la Coopération: UNCC), Food Supply Association (Centrale d'Approvisionnement: CA), aforementioned National Agricultural Credit Fund (Caisse Nationale de Crédit Agricole: CNCA) and National Union of Agricultuiral Cooperatives (Union Nationale des Coopératives: UNC).

UNCC was established in 1962 for the purposes of organizing farmers to cooperatives, training member farmers and their leaders and providing support on investment and marketing. However, UNCC was severely criticized at the government-sponsored seminar in 1982. Major points of this criticism were that the UNCC's centralized administration hindered the autonomy and independence of individual cooperatives and that UNCC did not provide support required by cooperatives. In 1985, UNCC was abolished and its role was succeeded by UNC.

CA was established in 1978 as a branch office of UNCC with major function of providing, storing and distributing agricultural input such chemicals and fertilizers. Until 1985, CA had monopolized fertlizer and chemical trade, but CA is now exposed to the competition from private sector in this field.

After the abolition of UNCC, CA is under the roof of UNC. Since then, UNC continues to remain as an organization to coordinate the cooperatives scattered all over the country, but actually cooperatives are so decentralized and their functions and activities have been much diversified

4) Marketing of agricultural products

Marketing of agricultural products in Niger are dealt by different semi-govermental organizations according to the commodity. Organization dealing with food crops ; Food Corporation of Niger (Office des Produits Vivrières du Niger: OPVN), for groundnut; Groundnut Corporation (Société Nigerienne de Commericialisation de l'Arachide: SONARA), and for rice ; Rice Corporation (Le Riz du Niger: RIN). These corporations buy and sell the products at officially fixed price. They also reserve and import/ export respective commodity for the stabilization of the domestic prices.

4. Current Situation of Livestock Industry and the Issues for Development

In Niger, types of farming are diverse, such as nomadic and sedentary or mixed one. Most of

crop farmers (sedentary) also raise cattle. Livestock is the 2nd important agricultural sub-sector after crops. In early part of 1990's, share of livestock in GDP was17% and 31.6% of the rural sector. Therefore, potential of increasing income by livestock is expected even by crop farmers in the situation of frequent drought and expanding desertification.

In numbers, 3 animals namely goat, sheep and cattle are dominant. As for draught animals, camel, horse and donkey are popular. Swine is extremely limited due to religious taboo as many people are Muslim, In case of poultry, chicken and guinea fowl are common, followed by duck and pigeon.

1) Current situation of livestock

Due to rapid desertification and repeated drought since 1960's, with human factors of rapid population growth, forest and pastureland have sharply decreased. Natural vegetation, biomass used as grass for livestock have decreased and grazing has been intensified, causing increased tension and conflict with crop farmers.

Nomadic herders often release their livestock to cropland of pearl millet and sorghum to vegetable garden in cool and dry season. These threaten crop farmers' production activity and confrontation of herders and crop farmers are intensified. Complementarity existed between the two parties in the past is now seen as a story of the past.

Decrease and destruction of pastureland often forced nomadic herders to move into inappropriate land for livestock, and this resulted in decreased productivity. It is pointed out that the herders are now facing difficulty to adapt to the changing environment due to weak organization and traditional poor cattle raising technology. As a result, some nomadic herders have now turned to sedentary (or semi-sedentary) or have stopped to keep some kind of animals or changed their composition (for example, reduce cattle and increase goat) due to the problems of drought, disease resistances and required feed. Livestock extension officers warn that so many herders retain livestock for the insurance of emergency without using for home consumption or field works and this often leads to the loss of livestock by decrepitude. But it is reported that herders do not respond to this advice.

Number of major livestock is listed on Table II.9.

(1) Number of major livestock

Table II.9 Number of major livestock and UBT*

Kind	Number	UBT
Cattle	7,336,088	5,868,870
Sheep	9,192,729	1,378,909
Goat	11,238,269	1,685,740
Donkey	1,477,075	738,535
Horse	230,176	230,176
Camel	1,565,420	1,565,420
Total	31,039,757	11,467,654

Note*Unité Bétail Tropical (Livestock Unit in Tropics): weight 250kg= 1 UBT

(2) Number of livestock by regions

Table II.10 Number of livestock by regions 1000head

		2005	2006	2007
Whole country	Cattle	7,336.1	7,482.8	8,242.8
	Sheep	9,192.0	9,467.8	9,846.7
	Goat	11,238.3	11,519.2	12,155.3
	Camel	1,565.4	1,588.9	1,606.4
	Horse	230.2	232.5	234.8
	Donkey	1,477.1	1,506.6	1,536.7
Agadez	Cattle	52.4	53.4	58.8
	Sheep	524.5	540.2	561.8
	Goat	616.5	631.9	666.8
	Camel	135.2	137.2	138.7
	Horse	2.5	2.5	2.6
	Donkey	89.0	90.8	92.6
Diffa	Cattle	799.8	815.8	898.7
	Sheep	715.5	737.0	766.5
	Goat	1,009.0	1,034.2	1,091.4
	Camel	367.3	372.8	376.9
	Horse	45.0	45.5	45.9
	Donkey	138.6	141.4	144.2
Dosso	Cattle	704.1	718.2	791.2
	Goat	660.2	680.0	707.2
	Sheep	840.0	861.0	908.6
	Camel	27.8	28.2	28.6
	Horse	11.6	11.7	11.8
	Donkey	124.4	126.9	129.4
Maradi	Cattle	1,132.9	1,155.6	1,272.9
	Sheep	1,520.7	1,566.4	1,629.1
	Goat	1,989.9	2,039.6	2,152.3
	Camel	249.894	253.64241	256.432
	Horse	16.4	16.5	16.7
	Donkey	182.5	186.2	189.9
Niamey	Cattle	36.6	37.3	41.1
	Sheep	138.8	142.9	148.6
	Goat	75.3	77.2	81.4
	Camel	0.042	0.04263	0.043
	Horse	0.3	0.3	0.3
	Donkey	2.5	2.5	2.6
Tahoua	Cattle	1,437.4	1,466.1	1,615.0
	Sheep	1,978.2	2,037.5	2,119.1
	Goat	2,089.6	2,141.8	2,260.1
	Camel	480.8	488.0	493.4
	Horse	28.9	29.2	29.5
	Donkey	377.9	385.5	393.2
Tillabéri	Cattle	1,550.1	1,581.1	1,741.7
	Sheep	1,292.9	1,331.7	1,385.0
	Goat	1,452.4	1,488.7	1,570.9
	Camel	85.3	86.5	87.5
	Horse	18.3	18.5	18.7
	Donkey	278.2	283.8	289.4
Zinder	Cattle	1,622.8	1,655.3	1,823.4
	Sheep	2,361.3	2,432.1	2,529.5
	Goat	3,165.6	3,244.7	3,423.9

Camel	219.1	222.4	224.8
Horse	107.2	108.2	109.3
Donkey	283.9	289.6	295.4

Source: Les données sont corrigées après la publication des résultats de RGCA
Source: Direction de l'Elevage

(3) Meat production

Production of meat increased 55% during the year 2000-2005, but per capita consumption remains low of 5kg per year, reflecting the lack of raw meat preservation facilities and uncontrolled slauthering.

Most of meat produced are consumed within the country, and very limited amount are exported to Nigeria and Cote d'Ivoire (Table II.11).

Table II.11 Trend of raw meat production (2000-2005)

	2002	2003	2004	2005
Modern slaughter / raw meat (kg)	27,919,808	26,921,513	30,107,369	36.924,022
/viscera etc. (kg)	7,396,949	7,138,979	7,997,015	9,631,897
Sub total (kg)	35,318,759	34,062,495	38,106,388	46,557,924
Traditional slaughter (kg)	24,721,730	34,060,492	38,106,388	46,557,924
Raw meat total (kg)	60,040,489	68,122,987	76,210,772	93,113,844
Average price FCFA/kg)	1,200	1,200	1,200	1,200
Total amount (1.0 milFCFA)	72.05	81.75	91.45	111.74

Source: MRA

(4) Milk production

In Niger, share of milk and milk products in total nutritional value is estimated as 20%, and about 80% of the supplementary nutrition sources. Milk production of a cow per day is considered as 1-2 litre on average of milking period. Production cannot meet domestic demand. According to FAO, Niger had imported 5 billion FCFA of milk products in 2003.

Increasing trend of import is observed. Low per head production in 2005 was due to the irregular rainfall and outbreak of desert locust damages (Table II.12).

TableII.12 Milk production (2002-2005) unit: litre

Kind	2002	2003	2004	2005
Cattle	175,411,368	178,919,631	182,497,986	186,147,968
Sheep	84,353,040	86,883,636	89,490,144	91,279,944
Goat	188,847,855	193,569,054	198,408,273	202,376,433
Camel	66,844,206	67,846,896	68,864,621	70,241,886
total	515,458,471	527,221,220	539,263,028	550,048,236

Source: MRA

(5) Hide (Raw hide and leather)

In Niger, processing of raw hide to leather are commonly practised by handcraft almost in all part of the country. About 95% of the total production are exported, of which 80% are to Nigeria. Yearly production are, 200,000 pieces of cow hide (tanned), 900,000 pieces of sheep

hide (raw) and 1,550,000 pieces of goat hide (raw). Leather production by semi-modern tanning technology account 912,000 pieces.

2) Themes of livestock industry

(1) Limitations of traditional technology

Repeated drought and outbreak of locust damage, together with rapid population increase, brought about drastic changes of environment surrounding agriculture in Niger. This situation makes it difficult to continue livestock production by age-old traditional technology.

(2) Confrontation with sedentary farmers

Entry of livestock to the field of millet and sorghum before harvest, and also breaking fence of vegetable garden often causes the troubles. Compensation for the damage is the root of the conflict

(3) Lack of veterinarians and livestock extension officers

As an extension officer covers very broad areas, technical services provided to local inhabitants are very poor. Veterinarians are also limited in number for appropriate technical support.

(4) Limited use of supplementary feed

In grazing major feed is natural grass. Therefore, to secure feed in dry season is the issue of concern. Securing supplementary feed is closely related to the forest and tree planting. As an example, *Acacia albida* will be taken up on its feed value. *Acacia albida* is very uselful tree for livestock in Niger. Dry nut has more than two times of feed value of groundnut leaves (0.77UF/kg) and one grown up tree provides 120-140kg nuts (Survey result at Bambay, Senegal). From 20 trees/ha 2,500kg nuts are harvested and these equal to 1,930kg of wheat (1,930UF). It is estimated that by using *Acacia albida* more than two times of cattle could be raised in Senegal and Niger.

(5) Marketing

In the marketing channel of livestock, there exist traditional middlemen who exploite nomads as well as the sedentary farmers. Particularly in case of sedentary farmers with a limited number of livestock, they consider their livestock as as insurance for emergency (famine, wedding, disease, accident etc.). In selling livestock to obtain cash, they are so often beaten down the price much lower than the market price.

5. Trend of Forestry

1) Forest areas

Forest in Niger occupy about 23% of the total land area with annual rainfall of more than 150mm - 600mm, located in the suthern part, streching to Sahel-Sahara, Sahel and Sahel - Sudan climatic zone.

No definitive data on forest resources are available. Department of Environment, in charge of forest issues, has no capacity to measure or estimate forest acreage due to lack of fund and human resources.

Therefore, in the midst of forest destruction and desertfication by repeated drought and rapid population growth, so many different figures on forest acreage have been presented.

-1981 Sahel Club 16,096,400 ha
-1989 Project on Soil/ forest Plan (PUSF) 14, 196,400 ha
Among above, 4 mil.ha will be available for fuel wood resource development
-1990 FAO 10,500,000 ha
-1991 Catinot（FAO） 13,000,000 ha
-1999 M. Hamadou, S. Gambo 5,741,914ha
-2005 FAO (FRA/ World Forest Resources Assessment)
Acreage: more than 0.5ha, Height: more than 5m
Covering ratio : more than 10% 1,226,000ha
Acreage : more than 5ha height: more than 5m
Covering ratio: 5 - 10% 3,740,000ha
Above forest are pointed out to be decreased by 60,000ha annually.

Figures in the base year differ by the reports. Due to lack of the latest statistical data, estimation needs to be made. In FAO's report (Connaissances actuelles et tendances des produits forestiers au Niger), figure of forest acreage differs much between figures used for fuel wood and for forest growth, due to the difference of surveyors.

Table II.13 Changes of forest acreage (Difference by surveyors/ FAO)

Surveyors	Changes of forest acreage (ha)				
	1996	1997	1998	1999	2000
GARBA.H and others	9,075,870	8,858,049	8,645,456	8,437,965	8,235,454
M.Laouali	12,863,600	12,673,200	12,482,800	12,292,400	12,102,000

Except the cases of projects executed at the specific areas with strict measurement, a certain figure is selected as a basis and multiplied by exponent in many cases. Therefore, some contradiction among the reports is often noticed.

In the following analysis, for the figures related to forest acreage, production and fuel wood,

data of the Ministry of Irrigation, Environment and Anti-desertification which is based on FAO (M.Laouali) will be used.

2) Classification of forest (natural forest) by types

Forest in Niger is classified into several types according to the formulation, vegetation and function.

(1) Plateau type

This type consists of tiger bush (brousse tigrée) which is intermixed by naked land and small scale forest, spotted bush (brousse tachetée) which is the seen as crowded tiger bush and scattered forest without forming any specific structure.

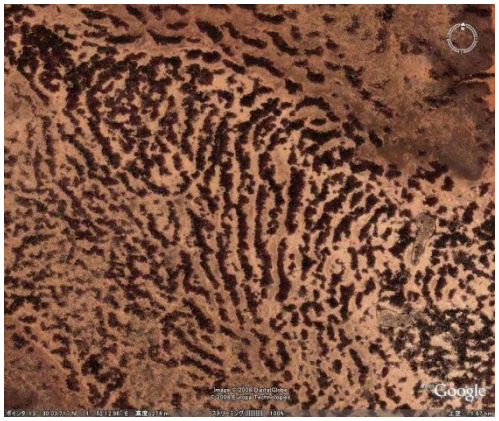


Photo II.1 Tiger bush

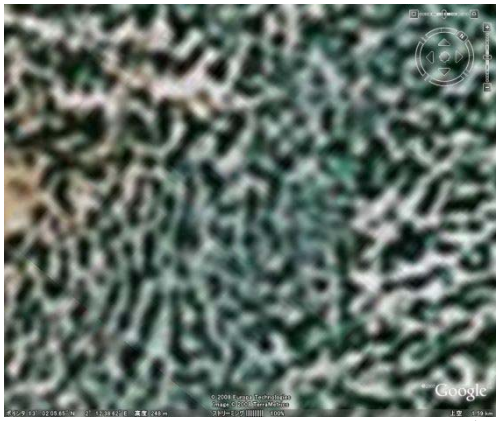
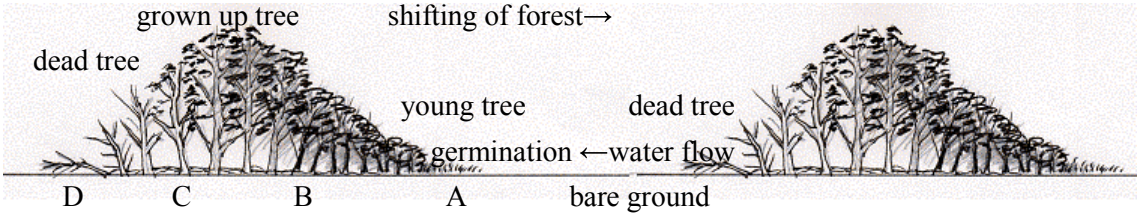


Photo II.2 Spotted bush (Google Earth)



Rainfall to the bare ground of Lithosols, forming the plateau, does not penetrate to soil, but flows A→B→C along the mild slope (0.5%-2.0%). Accumlated water become maximum at B where the sediment is high, and water does not reach D. Thus grown up trees in C stop their growth and trees in D wither. At the area of A, the connecting point of forest and bare soil, sprouts of trees are observed among pioneer plants like gramineous species and these sprout grow to young trees.Through these process for a long period, forest shift to bare ground. Tiger bush, so to speak, is in a diagram of water and soil conservation ultimately. Technology on water / soil conservation (CES/DRS) adopted in many places are undoubtedly the artificial version of this tiger bush system. Mechanism of spotted bush occurrence is not carified yet, but ussually this type is observed in the area of milder slope with more rich rainfall (Projet Energie II Report).

Fig. II.11 Tiger bush and spotted bush

This type of forest is, according to the preceding classification, exists in areas of southern part of Sahel (rainfall more than 450mm) and on plateaus in the west, central and eastern south,

equivalent to Sahel Sudan climate zone (more than 600mm).

More than 90% of these shrub forest (tiger bush and spotted bush) are occupied by the typical tree species such as *Guiera senegalensis, Combretum micranthum* and *Combretum nigricans*. According to the estimate by Abunta in 1984, Plateau type forest existed in 5,000,000ha, of which 2,200,000ha was tiger bush and spotted bush, and 2,800,000ha was scattered type forest. It is estimated that, by reclamation for farming and deforestation for fuel wood, on average 60,000ha of forest are being lost every year.

(2) Lowland/ flood plain type

This type is observed in lowland/ flood plain, particularly in the areas of clayey soil in Zinder, Maradi, Tahoua and Tillaberi regions. Major tree species here is a leguminous thorny tree represented by *Acacia nilotica*. Propagation capacity by natural regeneration is strong and has the tendency to grow densely, but also has the risk of extinction by attack of animal (young tree) and germination failure by flood.

(3) Sandy plain type

This type is found from southern part of Sahel-Sahara climate zone to the northern part of Sahel-Sudan climate zone, consisting of arid savannah. In addition to tree species of Combretaceae and fodder trees such as *Acacia raddiana* and *Acacia senegal*, from the eastern part of Zinder to Diffa regions many *Leptadenia pyrotechnic*a are observed.In areas of rainy and favorable condition in south, *Piliostigma reticulatum, Prosopis africana, Pourpatia bierra* are also included. This type covers biggest area at present, but acreage of this vegetation is not clarified.

(4) Agroforestry type

This type represents the combined one of farming and tree growing. In farmland with crops or in fallow, trees are scattered. More attention go to crops in general, and this often leads to the negligence of tree growing. But in some areas trees play very important role as a potential forest resources. According to the survey by Energie II project in 1990, agro-forestry colony in Zinder consisting mainly of *Acacia albida, Prosopis africana, Adansonia digitata* covered 157,950ha. Similarly in 1993 in Maradi region, it covered 100,000ha. Mainly extends in the southernpart (southern Sahel crimate zone) of the country linearly, density of tree planting varys from 10 to 100/ha.

Tree species combined with crops include;

－*Acacia albida*

－Doum palm (*Hypaene thebaica*)

－Ronier palm (*Borassus aethiopum*)

－Shea butter tree (*Butyrospermum parkii*), Baobab trree (*Adansonia digitata*) and others

All types of the above forest have also been exposed to natural and man made destruction caused by repeated drought, land reclamation for crop farming and cutting for fuel and animal feed. However, most severely hit are said to be Plateau type and Sand plain type. These two types, different from the Agroforestry type which harmonizes with farming, are located surrounding farming areas from south and north.

Sandy plain type, located in the north, has been exposed to the wave of land reclamation toward the north since1960's, when rainfall was favorable, partly due to its vastness and thinly scattered forest at flat plain where reclamaition was relatively easy.

In May 1961, the law on specifying northern limit for cultivation was enacted. The law (loi 61-5) specifies the line by indicating paricular dune, forest, wetland etc. in respective area, north from there being prohivited wet season cropping and forming communities there (Article 1 and 2). Those living and farming over there were ordered to abondon, with only one crop before leave permited (Article 3). Over the northern limit, food production by nomad and oasis farming were permitted (Article 4). However, the law was not practical and had not duly observed and cultivation continued to advance to the north.

In the course of these development, from '70's and '80's, repeated drought increased soil aridity and environmental destruction went on in this fragile ecosystem. This led to the accelerated desertification and lampant conflict between nomads and crop farmers.

On the other hand, in forest of Plateau type located in south-western part, due to its nature of tiger bush and scattered forest, conversion to cropland has occurred rather slowly compared to the level of rainfall. But reckless cutting tree for fuel caused serious problem. Around Niamey, the biggest city of Niger, concentric circle of destruction is expanding by illegal cutting and chaotic reclamation from increasing population pressure of 3.3% growth rate.

3) Forest products

(1) Fuel woods

Among forest products, fuel wood has the biggest share in Niger. Fuel woods consumption per person per day are, 0.65kg in rural area and 0.8kg in urban area. Fuel woods are sold through a number of steps to consumers, usually at retail price 50-100 FCFA/ bundle.

(2) Timber

Niger does not produce much forest products as mentioned already. Almost all of timber board and plywood consumed in the country are imported from Nigeria, Benin and Cote d'Ivoire. Papers and paper products daily used are all depending on import.

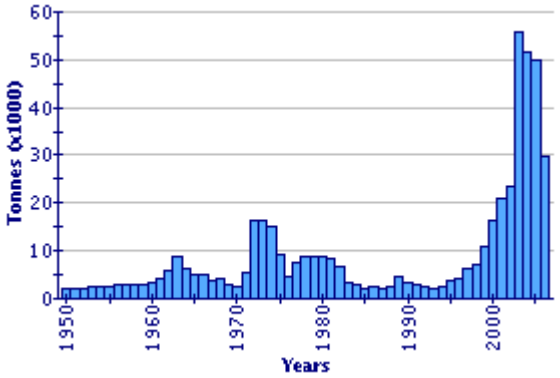
But its share in total import is fairly low. As most residence are made of mud brick or block, and use of furniture and paper products are limited, total consumption seems to be limited.

(3) Secondary products

Branches, leaves, roots, flowers, seeds, barks and resin of tree, together with honey and wild animals, can be said more important and valuable products than timbers for farmers and nomads. But most of them are for domestic use, and extremely small in terms of contribution to GDP. As the variety of their uses and kinds and their deep rooted preference by rural inhabitants are difficult to be measured, they are often underestimated of their importance.

6. Trend of Fisheries

Fishery in Niger has been very active since 1999 as indicated in the figure. Unpreceded record of fish catch are reported.



Source：FAO Fisheries Statistics

Fig.II.12　Fish catch in Niger

Table II.14　Fish catch in Niger（1972－2003）

Year	Production (t)	Year	Production (t)	Year	Production (t)
1972	16,400	1983	3,215	1994	2,516
1973	16,200	1984	3,000	1995	3,616
1974	15,050	1985	2,000	1996	4,156
1975	9,142	1986	2,325	1997	6,341
1976	4,715	1987	2,400	1998	7,013
1977	7,372	1988	2,500	1999	11,014
1978	8,783	1989	4,751	2000	16,264
1979	8,934	1990	3,200	2001	20,824
1980	8,892	1991	3,150	2002	23,650
1981	8,208	1992	2,454	2003	55,860
1982	6,840	1993	2,162	2004*	52,000

Source: DFPP　＊FAO yearbook 2004

As indicated in the trend of fish catch, Niger's fisheries has been stagnated for long after prosperous days in early part of 1970's. Particularly, during fourteen years from '83 to '96, average catch per year continued to remain low of around 2,900t. But in 1999, it turned to the increasing trend and in 2003, fish catch marked 55,860t, surpassing the total catch of the past 15 years.

Niger is an inland country. Needless to say, fisheries in Niger is the inland fisheries for fresh water fishes. According to the report by the Ministry of Irrigation, Environment and

Anti-Desertification, inland waters in Niger include Niger river and its tributaries, Komadougou Yobe river, Niger's portion of Lake Chad, 970 marshs and ponds and 69 reservoirs with total area of 400,000ha.

Type of the fisheries will roughly be classified by water body into 3, namely river basin fisheries at Niger river and Komadougou Yobe river, lake type fisheries like in Lake Chad, and that in marshs, ponds and reservoirs scattered all over the country.

Table II.15 Fishery production by region（fresh fish） (unit: ton)

	1996	1997	1998	1999	2000	2001	2002*	2003*
Agadez	-	-	-	-	-	-	-	-
Diffa	148.5	200	1,201	4,443	10,370	12,965	15,000	30,000
Dosso	1,141	864	1,006	1,262	1,871	2,495	2,994	2,994
Maradi	21	69.5	65,5	145	146	182.5	42	42
Niamey CUN	1,039	1,095	566	597	606	757.5	306	306
Tahoua	1,072	2,501	2,716.5	2,730.5	2,000	2,500	3,000	3,000
Tillaberi	597	1,500	1,267	1,686,5	1,380	1,725	2,070	2,070
Zinder	138.5	112	198	150	147	176.5	108	108
Aquaculture						30	40	40
Total	4,156	6,341	7,013	11,014	16,520	20,799	23,560	52,000

Source: DFPP ＊note by author. (estimation ? quoted as it was)

According to FAO data (January 2000), per capita consumption of fish in Niger as an animal protein was only 0.3-0.5 kg/year. In addition, fish comsumption concentrates mainly to urban area, thus the consumption of fish remains extremely limited.

Table II.16 Animal protein intake（January 2000）

	Burkina Faso	Mali	Niger	Senegal
Fish (kg/capita/year)	1.5	10.5	0.3－0.5	37
Meat (kg/capita/year)	—	7.8	7	—

Source: EIU(2005): aquaculture & fisheries report for Mali, Niger and Burkina Faso :
FAO (2005)

As seen in the Table II.16, except the case of Senegal which is a coastal country, per capita consumption of fish in Niger is very limited compared to other inland countries such as Burkina Faso and Mali. Due to lack of information, any change since 2000 is not available. Anyway, it is said that about 10% of fish catch in Niger basin and 80% of that from Lake Chad and swamps, ponds and reservoirs are smoked and exported to Nigeria. Therefore, domestic consumption is estimated at about 20 % of the total fish catch in the country.

(1) Varieties of fish

It is said that there exist about 100 kinds of fish in Niger river and 120 kinds in Lake Chad. Among them, 3 major varieties are African arowana (*Heterotis niloticus*), catfishes (*Clarias* sp.) and Nile tilapia (*Oreochromis niloticus*).

(2) People engaged in fishery

According to FAO, people engaged in fishery in Niger river basin were 1,157 in the year 1969, 7,983 in 1985 and 2000-3000 in the year 2000. There is a report that says, after the recovery of Lake Chad in 1998/99, many immigrant fishermen have emerged and now 10,000-20,000 fishermen are working. The report on 2003 says that total number of the people engaged in fishery, including those in processing and marketing was about 50,000.

In Niger river basin, in addition to the fishermen of Niger, many fishermen from Nigeria, Mali, and Benin are operating. Similarly, in Lake Chad, people from Nigeria, Mali, Cameroon, Sudan, Chad and Central Africa are also operating as professional fishermen. However, they are facing the problems, such as unstable fish catch, difficulty to diversify their ways of life, low wage, risk of works and seasonal fluctutaion of fish catch and limited season for operation. Thus fishery is considered as one of the most unstable proffession.

(3) Processing

Fished catch is basically all consumed by human and not used as animal feed. Lack of infrastructure for preservation and transportation of perishable raw fish is a major constraint to the effective resource utilization and marketing.

Raw fish are usually sent to the markets in the cities of neigboring regions. In Niger river basin, almost 90% of catch are sold in and around Niamey for domestic consumption. But in case of Lake Chad or marshs, ponds and reservoirs, about 80% of the catch are proccessed by smoking and most of them are exported to Nigeria.

Fishing are exclusively done by male, but female are also involved in processing and marketing fishes and fishery products.

Proccessing methods include smoking, drying and frying. Smoking is most popular, in which major varieties are catfish, Nile-perch, arowana, tilapia and synodontis.

For fried fish, both small and medium size fishes are used. And these are sold at nearby markets. Smoking are usually made in traditional way, in open air using earthen smoking stove. Inefficient methods, long time required and quick spoilage in spite of using a lot of fuel woods suppress the commercial value of the smoked fishes. It is said that about 50% of the products are lost by decomposition and attacks by fly. Introduction of improved smoking stove (altona and chorkor) is being promoted but the number of these stoves are quite limited. Smoked fishes are packed in sacks or carton boxes and then shipped.

(4) Demand and import

As mentioned earlier, animal protein intake in the form of fish in Niger is very low compared to that of neigboring countries. Lake Chad and marshs and ponds located in the south where most of the fish come from, are distant from many other consuming areas in the country. Cost of

transportation and others hinder the increase in consumption of fish in these areas. On the other hand, to respond to the strong demand in Niamey and other major cities for fish as a cheap and high quality protein resources, both fresh water and marine fishes frozen are imported in large quantity annually from Mali, Nigeria, Senegal, Benin and Cote d'Ivoire.

Table II.17 Fish import (Quantity and Amount)

Year	Quantity (kg)	Amount (FCFA)
1999	368,914	119,490,419
2000	723,197	183,928,929
2001	547,000	308,000,000
2002	453,802	164,824,089
2003	349,606	149,503,771
2004	449,694	178,244,391
2005	348,429	107,731,352
Total	3,240,642	1,211,722,951

Source: DSCN

CHAPTER III. JAPAN'S DEVELOPMENT COOPERATION ON AGRICULTURE AND FORESTRY

1. Japanese Cooperation in General

Since 1976, Japan has been extending development cooperation to Niger in the forms of Grant Aid, Loan, Technical Cooperation in general and dispatch of Japan Overseas Cooperation Volunteers (JOCV). In recent years, in line with the process of PRSP implementation, the cooperation has been focused on the issues of basic human needs. Towards the poverty reduction, the most important policy agenda, development cooperation has focused on establishing sustainable agricultural production and living condition through strengthening rural community. To this end, education, healthcare and rural development are selected as 3 major fields of priority (MFA website, 2007a, p.618).

- Education (Improvement of access, quality and management of basic education, Human resources development)
- Healthcare (upgrade basic health, counter measure for infectious diseases, support to reproductive health etc.)
- Rural Development (Promotion of sustainable rural development)

In recent years, in the field of education, a model of improved management of school has established by the [Project on Support to the Improvement of School Management through Community Participation (School for All)] Phase I and Phase II and has successfully extended in all part of the country, and the [Project on Strengthening of Mathematics and Science in Secondary Education (SMASSE-NIGER)] has contributed to upgrade the quality of education. In addition, the cooperation in the field of rural development has strengthened its function on information collection and donor coordination. Japanese cooperation has renewed its recognition.

Table III.1 Japanese ODA to Niger Net disburse basis.$ mil.

Year	G-G Loans(1)	Grant Aid(2)	Technical Cooperation(3)	Total
2002	-1.10	7.96	6.43	13.29
2003	-0.60	8.37	5.89	13.66
2004	-22.36	30.90	5.54	14.08
2005	-	17.20	6.47	23.68
2006	-	4.49	7.60	12.09
Total	-28.63	364.34	143.34	479.10

Note 1: (1), (2) include actually disbursed amount in the respective year committed by the Exchange of Notes by both governments. (Repaid amount are deducted in (1).)
Note 2: (2) includes not only of JICA but also those other Ministries and others.
Source: MFA website, 2007a, p.619

2. Performance of Japanese Development Cooperation on Agriculture and Forestry

Agriculture and forestry has been one of the priority areas for development cooperation. Cooperation on integrated rural development, protection from desertification, food security and promotion of irrigated agriculture has been taken up. However, under the condition of severe financial situation, fragile governance, unstable internal security and others of Niger, together with budgetary situation on the part of Japan, cooperation has implemented respective projects independently. Since Technical Cooperation (Development Study and Project-type Technical Cooperation etc.) requires implementation capacity of beneficiary countries, so far project type technical cooperation has not been implemented in Niger. In view of the recent tendency of harmonizing aid coordination, strengthening aid strategy and enhancing support to African countries under TICAD framework, integrated and strategic cooperation are now strongly expected.

Table III.2 Major cooperation performance on agriculture and forestry

Start	Conclude	Name of Project	Type of Cooperation	Outline
1976	1977	Project for Enforcement of Transport Capacity	Grant aid	Provision of vehicles for effective transportation and distribution of goods donated by development partners including Japan. Plants for maintenance of vehicles were included.
1978	Ongoing	Training Programmes		Initially, training on rice growing technology has been conducted to administrative and technical officials of Niger. In recent years, counterparts of JICA's cooperation are also attending training courses on farmers' organization, capacity building of women and so on.
1980	1980	Project for Reinforcement of the Transportation	Grant aid	Planning on consolidation and expansion of transport system of agricultural products. Vehicles were provided
1981	1983	Agriculture Development through Irrigation in Kourani-Baria	Development Study	F/S for the implementation of Irrigation Development Project by AfDB.
1984	1984	Project to Improve Transportation Capacity of the Niger Food Office	Grant aid	For the support of OPVN's activities on food security and of countermeasure against food crises of Niger, transport vehicles were provided
1984	Ongoing	Japan Overseas Cooperation Volunteers(JOCV)		At first, technical support of pests and diseases control, selection of appropriate varieties on rice, animal diseases control and prevention, soil improvement had been focused. Agriculture has big share in number of JOCVs dispatched together with education and health. Until 2001, with share of 20% or 91 JOCVs have been dispatched.

1985	1985	Enforcement of Transport Capacity of OPVN	Grant Aid	Vehicles for transportation of food supported by donors or procured within the country were provided to OPVN.
1985	1985	Enforcement in equipment of ONAHA	Grant Aid	Strengthening ONAHA, the irrigation authority of Niger, through procurement of equipment and machinery.
1985	1989	Study on Anti-Desertification Measures	Basic Study	2） (2) referred
1986	1986	Construction of Grain Stock Warehouses in Rural Areas	Grant Aid	Construction of 20 small scale grain warehouses and related machineries in 2 prefectures for grain reserve and storage. Size of 300m2 (including fertilizer warehouse and grain mill) and capacity at 100t of Grain and 176t of fertilizers.
1988	1989	Irrigation Development for Agriculture in Ouna Kouanza	Development Study	Planning of irrigation development for agricultural and social development based on the F/S conducted by Niger with France.
1988	1989	Ouallam Rural Infrastructure Rehabilitation	Development Study	Planning of agricultural development focused on drinking water and farming in dry season in the area of Ouallam against severe desertification.
1989	1989	Project for Grain Stock Warehouses Construction	Grant Aid	Construction of grain warehouses for the federation of cooperatives to store grains and enforce its functions. (10 houses of capacity 100t, and 10houses of 200 t each.) Threshers and flour mills attached.
1990	1990	Project of Construction of Maintenance Workshop of Engines and Vehicles of ONAHA	Grant Aid	Construction of workshop for construction machinery and equipment for irrigation to strengthen ONAHA's function.
1990	1995	Study on Anti-Desertification Measures.	Verification Study	2）(2) referred
1990	1994	Project of Rehabilitation of Rural Zone in Ouallam Plan I・II・III	Grant Aid	Well digging(shallow wells 35, composite wells 65) and irrigation facilities and equipment
1993	2001	Project for the promotion of aforestation in Kareye-Gorou	Team of JOCV	2）(3) referred
1994	1995	Project of Rehabilitation of Rural Zone in Ouallam (Phase 2)	Grant Aid	Digging wells (shallow wells 10, composite wells 5) and provision of vehicles equipped with drill, water wagon, compressors and other equipment for irrigation.
1995	1997	Project of Rehabilitation of Rural Zone in Ouallam (Phase 2)	Grant Aid	Digging wells (shallow wells 35, deep wells 5, and composite wells 60) and 11 small irrigation facilities for vegetable growing in dry season and provision of related machinery.
1996	2000	Study on Anti-Desertification Measures.	Technology Development Study	2）(2)referred

1997	1999	Study on Plan against Desertification in Tillaberi Region	Development Study	Master Plan Study for prevention of desertification and integrated development of Tillaberi, center of agricultural production in the country and densely populated.
2000	2001	Planning of Rural Development	Dispatch of expert	Support to the revision of agricultural policy of Niger, preparation of study plan and table at the then Department of Planning and Research, guidance on document preparation to the then Planning Division and Inspection Divisions, and data collection for rural development to update the data base etc.
2004	2005	Planning of Rural Development	Dispatch of expert	Expansion of data base for rural development, and strengthening the executing capacity of the Study and Planning Department of the Ministry
2005	2009	Study on Sahel Oases Development	Development Study	2）(1)referred
Multi year Implementation		Assistance for Promotion of Food Production	Grant Aid	2）(6)referred
Multi year implementation		Assistance for Underprivileged Farmer	Grant Aid	2）(5)referred

3. Major Agriculture and Forestry Projects and their Performance

1) Study on Sahel Oases Development

For the effective use of small scale reservoirs constructed by the Special Program of the President (PSRPN: Programme Special du President de la Republique du Niger), the government of Niger requested the government of Japan in 2004 to implement the Development Study on rural development in the surrounding areas of these small scale reservoirs for poverty reduction and prevention of desertification. Preliminary survey was conducted to confirm the relevance of the Study and the Study started in November 2005 for the 4 year term.

The objectives of the Study were; ①to formulate Action Plan (A/P) to implement the community-based rural development through utilization of small scale reservoirs, supported by administration and NGOs and by farmer-to-farmer approach in the Study area, ②in the course of the Study, to implement pilot projects for the capacity development of Nigerien counterpart personnel as well as of the communities concerned. Target of the Study is those beneficiary communities located near the reservoirs in Tillaberi, Dosso, Tahoua, Maradi and Niamey CUN. Among them, 4 reservoirs and their surrounding communities were selected for the Pilot Project (P/P) from the second year of the Study to confirm the validity of A/P and to grasp the issues to be addressed for more practical A/P finalization. Outline of Pilot Project is shown in the following Table.

Table III.3 Outline of the P/P of "Study on Sahel-Oases Development"

	Target	Activity	Name of project		Contents
Minimum package	Administrative unit	Enhance support to farmers by administration	Strengthening the working condition of field extension officers		Provision of bikes and fuels
			Capacity development of field extension officers (E/O)		Upgrading facilitation and management capacity of E/O, Provision of various guidelines, Estimation of available water in reservoir
			System of information collection and sharing		Improving guidelines, Monitoring sessions, Management committee, Donors, NGOs information exchange
	Reservoir unit	Capacity development on management of reservoir users	Support for organizing users' association of reservoirs		Support to set up users' association
			Capacity development of executives of association		Support to capacity development of executives
			Capacity development on operation and maintenance (O/M) of reservoir		Support to capacity development on simplified O/M methods
			Establish system for information exchange and extension among beneficiaries		Support for extension of technology between reservoir and village, Holding workshops of association with village level organizations
	Village unit	Capacity development on project management of farmers	Support to organize farmers' group		Support to set up farmers' organization
			Support to capacity development of executive members		Training course for leaders, Training on preparation of request form on village development plan
Small scale integrated venture	Reservoir unit	Income generation	Improve cultivation technique	1. Basic farming techniques and pest/ disease control	Support to acquire basic knowledge on farming, pest and disease control
				2. Introduction of eco-farming	Support to acquire knowledge on water saving technology in fruit tree growing etc.
				3. Introduction of new varieties	Demonstration of improved varieties of pearl millet and sorghum
			Upgrading farm management technique		Method to obtain seed from their own crops, Joint purchase of equipment and materials, Storage and shipment, Risk management, Collection and use of price information.
			Trials of NERICA rice		Support to introduce NERICA
			Aquaculture introduction trial		Support to the introduction of inland fisheries
			Capacity development on operation and management of irrigation system		Techniques on digging cement irrigation well, pumping up by cattle, improved pump operation and management
			Soil conservation		Support on agro-forestry technology, provision of equipment/ materials required

	Target	Activity	Name of project	Contents
			Countermeasures to damages of reservoir caused by livestock	Establish community land committee. clarification of the route for nomad, establish land mark of boundary
			Income generation activities	Diversify income sources of farmers
		Improvement of living conditions	Increase in literacy	Rearing teachers within village, holding class for literacy
			Health and hygiene	Campain on health and hygiene, Hygiene on reservoirs' water, Introduction of simplified water purification facility
			Introduction of improved kitchen stove	Saving fuel woods, Reduction of female labor
	Community unit	Income generation	Introduction of Rotational Credit System(Ton- Chin)	Support to micro-finance introduction

As of now, only one year is left for the Study. A/P is to be finalized through various monitoring activities. So far, following points are raised as practical achievements of P/P.

In the past, reservoirs were not systematically utilized, but through implementation of P/P, 3 organizations, namely, reservoir beneficiary association, community land committee and community development committee have been organized. With technical and management support, these organizations realized sustainable and equitable use of productive resources such as land and water of reservoirs with increased productivity and capacity of farmers in beneficiary communities has also increased. Without those solid rules and regulations on water use of reservoirs on the sites, there may occur conflicts or disputes on land and water among farmers in quite near future because farmers living near the reservoirs are increasing in number. In addition, many reservoirs constructed under PSPRN are facing the problems of accumulated sand and breach of some facilities. These problems are to be tackled by the implementation of Action Plan (A/P).

Achievements so far obtained are;

- At the site of one reservoir (Bourdi), 50 wells were dug for vegetable growing in dry season as the anti-locust project. Association of reservoir's beneficiary farmers, introduced by P/P, decided, after consultation with Director of the Prefecture of MDA and field extension officer, to collect fee from farmers who use these wells as the fund for association's operation and management.
- At the site of the reservoir (Guidan Bado), inland fishery was introduced. On that occasion, association of reservoir established a three party's partner relationship with Department of the Prefecture of MDA and the municipality for the sustainable aquaculture development. Through an appropriate management of aquaculture business by partnership, increased income of farmers of the association and tax income for municipality are eagerly expected

mutually.

- At the site of reservoir (Bourdi), association of reservoir's beneficiary farmers, supported by P/P, produced 3,000 seedlings of tree to plant near the reservoir for soil conservation. As it was found not enough, the association requested support for additional 9,000 seedlings to donor agency by themselves.
- Using the method of the "Projet Intrant" executed by FAO, shops for equipment and materials (Boutique des Intrants: BI) were opened. Associations of reservoir beneficiary, strengthened by P/P, could purchase materials and sell their products jointly through BI, thus improved their farm management technique.
- In communities around reservoirs, where Tontine (rotational micro-credit groups) were formed, member farmers improved their access to credit. As they could obtain fund for income generation activities, their income increased and their living conditions improved very much.
- In introducing associations of reservoir users, [self promotion] of individual farmers was much encouraged. For regional development, things able to be done by each individual are very much limited. Therefore, organizing farmers is important, but only organizing does not make sense. Organization needs to function well. In the A/P, the sytem was introduced to decide all the process by members themselves, from selection of executive members, analysis of current situation, consideration of coutermeasures, implementaion and operation and management to empahsise the importance of self consciousness that each individual is the true actor of the regional development and engages in activities sustainably.

To ensure sustainability and efficiency of these achievements, A/P includes the partnership of extension officers and local government agencies. In other words, in A/P, the role of extension officers of Commune is much emphasized[1], though Region, Prefecture and Commune offices of the MDA are expected as executing agencies. After the termination of support by JICA, extension officers need to visit the sites of reservoirs and to participate in the regular rmeetings. The cost of the extension officers for these activities need to be borne by the administrative side. A/P needs, therefore, to include concerned Ministries and their branch office at local level for the ways of information collection and sharing.

2) Anti-desertification projects

The former Japan Green Resources Agency (Currently merged to Japan International Research Center for Agricultural Sciences: JIRCAS), has accumulated and diffused technologies of agriculture and rural development and anti-desertification for poverty reduction

[1] Currently, extension officers are mainly involved in survey of crop harvest forecast such as pearl millet and sorghum and they have provided limited technical advice so far. Therefore, A/P includes contents to expand capacity of extension officers to "listen, confirm and support planning" for tackling development issues together with farmers.

in West Africa[2] (Japan Green Resources Agency, 2000, p.2; MAFF website, 2003, p.32).

First of all, Basic Study on desertification of basin all along the Niger river was conducted to grasp and analyze the current situation of desertification with Niger River Basin Organization (ABN) and its 9 member countries from 1985 to 89. Based on the result, basic plan for prevention of desertification was prepared with future image of agriculture and rural development. In line with this basic plan, verification study was conducted from 1990 to 1995 at Magou village[3] in Niger[4]. Through this verification study, conducted by participation of local farmers, validity of various techniques against desertification was confirmed. To ensure more broadly adaptability of these techniques, technology development study[5] was conducted from 1996 to 2000 in a row and its results was complied as technical manuals for prevention of desertification in Sahel[6] which includes both soft and hardware technologies. These technologies have been applied not only in Niger, but also to Mali and Burkina Faso[7].

3) JOCV activities in Kareye-Gorou

The activity of JOCV at Kareye-Gorou[8], Kollo department, Tillaberi region has started from the "Project for the promotion of aforestation in Kareye-Gorou (1993-2001). In Kareye-Gorou, people had been facing serious problems of desertification such as erosion and sand dunes movement which led to burying cropland. To settle sand dunes and to increase income of farmers, agroforestry approaches including tree planting with farmers' participation, vegetable/ fruits growing, marketing and reducing tree cutting by using improved cooking stoves have been taken (MFA, 2001, Topics 6). Since then, 3 experts and 33 JOCV in 4 professional titles have been dispatched. As a result, tree planting of 300,000 seedlings, technologies on production of better onion varieties and grafting of mango trees were well disseminated and contributed much to the increased income and improved living standard of farmers.

Later on, these JOCV activities evolved into projects of JOCVs [Project for improvement of living conditions in Kareye-Gorou Phase I](2001-2005) and [Phase II](2005-2010). In these projects, JOCV members of various fields, such as community development, vegetable

[2] Project supported by the Ministry of Agriculture, Forestry and Fisheries of Japan.
[3] Located at 60km southeast of Niamey, verification field of 100ha was established.
[4] It was verified that, by adoption of the corroborated technologies, increase in food and fuel wood production to meet the needs of increasing population, and increase in animal feeds grass were possible. These contents were summarized in [Model Plan for the Prevention of Desertification] covering whole village of Magou (1,800ha).
[5] The results of the Study on Plan for the Prevention of Desertification in Tillaberi region (1997-98) are also incorporated.
[6] Technical manuals consist of (i)Preparation of the plan, (ii)Fostering farmers' organization, (iii)Water resources development, (iv)Water resources utilization, (v)Soil conservation, (vi)Agriculture, (vii)Livestock, and (viii)Tree planting.
[7] "Study on Sahel Oases Development" in Niger, "Study of Prevention for Desertification in the South Region of Segou"(2000-03), "Study on the Capacity Building Programs for the Community-based Prevention of Desertification in the South Region of Segou"(2004-08) in Mali, "Study on the System to Alliviate the Land Degradation"(2000-2004) and its phase II(20004-2006) in Burkina Faso.
[8] Stretching to 50km at the right bank of Niger river.

production, tree planting, nurses, primary school teachers, sociologists and others work in 39 villages, led by field coordinator under the common goal of [to contribute to the improvement of living and educational conditions of the rural people through enlightening and technology transfer in various fields].

4) Grant Assistance for Underprivileged Farmers (ex-2KR)

Assistance by 2KR in Niger has started in 1982 under the recognition of importance to support the effort of developing countries to solve the problems of food shortages by themselves. Until 1995, 2KR had been provided every year. Since then, in 1997, 1998, 2000, 2001, 2004 and in 2006 it was provided with total amount of yen ¥8.68 Billion (E/N basis).

Table III.4 2KR performance (¥ Billion)

Year	82～96 total	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
E/N basis	6.2	0.54	0.44	-	0.40	0.50	-	-	0.30	-	0.30

Source: JICA, 2008, p.16

From 1997 to 2001, goods procured by 2KR consisted of fertilizers, agricultural chemicals and agricultural machinery with respective share of 22%: 75%: 3% by dominate share of agricultural chemicals. Since 2004, agricultural chemical has been excluded from the list of goods to be procured by 2KR. In recent years (2006), urea, DAP and irrigation pumps were procured by 2KR and distributed all over the country through Procurement/ Supply Center (Centrale d'Approvisionnement: CA)[9] and local offices of the Ministry of Agricultural Development. In case of fertilizer, particular attention was paid to improve access of small scale farmers in food insecure situation, by channeling distribution through local offices of the ministry and BI (Boutique des Intrants, shops for equipment and materials). In selling these fertilizers, priority was given to members of farmers' organizations. On average, farmers cultivate only 0.25-0.50 ha per family and many of them belong to farmers' organization. Sales price is decided by the Ministry and a management and monitoring committee for fertilizers, taking into account the rising import price and also high domestic price, so as to ensure access of small scale farmers (JICA, 2008, p.22).

Chronic shortage of fertilizer continues in Niger, and needs for fertilizer of 2KR were confirmed through field hearings of the survey conducted in 2008. As for irrigation pumps, 3 fields visited[10] during the survey revealed that, without irrigation and access to water, agriculture would be practically difficult to continue in Niger, which clarifies importance of irrigation pumps.

[9] A public organization established in 1978 for the purposes of stable supply of agricultural equipment and materials (fertilizers, chemicals, seeds and equipments) to farmers. Self-supporting accounting system is applied and is supervised by the Ministry of Agricultural Development.

[10] Cooperation of Seberi Irrigation District, Cooperation of Winde Beri Irrigation District, Cooperation of N'dounga Irrigation District.

The effect of fertilizer for increasing productivity is shown in TableIII.5. Yield increase in pearl millet was 63%, while that of sorghum and rice were 40% and 125% respectively. While the effect of fertilizer is well noted, soaring international price has brought about chronic shortage of fertilizers in Niger. Fertilizers by 2KR contribute in solving this problem.

Table III.5 Effect of fertilizer application

(unit: FCFA/ton)

Fertilizer	Crops	Without fertilizer	With fertilizer	Increased yield
DAP (18-46-0)	Rice	2.00	4.50	125%
	Pearl millet	0.40	0.65	63%
	Sorghum	0.40	0.56	40%

Source: Ibid, 2008, p.16

In addition, using the counter-fund of 2KR, following projects were implemented[11].

Table III.6 Performances of counter-fund use

Year	Purposes of use	Amount (FCFA)
1996	Audit to improve CA management	17,550,000
1997	Counter measures for poor farmers	323,087,586
1997	Support to Rice Cooperatives I	80,336,499
1998	Support to Rice Cooperatives II	50,336,499
1998	Procurement of Ag. Chemicals	100,000,000
1999	Bank charges	9,619,724
1999	Budgeting for Support to farmers	144,539,622
1999	Bank charges for export of animal products	1,565,476
2000	Support to the start of Animal Products Development Plan (PPEPA)	21,000,000
2003	Procurement of fertilizers and pumps	393,882,832
2007	Procurement of fertilizer	400,000,000
Total		1,541,918,238

Source: Ibid, 2008, p.30

In principle, counter-fund has been used for rural development and food production promotion. In 2007, 3,500t of fertilizers were procured. Total committed amount in 2007 was 1.04 billon FCFA, and from which 0.4 billion FCFA was used for fertilizers (Ibid, 2008, p.23).

How to procure better quality of fertilizer stably is the theme of the future. Through the distribution channel of CA, branch offices of the Ministry and BI, shortages of fertilizers for small scaled farmers need to be eradicated. In addition, more effective methods of fertilizer application, including micro fertilizer application recommended by FAO, need to be disseminated. At the end, during the above mentioned survey, a comment was provided by World Bank that improvement of monitoring after the sale/ distribution of fertilizers would be conducive to grasp the effect of supplied fertilizers more precisely.

[11] Regarding the reserve of the counter-fund of 2KR, as procured chemicals by 2KR were not sold in markets but mostly used for national pest control program, amount of reserve did not reach 100% until 2001. In 2004, reserve of the counter-fund reached to 100%, or 401,463,413 FCFA, the minimum required amount. In 2006, the reserve reached to 95%or 370,000,000 FCFA, with remaining 5% expected to be reserved soon.

5) Increase of Food Production (ex-KR: Kennedy Round)

KR food aid has been provided to solve the problem of food shortage in Niger. Started in 1997, assistance continues except the year 2001.

Table III.7 KR Performance, production and consumption of rice in Niger

E/N;¥0.1billion, others; 1000t (paddy)

Year	Amount in E/N	Procured quantity	Production	Consumption
1997	4.0	n.a.	73.8	
1998	4.0	n.a.	58.6	
1999	3.6	8.0	62.0	
2000	3.0	9.0	60.5	133.6
2002	4.5	9.0	79.9	79.8
2003	3.5	7.0	57.0	212.0
2004	3.5	6.5	78.1	218.9
2005	4.1	8.0	59.9	232.9
2006	3.8	5.0	78.4	160.8
2007	5.0	n.a.	70.0	n.a.

Source: NAF website (2009b); TableII.8

6) Cooperation by NGOs, universities and others

In parallel to the increase of cooperation by the Government, cooperation by NGOs, universities and others are gradually getting visible. NGOs such as AMURT Japan are implementing support on emergency food aid and technical support to food security. Research Agencies such as universities and JIRCAS are dispatching research scientists to Niger and their many research results on dryland agriculture are being published[12].

4. Needs in Enforcement of the Program Approach

As mentioned already, agriculture and forestry has been a priority sector in Japanese cooperation to Niger and many cooperation projects in this sector have been implemented. Though the series of the cooperation projects implemented have been appropriate along with the changing needs of those days, it seems difficult to find consistency and strategic perspectives. From now on, for realizing more effective implementation of cooperation, consistency and strategic implementation should be established in line with SDR of Niger. On November 2009, the [Study on Sahel Oases Development], the central project in the field of agriculture will be finalized. Based on the expected results of the Study, initiation of next projects on effective water resource utilization is being considered. For example, increased productivity by

[12] "Evaluation and utilization of genetic resources of leguminous plants feasible to be introduced to agro-pastoral regions in West Africa / Sahara region (in Japanese)." (Agriculture, Forestry and Fisheries Research Council Secretariat web site,2009a), "Improvement of fertility of sandy soil in semi-arid tropics of West Africa (in Japanese)"(Agriculture, Forestry and Fisheries Research Council Secretariat web site,2009b; Ibid, 2009c; Ibid.2009e). In addition, JIRCAS Commissioned Research "Documentation of ILRI/JIRCAS Fakara daata sets", collected in cooperation with ILRI (International Livestock Research Institute) and ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) (JIRCAS website, 2007).

intensification of agriculture in the irrigated areas and agriculture development through community development in the dryland areas may be among them. Utilizing accumulated knowledge and experiences gained through implementation of the projects in the past, such as prevention of desertification, integrated rural development, irrigated agriculture development, etc., more strategic cooperation needs to be considered.

Table III.8 SDR themes and the relationship with Japanese cooperation

Theme Japanese government committed	Theme not committed
・ Local/ community development ・ Natural resources management by community ・ Irrigation infrastructure ・ Safe water and sanitation ・ Natural hazard/crisis prevention and management ・ Health and nutrition ・ Increase income of the poorest ・ Protection of environment ・ Irrigation development ・ Rehabilitation of land and reforestation	・ Professional organizations and marketing (framework for consultation among organizations) ・ Professional organizations and marketing (Establishment of professional organizations and their strengthening) ・ Professional organizations and marketing (Marketing of agriculture and animal products) ・ Professional organizations and marketing (Capacity development of economic organization and encouragement of regional economic organization) ・ Rural infrastructure on transportation and traffic ・ Rural infrastructure on communication ・ Rural infrastructure on electricity ・ Rural finance system ・ Enforcement of legal system (Information sharing system and knowledge of rural sector) ・ Development and stabilization of pastureland ・ Kandadji (dam) development