



Seychelles

GEOGRAPHY, CLIMATE AND POPULATION

The Seychelles Archipelago lies in the Indian Ocean, 4° south of the Equator and about 1 500 km from the east coast of Africa. It comprises more than 115 islands, formed on pinnacles of ancient volcano islands, with a total area of 450 km². The archipelago is made up of two main groups of islands: the Mahe-Praslin granitic group, of which Mahe Island covers 158 km², Praslin Island 42 km² and La Digue Island 10 km², and the other island groups, consisting of coral atolls and sandbanks. Two types of soils prevail in the Seychelles: i) ferralitic soil, commonly known as “la Terre Rouge” or red soil and originating from the weathering of granitic rock, is widely extended over the slopes, hills and mountains of the granitic islands: ii) calcareous sandy (Shoiya series) soil exists on the small plateaus on the coast of the granitic islands and on the coralline islands. Cultivated area is 7 000 ha, or 15 percent of the total area of the Seychelles, of which arable land covers 1 000 ha and permanent crops 6 000 ha (Table 1). As much as

TABLE 1

Basic statistics and population

Physical area			
Area of the country	2002	45 000	ha
Cultivated area (arable land and area under permanent crops)	2002	7 000	ha
• as % of the total area of the country	2002	15	%
• arable land (annual crops + temp. fallow + temp. meadows)	2002	1 000	ha
• area under permanent crops	2002	6 000	ha
Population			
Total population	2004	82 000	inhabitants
• of which rural	2004	50	%
Population density	2004	182	inhabitants/km ²
Economically active population	2004	39 000	inhabitants
• as % of total population	2004	48	%
• female	2004	46	%
• male	2004	54	%
Population economically active in agriculture	2004	30 000	inhabitants
• as % of total economically active population	2004	77	%
• female	2004	50	%
• male	2004	50	%
Economy and development			
Gross Domestic Product (GDP) (current US\$)	2003	720.1	million US\$/yr
• value added in agriculture (% of GDP)	2003	3.3	%
• GDP per capita	2003	8 890	US\$/yr
Human Development Index (highest = 1)	2002	0.853	
Access to improved drinking water sources			
Total population	2002	87	%
Urban population	2002	100	%
Rural population	2002	75	%

60 percent of the total land area consists of zones that are protected for environmental reasons.

The climate is wet tropical (equatorial) with little variation in temperature (27 °C) and relative humidity (80 percent) during the year. The climate is dominated by patterns of monsoons. The southeast monsoon, from May to October, brings in cool winds but little rainfall. This is the main vegetable growing season. The northwest monsoon, from November to April, brings variably gentle winds with low clouds and heavy rainfalls. It is a difficult season for vegetable production, due to high temperatures and rainfall and torrential rainstorms. Average annual precipitation is 2 330 mm, varying from 2 370 mm on Mahe Island, to 1 990 mm on Praslin Island, 1 620 mm on La Digue Island and 1 290 mm on average on the other islands. The heaviest rains occur on Mahe Island where the central plateau with an altitude of 900 m above sea level receives up to 3 500 mm/year, while the south of the island receives less than 1 800 mm/year.

Total population of the country is 82 000 inhabitants (2004), of which 50 percent are rural. Annual population growth rate is 1 percent (1990-2002). The population density is 182 inhabitants/km², but varies from 1 inhabitant/km² on the coralline islands to more than 159 inhabitants/km² on La Digue Island and Praslin Island and 446 inhabitants/km² on Mahe Island. The unemployment rate is 7 percent.

ECONOMY AGRICULTURE AND FOOD SECURITY

In 2003 the Gross Domestic Product (GDP) was US\$720 million (current US\$), of which agriculture accounted for 3.3 percent. About 30 000 people, or 77 percent of the economically active population, are active in agriculture (Table 1). Agricultural production output statistics in 2002 showed that 100 percent of the eggs, 80 percent of the poultry, 60–65 percent of the fruits and vegetable as well as the pork consumed were produced locally. Domestic export consists mainly of canned tuna, which contributed to 86 percent of the total export. There is a continuous decline in the exportation of raw products, especially copra and cinnamon, which in the 1970s occupied 95 percent of the total export and employed up to 70 percent of the population. The agricultural sector is characterized by small family farms practising mixed farming.

WATER RESOURCES AND USE

Water resources

The granitic islands have many small, steep watercourses, but most of them have only ephemeral flows. Groundwater resources are limited as not much water is stored at the feet of the hills and the water available is often hard and contains traces of salt. The wetlands have recently become an attraction for eco-tourism given their rich biodiversity. The total dam capacity is 0.970 million m³. The Rochon Dam, which collects its waters from the Rochon River, has a storage capacity of 0.050 million m³. Surplus water is forwarded to the La Gogue Dam, which has a storage capacity of 0.920 million m³.

In 2003, 8.8 million m³ of wastewater were produced. Wastewater is treated at the central sewerage treatment plant in Victoria and Beau Vallon with an annual production of 0.9 million m³/year (Table 2). The remainder is being disposed of via septic tanks. Industry reuses about 0.006 million m³/year of the treated wastewater. About 1.0 million m³/year of desalinated water is produced for potable use to compensate for the shortage that occurs during the dry period. There are four desalination plants, two on Mahe Island, one on Praslin Island and one on La Digue Island.

Water use

In 2003 total water withdrawal was 12.3 million m³, of which agriculture accounted for only 7 percent (Table 2 and Figure 1). Most of the agricultural, domestic and industrial waters come from small streams or rivers from the hillsides, depending on monsoons

TABLE 2

Water: sources and use

Renewable water resources			
Average precipitation		2 330	mm/yr
		1.049	10 ⁹ m ³ /yr
Internal renewable water resources		-	10 ⁹ m ³ /yr
Total actual renewable water resources		-	10 ⁹ m ³ /yr
Dependency ratio		0	%
Total actual renewable water resources per inhabitant		-	m ³ /yr
Total dam capacity	1989	0.97	10 ⁶ m ³
Water withdrawal			
Total water withdrawal	2003	12.3	10 ⁶ m ³ /yr
- irrigation + livestock	2003	0.9	10 ⁶ m ³ /yr
- domestic	2003	8.0	10 ⁶ m ³ /yr
- industry	2003	3.4	10 ⁶ m ³ /yr
• per inhabitant	2003	152	m ³ /yr
• as % of total actual renewable water resources		-	%
Non-conventional sources of water			
Produced wastewater	2003	8.8	10 ⁶ m ³ /yr
Treated wastewater	2003	0.9	10 ⁶ m ³ /yr
Reused treated wastewater	2003	0.006	10 ⁶ m ³ /yr
Desalinated water produced	2003	1.0	10 ⁶ m ³ /yr
Reused agricultural drainage water		-	10 ⁶ m ³ /yr

and the rainfall pattern. The abstraction of surface water amounts to around 11.2 million m³/year (2003) and of groundwater to 0.3 million m³/year (2003.) The principal groundwater abstraction is on la Digue Island for domestic and agricultural consumption.

IRRIGATION AND DRAINAGE DEVELOPMENT

Evolution of irrigation development

The irrigation potential in Seychelles is estimated at 1 000 ha. Both irrigation and drainage have taken a tremendous step forward in the last 30 years, from small-scale gardening watered by watering cans to localized and sprinkler irrigation. Two state farms introduced drip irrigation on an experimental basis, which failed due to lack of know-how and exigencies of the operation and maintenance of the overall set-up. Later research focused basically on localized irrigation and results were disseminated to farmers and gradually there was a re-introduction of micro-sprinkler and drip irrigation.

The total area equipped for full/partial control irrigation is 260 ha (2003), of which surface irrigation is 20 ha, sprinkler irrigation 40 ha and localized (drip) irrigation 200 ha (Table 3 and Figure 2). 77 percent of the area equipped for irrigation is actually irrigated. Surface water is used for irrigation. Only during very dry conditions, when surface water starts to dry out, will farmers living at sea level pump groundwater and

FIGURE 1
Water withdrawal
Total: 12.3 million m³ in 2003

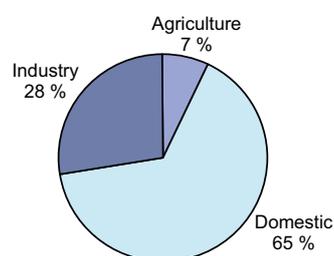


FIGURE 2
Irrigation techniques
Total: 260 ha in 2003

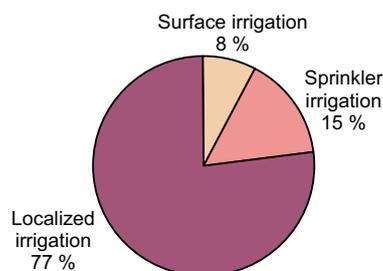


TABLE 3
Irrigation and drainage

Irrigation potential		1 000	ha
Water management			
1. Full or partial control irrigation: equipped area	2003	260	ha
- surface irrigation	2003	20	ha
- sprinkler irrigation	2003	40	ha
- localized irrigation	2003	200	ha
• % of area irrigated from groundwater	2003	0	%
• % of area irrigated from surface water	2003	100	%
2. Equipped lowlands (wetland, ivb, flood plains, mangroves)	2003	0	ha
3. Spate irrigation	2003	0	ha
Total area equipped for irrigation (1+2+3)	2003	260	ha
• as % of cultivated area	2003	4	%
• average increase per year over the last years		-	%
• power irrigated area as % of total area equipped		-	%
• % of total area equipped actually irrigated	2003	77	%
4. Non-equipped cultivated wetlands and inland valley bottoms	2003	0	ha
5. Non-equipped flood recession cropping area	2003	0	ha
Total water-managed area (1+2+3+4+5)	2003	260	ha
• as % of cultivated area	2003	4	%
Full or partial control irrigation schemes	Criteria		
Small-scale schemes		2003	0 ha
Medium-scale schemes	2–70 ha	2003	260 ha
Large-scale schemes		2003	0 ha
Total number of households in irrigation			-
Irrigated crops in full or partial control irrigation schemes			
Total irrigated grain production	2003	0	tonnes
• as % of total grain production	2003	0	%
Total harvested irrigated cropped area	2003	224	ha
• Annual crops: total	2003	224	ha
- pulses	2003	3	ha
- vegetables	2003	208	ha
- flowers	2003	13	ha
• Permanent crops: total	2003	0	ha
Irrigated cropping intensity			- %
Drainage - Environment			
Total drained area	2003	15	ha
- part of the area equipped for irrigation drained	2003	15	ha
- other drained area (non-irrigated)	2003	0	ha
• drained area as % of cultivated area	2003	0.2	%
Flood-protected areas			- ha
Area salinized by irrigation	2003	0	ha
Population affected by water-related diseases			- inhabitants

mix it with surface water to be able to meet the crop water requirements. All irrigation schemes are medium-scale schemes (2–70 ha) and state-owned.

Role of irrigation in agricultural production ,the economy and society

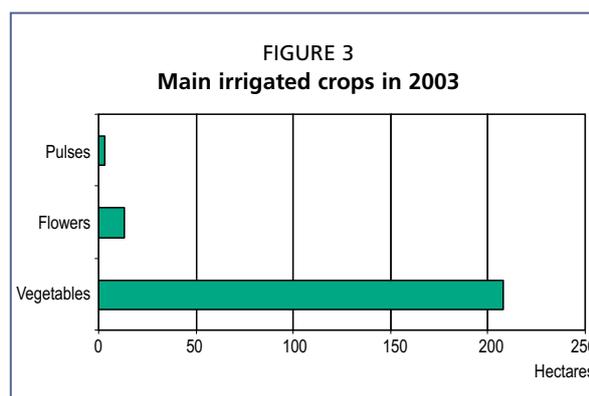
The harvested, irrigated and cropped total consists of vegetables (208 ha), pulses (3 ha) and flowers (13 ha) (Table 3 and Figure 3). The main irrigated vegetables and pulses are cabbage, pumpkin, beans, tomatoes, eggplant, cucumber, lettuce, spring onion, cocoyam, capsicum, okra and spices. Crops such as sweet potatoes, cassava, plantains, sugar cane, bananas and citrus fruits are rainfed but irrigated at the planting stage.

The development cost of public surface irrigation schemes is on average US\$2 437/ha, and operation and maintenance cost US\$500/ha per year. On-farm installation for sprinkler irrigation is around US\$6 000/ha and for localized irrigation US\$8 000/ha.

Operation and maintenance is carried out by a group of workers under the Irrigation Unit of the Ministry of Agriculture and Marine Resources. Water supply to the schemes is metered and farmers are billed monthly by the Irrigation Unit for their consumption. Water is distributed according to farm activity and size. Men and women have the same role on the farm.

Status and evolution of drainage systems

Drainage is important in the lowland areas, which experience temporary but high accumulations of water during heavy and intense rainfall. The total irrigated area under drainage is 15 ha. Rainfed areas are not drained. The main drains are constructed by digging and opening the waterway in the natural drainage system to evacuate water during heavy rains. Farmers are responsible for creating secondary and possibly tertiary drains themselves.



WATER MANAGEMENT, POLICIES AND LEGISLATION RELATED TO WATER USE IN AGRICULTURE

Institutions

Main institutions involved in the irrigation and water sub-sectors:

- The Water and Sewage Division of the Public Utilities Corporation has all water resources under its jurisdiction.
- The Rivers Committee is responsible for water abstraction rights under the Public Utilities Corporation Act of 1985. It discusses national problems and decides on any development in irrigation and potable water. The legal framework adopted is that water is a public domain and thus its uses need to be controlled so that there is an equitable distribution of this vital resource, giving top priority to water needs for domestic purposes. The Rivers Committee is made up of members from the Water and Sewage Division of the Public Utilities Corporation, the Ministry of Health, the Ministry of Agriculture and Marine Resources, the Ministry of Environment and Natural Resources, the Ministry of Land Use and Habitat and the Ministry of Industry and International Business.
- The Ministry of Environment and Natural Resources is responsible for wastewater management and water pollution control.
- The Ministry of Agriculture and Marine Resources (MAMR) administers a number of small reservoirs and communal irrigation systems.

Finances

Funding for water development activities is determined by the government. The MAMR is responsible for planning and procurement. The Irrigation Unit under the Public Utilities Corporation invoices the farmers on a monthly basis for their water consumption. The tariff is US\$0.30/m³ for the first 150 m³ and above that US\$0.20/m³.

Policies and legislation

The most important water act is the Public Utilities Corporation Act 1985, which empowers the Rivers Committee to manage all water resources and allows it to prepare project plans for water development in the country. However, the water policy of the country puts more emphasis on the collection of water for domestic purposes.

ENVIRONMENT AND HEALTH

Farmers in the lowland coastal areas have drainage systems installed. No areas are waterlogged or salinized. Generally, water destined for agricultural use is clean and can also be used for household purposes and drinking if boiled.

PERSPECTIVES FOR AGRICULTURAL WATER MANAGEMENT

In its 2000–2010 mission statement, the MAMR proposed the development of more agricultural areas to be equipped with the basic requirements for farming whereby roads and water are top priorities. However, the role of the government for irrigation services is uncertain. More freshwater could be made available on the northern part of Mahe Island, where there is potential for development of another dam. The government is also investigating the possibility for a water development project in the Grand Anse catchment area in the central-west part of Mahe Island.

MAIN SOURCES OF INFORMATION

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