

## MARKET-ORIENTED URBAN AGRICULTURAL PRODUCTION IN DAKAR

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### 1. Introduction

Occupying the Sahelian area of the tropical zone in a wide coastal strip (500 km along the Atlantic Ocean), Senegal covers some 196,192 km<sup>2</sup> of gently undulating land. The climate is subtropical, with two seasons: the dry season lasting 9 months, from September to July, and the wet season from July to September.

The Senegalese GNP (Gross National Product) of \$570 per capita is above average for sub-Saharan Africa (\$490). However, the economy is fragile and natural resources are limited. Services represent 60% of the GNP, and the rest is divided among agriculture and industry (World Bank 1996).

In 1995, the total population of Senegal rose above 8,300,000 inhabitants. The urbanisation rate stands at 40%. Dakar represents half of the urban population of the region, and more than 20% of the total population. The other main cities are much smaller (Thiès: pop. 231,000; Kaolack: pop. 200,000; St. Louis: pop. 160,000).

**Table 1:** *Basic facts about Senegal and Dakar*

	<b>Senegal</b>	<b>Dakar (Urban Community)</b>
<b>Area</b>	196,192 km <sup>2</sup>	550 km <sup>2</sup>
<b>Population (1995)</b>	8,300,000	1,940,000
<b>Growth rate</b>	2,9%	4%

*Source: DPS 1995.*

The choice of Dakar as Senegal's capital was due to its strategic location for marine shipping and its vicinity to a fertile agricultural region, the Niayes, so called for its stretches of fertile soil (*Niayes*), between parallel sand dunes. Since colonial times, the development of infrastructure and economic activity has been concentrated in Dakar and its surroundings. Today, Dakar encompasses nearly 80% of all industry and 85% of enterprises, in less than 0.5% of national territory. With a population of 1,939,639 in 1995, it is the most densely populated city in the country (DPS 1995). The 4% population growth rate in Dakar is higher than the national average of 2.9%. Within 25 years, the population has more than doubled.

According to various sources cited in Seck et al. (1997), the population of Dakar will reach 4,500,000 by 2015. Another important factor is the extreme youth of the population (more than 55% of the population is younger than 20 years).

In 1988, more than 405,000 economically active people (persons 10 years and older) lived in Dakar, of whom more than 25% were unemployed (DPS 1992)<sup>1</sup>. This group consists mainly of men (more than 310,000, over 75%). A more detailed analysis shows that the job market is dominated by a mixture of salaried employment (42%), independent work (30%) and apprenticeships (15%); these three categories primarily involve the youngest section of the population (Seck et al. 1997).

The term “City of Dakar” in this study stands for the Urban Community of Dakar (CUD in French). Since 1990, the CUD comprises the township of Dakar (equivalent to the Department of Dakar), the townships of Pikine and Guédiawaye (forming the Department of Pikine), as well as the townships of Rufisque and Bargny (part of the Department of Rufisque, which also includes the rural communities of Sebikotane and Sangalcam). The three departments comprise the Dakar region, which is located in the Niayes zone.

## **2. Dakar's different urban agricultural production systems**

Since colonial times, Dakar has maintained close ties with its agricultural hinterland, the Niayes zone, for its food supply. Urban agriculture as discussed in the present document includes agriculture practised in the interior of the city (inner urban agriculture) and agriculture in the surrounding area (periurban agriculture). It is always difficult to define the pertinent limits for urban agriculture. The definition used in this paper emphasises the degree of influence exercised by the city concerning the market and urban resources. Urban agriculture is defined as agriculture located inside and around the city for which there is an alternative in the use of resources - one agricultural and the other non-agricultural. This alternative generates competition but also possible complementarity between different possible uses (Moustier & Mbaye 1998):

- building areas / agricultural ground;
  - water destined for urban needs / water for irrigation;
  - non-agricultural labour / agricultural labour;
  - household and industrial waste / agricultural resources; and
- a combination of agricultural and urban activities which generate negative side effects (theft, environmental pollution) and positive ones (green spaces).



## Productions agricoles, infrastructures et ressources



*Family type periurban market gardening (Picture Alain Mbaye).*



*Market gardening near a slum in Dakar using recycled waste (Picture Alain Mbaye).*

We consider the Dakar region to be subject to these characteristics of competition and complementarity, which apply within a maximum range of 50 km around Dakar city limits.

Crop production, in particular the cultivation of vegetables, is most often realised in dune sites and basins, which can be classified into three types (Mbaye 1998):

small basins of sand, which dot the coastal range of dunes or *dioukis*;

depressions between dunes, slightly damp; and

the *Niayes* with their often peaty beds in the black greenstone soil, which resemble the sheltered places where sand has not reached, and which are made arable by a slight layer of groundwater.

The Niayes zone benefits from excellent conditions for cultivating vegetables: the influence of the cold current from the Canaries, mild average temperatures, light soil and good drainage. The area is subject to strong pressure on land. The colonisation of the habitable areas was effected according to the physical characteristics of the individual locations. The preservation of space for agricultural use was not the primary concern of the authorities; they faced the urgent necessity of quickly finding sufficient housing for a large group of people.

## **2.1 Main production systems**

The socio-economic profiles of the cultivators vary widely: amateur gardeners, young school drop-outs looking for a stable source of employment, multi-active entrepreneurs, and so on. The survey conducted by Niang in 1993 among 300 farmers in Cambérène, Pikine and Ouakom indicates an equal division between the different socio-economic classes, aged 20 to 55 years. More than 50% of the farmers originate from urban areas (Dakar or Thiès): farming is not dominated by people from rural areas or by foreigners, but by the urban population for the purpose of generating income (Niang 1998).

The farms differ in size and type of products mainly corresponding to a rather broad spectrum of ages, levels of education and access to extra-agricultural sources of income. Agricultural production, both in and around the city, is dominated by market gardening and poultry keeping in family farms. It is estimated that these two types of farms represent more than 70% of the agricultural activity in and around Dakar. The most important production systems fall into the following categories:

- family periurban vegetable production systems (approximately 3500 farms);
- commercial periurban vegetable production systems (1000-1200 farms);
- specialised systems of poultry farming (approximately 340 farms);
- periurban systems of combined agriculture and poultry production (100-200 farms); and
- backyard horticulture and livestock systems (200-250 units).

### ***2.1.i Family periurban vegetable production systems***

These farms are often located at the periphery of the city, in the Departments of Pikine and Rufisque. Generally, the farmland is not owned by the cultivators; they rent or lease it from landowners or rural communities. The areas cover about 0.1 to 1 ha and some 3500 operations (MEACC 1996).

The vegetables are principally produced for sale, and provide most of the producer family's income. The average family size varies from 10 to 12 people, of whom three or four work on the farm. One or two non-family employees also work in the operation. The fact that these activities occupy a primary place in the family income means that farmers aim at producing throughout the year. This type of farm contributes more than 70% of the local market supply of vegetables (ISRA 1997).

The farms produce a variety of vegetables; each kind is generally cultivated in a separate plot. The main crops are tomatoes, onions, cabbage, potatoes and watermelons. Leafy vegetables, such as *bissap* (Hibiscus), with its short cycle and quick yield, and *jaxatu* (*Solanum aethiopicum*), play an important role in the smaller farms (less than 0.5 ha) and their production is without doubt underestimated by the available statistics.

Irrigation is practised, either by capturing surface groundwater from pits 2-5 m deep called *céanes*, which provide water for 8-9 months of the year, or by means of subscription to the water distribution network of Senegal Water Company (SDE - formerly SONEES, but recently privatised).

The farmers use seed, fertiliser and phytosanitary products; the latter are generally imported. These inputs are delivered in small quantities close to the production area. Facing a characteristic environment of sandy and nutrient-poor soil, the growers of the small agricultural plots of the Niayes became aware of the importance of using organic matter very early on. Equipment is limited to watering cans, rudimentary farming implements, equipment for phytosanitary treatment and, in some rare instances, a small generator-run surface irrigator.

The productivity is indicated in Table 2, in which the figures represent the spectrum of agricultural farms in the Dakar region. Factors explaining yield variability are numerous, but rainfall during the cultivation period is especially significant.

**Table 2:** *Distribution of yield from market farming in the Dakar region*

<b>Crop</b>	<b>Production</b>
Potatoes	20-30 t/ha
Tomatoes	20-80 t/ha
Green beans	6-12 t/ha
Onions	20-60 t/ha
Cabbages	10-80 t/ha

*Source: MEACC 1998.*

### ***2.1.ii Commercial periurban vegetable production systems***

These systems are also situated in the Departments of Pikine and Rufisque, between 15 and 30 km from the centre of Dakar. Since the National Land Act of 1964 permitted private developers to buy land from ordinary landowners, farms of 1-20 ha and more have developed. They now number between 1,000 and 1,500 units, and can be classified by size: 65% have 2-5 ha, 22% have 5-10 ha and 13% are larger than 10 ha (MEACC 1998). Some of these farms have combined and now form “joint economic interest organisations” (GIE), which enjoy certain advantages, particularly in terms of access to credit.

The land is mainly farmed by paid labourers. There are on average six permanent employees per farm. Production is aimed at the domestic market and exports. The individual farmers generally have other sources of income (trade, building industry, civil service, etc.). The main crops on these farms are green beans (for export), potatoes, tomatoes, onions, cabbages, okra, *jaxatu* and eggplants. The farmers plant two or three successive crops per year. Part of the land is sown with a winter crop, either groundnuts or grain, in order to improve the condition of the soil. Some farms cultivate fruits (citrus fruits, mangos, papayas) on irrigated land. The farms have modern crop irrigation at their disposal, using drills and generator-run pumps. The greater part of the cultivation is automated. The diesel generator-run pumps and sprinkler systems represent a high level of investment, usually between 3 and 10 million FCFA.

### ***2.1.iii Specialised systems of poultry farming***

These 250 operations are located in periurban areas. They are owned by the farmer and managed by hired employees (Arbelot et al. 1997). The products are entirely destined for sale. This category includes an important number of people from the civil service and the private sector, for whom poultry farming represents a supplementary income. However, what has also happened is that 85

farmers (during their active life or after retirement) have abandoned their principal activities and focused full-time on poultry farming. The products include both broilers and laying hens (on average 4000 broilers and 2000 laying hens per year).

The buildings involved in this activity are reasonably large in size (700-1400 m<sup>2</sup>) but, as is the case for the entire livestock industry in Dakar, the equipment (feeding and watering troughs) is obsolete and health guidelines are not closely followed.

#### ***2.1.iv Periurban systems of combined agriculture and poultry production***

These farms are located in periurban areas, and the land is owned by the farmer. The products are entirely destined for sale, and the revenue complements salaried activities in both the public and the private sectors (Arbelot et al. 1997). The combined agricultural and poultry operations raise broilers (an annual average of 4000) more often than laying hens (an annual average of 800), and the buildings used for production have an average size of around 150 m<sup>2</sup>. Poultry production in these operations is generally combined with gardening and fruit production.

#### ***2.1.v Backyard horticulture and livestock systems***

Urban gardens are being developed in the city's districts as a result of initiatives by the inhabitants who collect and recycle household refuse. Many of the locations under cultivation were previously used as garbage dumps.

The courtyards of houses are often used for small poultry and cattle farming. According to Arbelot et al. (1997), there were approximately 150 small urban livestock farms in 1984. The urban livestock farms are located at the owners' homes, in buildings with limited space (about 50 m<sup>2</sup>) and under the direct management of the owner. Production is centred around selling broilers during religious feasts; on average, 1000 broilers are produced annually. Such owners are largely young people (under 30 years) who gain a seasonal income from these activities.

There are also small fruit orchards, which generally produce heterogeneous kinds and varieties of fruits; their numbers have not as yet been determined. Such orchards are generally located close to the homes or bordering depressions, and are often very poorly kept.

#### ***2.1.vi Other types of production***

There are also other types of less significant agricultural production: privately managed fruit farms, exploited indirectly by urban investors;

dairy and sheep farms, generally extensive; ornamental horticulture farms, primarily located in the Cambérène area; and rainfed agriculture producing grains (millet, sorghum and maize), leguminous crops (groundnuts, *niébé* beans) and cassava, and mainly practised between July and September by the inhabitants of the rural communities of Rufisque.

### **3. Impact analysis**

#### **3.1 Contribution to urban household food supply**

The contribution of urban production to the food supply of Dakar is substantial in the case of vegetables and poultry. Urban agriculture cannot satisfy urban needs for dry products like grains and tubers, which represent more than 30% of food consumption. However, unlike fresh vegetables and livestock, these can easily be stored and transported from rural production areas without major losses.

The proximity of Dakar, the major centre of consumption, forms a determining factor in the development of the vegetable and poultry sector. To determine the precise contribution to meeting Dakar's requirements would entail detailed comparative surveys of the origins of the products, their quantities on the urban market and the quantities consumed by the producers. Such data are not available at present. However, the relative importance in tonnage in the Dakar region compared to national production has been estimated and serves as an approximate indication of the minimum contribution to urban demand. This is based on the assumption that most of the tonnage in this region flows into Dakar's markets, and that Dakar takes in 40% of the total demand for vegetables (Seck et al. 1997). Based on *Direction de l'Horticulture* statistics, national vegetable production during the season 1994/1995 was 154,000 tonnes, of which 4,500 tonnes were exported. In the same season, 13,000 tonnes were imported. Therefore, national vegetable consumption was 162,500 tonnes, of which the city of Dakar consumed 65,000 tonnes. The Dakar region produced approximately 40,000 tonnes of vegetables in that season, not including green beans and melons for export. The Dakar region therefore covered more than 60% of its own vegetable consumption.

Dakar poultry farming represents nearly 33% of total national production and meets 65-70% of the national demand for chickens; private societies collect the chickens, store them near the production areas and distribute them to poultry farmers (ISRA 1997).

Proceeding from the information in the ECAM household food consumption survey (1997), we can estimate that suburban vegetable and poultry production represents 12% and 7%, respectively, of Dakar food consumption. Suburban agriculture would therefore represent around 10% of total food consumption of Dakar.

It is interesting to note that suburban production supplies not only enough to meet the dietary needs of Dakar but, in conjunction with Niayes region farming, there is a surplus of poultry production which can be sold for export.

It is also important to look at the contribution of urban agriculture to future food security. Indeed, the Dakar food situation has deteriorated over the last ten years. Per capital meat consumption has dropped from 20 kg in 1993 to 11 kg in 1997, while milk consumption has dropped from 30 to 27 litres per person. The number of imported products, such as potatoes, milk products and poultry, is increasing. At the same time, suburban agriculture is declining as a result of the expansion of built-up areas and the lack of respect for the non-construction zone. The area available for grain production dropped by 29% from 1980 to 1994, and the area for fruits and vegetables went down by 6%. The supply zones for Dakar are increasingly located away from the city, and the costs of transport represent more than half of the selling price (Seck et al. 1997, Seck & Moustier 1998). From a food-security point of view, it therefore seems advisable to increase the contribution that urban agriculture makes to providing food for Dakar.

### **3.2 Health**

Agricultural production taking place in an urban environment creates certain household health threats. For example, many wet-season production sites located in the poor quarters are adjacent to industrial areas and main roads.

Very high concentrations of nitrates (in the order of 200-500 mg/l) and bacteria originating from faecal waste have been observed in water used for irrigating agricultural plots on many production sites (Niang 1993, Valentin 1998). The water can be industrial waste, effluent or household waste. The potential consequences are very serious when the producers make direct use of non-treated domestic wastewater for irrigation.

Dakar and Pikine produce nearly 120,000 m<sup>3</sup> of wastewater per day, of which 50,000 m<sup>3</sup> are drained through the sewer network directly from households and 70,000 m<sup>3</sup> are filtered indirectly by means of “watertight” pits (Infoterra 1996). In reality, of the 50,000 m<sup>3</sup> drained into the sewers, only some 9,000 m<sup>3</sup> are treated in Cambérène's wastewater treatment plant before being released into the

sea. Most of the rest is dumped untreated into the sea or used directly in farming. The latter is the case in the Niayes of Pikine and in the non-built-up areas of the Ouakam district, where many cultivators exclusively use wastewater from the sewer network of the city (Niang 1996). The food products from these farming systems are sold indiscriminately in all the markets of Dakar, exposing the entire population of the city to an enormous sanitary risk. Niang (1996) mentions a typhoid fever epidemic of 400 reported cases in Dakar. The epidemic was apparently caused by the consumption of vegetables from Pikine farming sites that use wastewater which is insufficiently treated or not treated at all.

### **3.3 Urban farming and the urban environment**

Similar to 70% of the urban zones of West Africa (ENDA 1997), a lack of municipal and state funds means that many of the urban districts of Dakar do not have an adequate network for distributing drinkable water, carrying off wastewater and/or collecting household waste. In 1993, the amount of household waste was estimated at 870 tons per year (CUD 1993). Farming makes it possible to remove and partly recycle organic waste, both solid and liquid.

Organic waste is systematically used in farming. Groundnut shells, fish waste, poultry excrement, industrial waste, fertiliser, garden soil and various composted materials are transported by a chain of manual labourers. The inhabitants of the poorest districts took the initiative of collecting and recycling urban waste as part of the search for long-term solutions to cleaning up their surroundings (Niang 1996, Gaye 1996, ENDA 1997). In Diokoul and Castors, districts in the city of Rufisque, previously uninhabitable areas filled with garbage now form true urban farms in the heart of town close to well-functioning networks for removing household garbage and wastewater. Two plants for treating wastewater (macrophyte basins) and composting household garbage are located there. An integrated management system is in place through which the final products are either sold or used on the agricultural plots of the plants themselves. The recycled water is sold, stored for irrigation of agricultural plots, used for the reforestation of large abandoned stone quarries or used in making *parpaing* blocks. The compost is sold to farms and individuals.

As a result of its biophysical characteristics and the microclimate of the city, the Niayes zone, Dakar's principal site of agricultural production, has gained the title 'green lung' and has even been declared a public state resource (UICN 1998) in order to preserve it. Because most of the farming areas are located in depressions and dune areas, the water is able to penetrate the soil, in contrast to the built-up areas, which are almost impermeable to water. Growing produce on the hills of non-built-up areas reduces soil erosion as a result of rainwater retention (Valentin 1998). The survival of the numerous interdunal depressions

where agricultural activities are being developed depends on the fixation of the dunes. The *filao*<sup>2</sup> plantations between Cambérène and Guédiawaye have caused the rate of white dune-sand erosion to be reduced from 12 m to 2 m per year. The positive role the Niayes play in the urban environment is now compromised by the urbanisation of the dune areas.

### **3.4 Urban farming and the domestic economy**

The direct creation of employment in urban agriculture has been estimated at over 15,000 jobs in the Dakar region (MEACC 1996). Informal, interdependent business networks have formed spontaneously both upstream and downstream from the urban agriculture itself. These networks help to create jobs in the crafts and service trades. Focusing specifically on the market farmers of the Santhiaba at Thiaroye-sur-mer neighbourhood, Valentin (1998) lists a variety of crafts and services which are a great source of employment and income to the people. The market gardeners make use of many metalworkers and blacksmiths to fashion small implements such as watering cans and hoes. In the services sector, vehicles are hired to haul manure, groundnut shells, fish waste, mineral fertilisers, etc. Small retailers offer various agricultural commodities packaged and adapted to the needs and budgets of small gardeners. On another level, the use of waste and garbage of all types has encouraged the emergence of a chain of crafts related to the recovery, processing and selling of such wastes. This has helped to create petty jobs that contribute directly to the supply of inputs and small farming implements for urban agriculture (Waas & Diop 1990).

In the fruits and vegetables commodity systems, farmers' wives play an important role in the marketing networks, especially in Cambérène, Thiaroye, Pikine and Yeumbeul, where petty commodity production predominates. These women set themselves up as retailers and account for 45% of traders in most of the principal markets.

The data available on prices do not reveal excessive profit margins when compared to other businesses. Seasonal price fluctuations pose more of a problem for the consumer than does the overall price level. For example, the price of cabbage fluctuated from 1989 to 1993 between a low of 84 FCFA or US\$ 4.00 per kg in February to a high of 423 FCFA (US\$ 21.00) in October, the month with the highest prices (ISRA/CDH data).

### **3.5 Urban agriculture and gender relations**

From ISRA (Senegal Institute for Agricultural Research) researchers' frequent contacts with the Niayes region's horticultural and livestock farms, it appears

that men are probably in charge in three out of four cases, though female family members - wife, daughter or niece - participate in the work. As with many other urban occupations in Africa, the higher the start-up costs, the more men are involved in the business (Moustier & David 1997). Thus, women are practically absent from poultry raising and ornamental horticulture. On the other hand, they are nearly as numerous as men in backyard market gardening. The Niang study (1998) shows that men accounted for 99% of the market farmers surveyed in 1993 at Cambérène and Pikine and 63% of the market farmers of Ouakam.

The Fedri group, located about 10 km from Dakar, presents an interesting case of women voluntarily investing in urban agriculture. The group consists of 9 women who combine their vegetable farming activities aimed at the domestic market (okra, tomatoes) and for export (green beans) with raising small ruminants, sheep and cattle. They even tend forest plots and fruit orchards. The group is financed by a NGO (non-governmental organisation). It is noteworthy that the women in the Fedri group are former vegetable retailers. The women market farmers and producers always play a separate role in the areas of marketing and processing agricultural products. Selling vegetables incurs low start-up costs and can serve as a good take-off point for entering farming. However, as with production, men take up the selling activities with the highest start-up costs. Over 90% of vegetable retailers in the open markets in Dakar are women, while all the shopkeepers retailing various food products, including onions, are men. Men are also involved in wholesaling onions and potatoes, because these products can be stored and the men can raise the needed, significant working capital. Storage is not needed for perishable vegetables such as greens and tomatoes, where women are in the majority both as wholesalers and as retailers.

## **4. Policies affecting urban agriculture**

### **4.1 Urban agriculture and urban planning**

An important aspect to note is the lack of a formal framework for joint action in the field of urban agriculture. The public authorities do not openly promote it, neither is there a written policy for its eradication or prohibition (Valentin 1998). One indication, however, is that it apparently is not a priority in urban planning policies and programmes. Small producers are most affected by this, as they realise that the lands they occupy may be recovered by the government at any time for a public purpose.

The colonisation of the Niayes region of Pikine-Cambérène and of new construction areas between Dalifort and Cambérène illustrates this threat. The urgent need to house the homeless population takes priority over maintaining, or relocating, farming areas. Problems with understanding Senegalese real-estate law, particularly the 1964 National Land Act, are that those who farm the land rely on the fact that “the land first belongs to those who cultivate it”. The first actions arising from the government’s policy of regionalisation and decentralisation, notably the transfers of jurisdiction to local and regional authorities, are now causing the latter to play a major role in the development and redistribution of land falling under their jurisdiction. In its final provisions, the National Land Act grants discretionary powers to urban community leaders to allocate land (Decupper 1995).

The fear is that the well-known lack of distribution criteria, combined with pressing urbanisation, are sounding the death knell for much of the farming around Dakar. Industrial plants already have shown a noticeable propensity to occupy rural communities, and are more likely to create jobs and significantly contribute to municipal treasuries (Tall 1999).

Run-away urban sprawl and the resulting environmental problems have led the government to develop a project in Dakar’s master urban plan for “1982-2001” (World Conservation Union 1998). This project has already resulted in a draft decree for setting aside 700-800 ha in the western and southern zones of Pikine, which should protect space for farming activities, parks and recreational areas, and sports and cultural activities. The urban plan calls for:

- stabilising dune slopes with appropriate plantings to limit the filling of dyked enclosures by sand;
- strengthening protection of oil palm and coconut formations;
- assigning land for family farms and agricultural experimental stations on land suitable for small market farms and orchards;
- using land unsuitable for farming for cultural, educational, sports and recreational purposes;
- developing deep ponds and lakes to provide drainage for the Niayes region; and
- creating new sewage treatment plants to treat wastewater to be re-used for agricultural irrigation.

However, at the present time, it appears that this plan cannot be properly implemented, because of the rapid pace at which space is being used in a way that does not conform with the plan. One example is the creation of the towns of Guédiawaye and Bargny, which occurred after the master plan studies were made. This prevented laying out the plots in question in the western and

southern areas of Pikine. The World Conservation Union (1998) cited several reasons for the difficulty in setting aside the land. These include the government's inability to raise funds from expropriation loans, real-estate speculation and the high cost of land reserves. Other problems were the lack of coordination among the towns of Patte d'Oie, Dalifort and Pikine, all of which are included in this zone. The government nevertheless allocated a portion of the Niayes region to create a "science park" for technical and scientific innovation as well as sports and cultural activities.

#### **4.2 Recent initiatives and measures encouraging urban agriculture**

Cambérène's Centre for Horticultural Development (CDH) was formed in 1972 with financial support from Belgium and the Food and Agriculture Organisation of the United Nations (FAO). It is about 20 km from Dakar in the heart of a major horticultural area. The centre administratively depends on the Department dealing with Niayes region in ISRA. The CDH has spurred the fostering of a diversified and steady production of vegetables, fruits and flowers (Mbaye et al. 1998). Among the centre's achievements, we can cite the fine-tuning of growing schedules to spread vegetable production over the rainy season, fruit tree and vegetable nursery techniques, selection of varieties, and making an inventory of methods to combat crop pests and diseases. The CDH is also involved in gathering data on farm produce prices in Dakar markets.

It is difficult to assess the effect of CDH projects on the development of urban agriculture. The channels for communicating the results are numerous and diffuse (e.g. technical recommendations spread by NGOs and tours of the centre by producers). However, urban farming as a profession has not been sufficiently analysed. Although a farmers' typology exists, there is not enough information on the relative size of the various groups represented, and their technical and economic results are not monitored over time. However, the price data shows that the seasonal peak of supply prices has been reduced, thanks in large part to the action taken by the CDH. From 1990 to 1994, the multiplier for vegetables dropped from 3 to 1.9 (Seck et al. 1997).

On other fronts, measures taken to improve sanitation in several Dakar areas, particularly in terms of household garbage collection and recycling and wastewater, have indirectly resulted in further development of market gardening.

## **5. Perspectives for the development of urban agriculture**

### **5.1 Constraints and threats**

In its strategic plan, CDH, which focused its investigations on the Niayes region, attempted to list and analyse the principal constraints for expanding urban agriculture (ISRA 1997). The analysis was extended and supplemented by several other contributions (Mbaye et al. 1998, Mbaye 1988, Seck & Moustier 1998, Seck et al. 1997; Bastianelli et al. 1998, UICN 1998). The constraints apply to a city that has almost reached the limits of its carrying capacity, a city under extreme demographic pressure, where human settlement areas are in fierce competition with agriculture for insufficient resources that are declining even further. A study conducted on the Niayes of Pikine-Thiaroye (Ndong 1990) demonstrates how pervasive this process has become.

Urbanisation has substantial consequences for agricultural land (UICN 1998), i.e.:

- a gradual reduction in the surface of dunes and dyked areas as they give way to development;
- a reduction in water flow owing to a lesser amount of surface available for drainage of sand from dunes, and to consumption by the activities of residents;
- a reduction in biotopes and in the number of animal and plant species characteristic of the site; salinisation of agricultural land;
- pollution of the water table (by nitrates) caused by defective residential sanitation systems and intensive use of mineral fertilisers by farmers; and
- pollution by miscellaneous waste.

With regard to the farmers themselves, the constraints can be broken down into the following three major categories:

- constraints in terms of access to land and irrigation water;
- limits to efficiency posed by scarce resources (land and water) that slow down attempts to intensify production (problems accessing inputs, technical extension and agricultural credits, etc.); and
- constraints related to the valuing of production (problems of competitiveness, unstable supply and demand).

Considerable advances have been made in promoting and monitoring production through the distribution of technical advice from research and through increased follow-up and cooperation among the various sectors in the region. However, these measures have never been included adequately in an overall approach to

sustainable natural resource management. Furthermore, they suffered from sector-based technical attitudes demonstrating little knowledge of the social, economic and political stakes involved in the gradual and irreversible urbanisation of agricultural space. Indeed, what alternative could be suggested to a residential development program covering 8,200 ha in the rural areas of the Rufisque-Bargny district? What choices should be made when it comes to policies for supplying drinking water and irrigation water in a city like Dakar, where the daily shortage of drinking water amounts to 100,000-162,000 m<sup>3</sup>? How can sustainable sanitation projects be made to work in a city where waste production levels exceed the garbage collection and recycling capacity and where most of the residents live in highly precarious conditions? These are fundamental questions for which effective and lasting answers must be found if we wish to maintain urban agriculture as an asset.

## **5.2 Recommendations**

Two major types of recommendations come to mind: those aimed at preserving the physical resources and production potential of the sites that lend themselves to urban agriculture, and those aimed at securing food supply and distribution systems. The recommendations are made in the context of recent collaborative efforts, such as cooperation on the inventory and description of the Niaye area of Dakar (UICN 1998), the sub-regional FAO/ISRA seminar on food supply and distribution systems in French-speaking Africa (Seck et al. 1997) and the recommendations by the GRS<sup>5</sup>. We shall conclude with a third type of recommendation: the creation of an information system on the dynamics of urban agriculture in Dakar.

### ***5.2.i Preserving physical resources and production potential***

We mentioned the plan to set aside 700-800 ha in the Niayes region and the problems encountered in implementing this project. The state must be firm in implementing this plan, and more particularly the following measures:

- preserving the dyked areas located in the areas outside the (development) site, particularly the two bodies of water included in the property of the Hann-Maristes housing construction project;
- preventing any appeals by the expropriated landowners to repeal the transferability of their land;
- extending land-use research to the dyked areas outside the development site with a view to including them in the site;
- redefining the land-use plan by updating the former development plan;
- establishing a committee to protect the site;
- not caving in to any requests for land included in the site owing to its status as a public purpose area;

- making the residents aware of the important role to be played by the site in preserving the fabric of the city;
- establishing a framework for co-operation among the various institutions involved in any way in the management or use of the site;
- stepping up production;
- eliminating or reducing the tax on major basic agricultural inputs (fertilisers, pesticides, seeds, chicks) and basic foodstuffs; projects are underway to deal with these issues, but the slow pace of implementation is causing a certain scepticism among the major potential recipients; and
- adapting the terms for loans to the socio-economic status and strategies of the players. The terms involve collateral (deemed high and difficult to obtain), interest rates, loan term (shorter than the production and marketing cycle), and procedures for extending and obtaining loans (too long and complex). They should be revised thoroughly for each category of recipient.

Production systems must be streamlined and production costs reduced. In the area of the use of water resources, steps are already being taken towards more rational management, and vital techniques and equipment are being used to save water (Mbaye et al. 1998). Surveys conducted in the market gardens in the Dakar region (MEACC 1996) show that producers prefer localised micro-irrigation systems. These systems can help to save water while at the same time contributing to substantial productivity gains and better parasite control.

#### ***5.2.ii Securing food supply and distribution systems***

Emphasis must be placed on strengthening or creating effective organisations to market the products from urban agriculture both in the wholesale and in the retail markets, i.e.:

- the wholesale redistribution platforms in Dakar must be revitalised;
- credit unions must adjust to the investment capacities of producers, wholesalers and retailers; and
- fora to discuss marketing problems can lead to shared solutions and action plans aimed at concrete objectives, such as reducing seasonal losses and reducing imports.

These actions must be backed by information systems on production and marketing conditions

#### ***5.2.iii Information system on the dynamics of urban agriculture in Dakar***

All the above-mentioned actions must be based on careful observation of the phenomena associated with urban agriculture by an information system to be used by private operators and policy makers. The most effective dialogue between stakeholders is one in which the players have a basis for reliable

evaluation of their situation in terms of resource preservation and competitiveness of the sectors. Data on agriculture in and around cities are still fragmented from a geographical perspective, do not represent a continuous timeline and are not easily available to private stakeholders and policy-makers. Urban agriculture is a sector that involves substantial transfers of resources (e.g. land, waste and water) and traded products, and movements of farmers. The produce in question is subject to numerous hazards and is highly dependent on market demand. Therefore, it is important to have tools for measuring and observing movements of resources and products over time, with particular emphasis on the following:

- the farmers, producers, merchants and other service providers: monitoring the diversity and relative importance of the various categories in terms of strategies as well as technical, economic and social results;
- urban consumer households: monitoring the products consumed in terms of quantity, price, quality and origin;
- movements of products between consumption and production, and the place of urban agriculture in these movements in terms of quantity, price and quality;
- movements of organic matter and energy (supply and use);
- movements of water resources;
- changes in land use and location of farms;
- changes over time in the cost of resources and operating income at the various stages of the commodity systems; and
- impact of technical and institutional support on the various indicators.

A monitoring body should focus on gathering and analysing these data and on distributing them and discussing them regularly with private stakeholders and policy-makers. This organisation would form the basis for stakeholders' dialogue, which is vital to reduce competition and enhance complementarity in accessing resources and urban markets (Seck & Moustier 1998).

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- 1 The analysis of economic activity in the Senegalese context is very complex (DPS 1992). Children typically carry out productive activities, and women are often involved outside the home in the production of goods and services, especially in the informal sector.
  - 2 The *filao* (*Casuarina equisetifolia*) is a plant originating in the coastal area of Southeast Asia, currently used for enriching sandy, poor soils.
  - 3 GRS was created by a decree of the Senegal Ministry of Agriculture in July 1996. Its mandate was to formulate expert opinions and recommendations on: (i) options in terms of long-term agricultural policies consistent with the other objectives of the ministry and rational natural resources management; (ii) ways and means to reconcile approaches and concerns of agricultural producers within the objectives and constraints of the State; and (iii) preparation of programs and investment projects in the agricultural sector.

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