



**High-Level Conference on:**

**Water for Agriculture and Energy in Africa: the Challenges of Climate Change**

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## **National Investment Brief**

### **SEYCHELLES**

#### **EXECUTIVE SUMMARY:**

Seychelles portrays a moderate level of undernourishment with one out of ten persons classified as such. Both the proportion and the number of undernourished people have decreased from 1990-92 to 1999-2001 and the country records levels of undernourishment (10%) well below those registered in East Africa (39%) and Sub-Saharan Africa (33%).

Agriculture in Seychelles is characterised by small farms with an average size of 0.5 hectares and rarely exceeding 2 hectares, employing various levels of technology and management. Currently 6000 hectares are under some form of agricultural production, of which only about 200 hectares are under intensive cultivation. The irrigation potential in Seychelles is estimated at 1 000 ha and the total area equipped for full/partial control irrigation is 260 ha (2003).

The principle source of potable water on the main islands of Mahe, Praslin and La Digue in Seychelles are the numerous rivers and streams to be found on the islands, but most of them have only ephemeral flows. Moreover, the flows in the rivers and streams are erratic and fall to very low values during prolonged periods of drought. In none of the islands there is hydropower potential and the Seychelles depend on import of refined petroleum to satisfy national needs. The import costs 10% of the Gross Domestic Product (GDP).

In its 2000–2010 mission statement, the Ministry of Agriculture and Marine Resources proposed the development of more agricultural areas and the vision of the government's National Agricultural and Fisheries Policy 2003–2013 (NAFP) is to achieve food security through sustainable agricultural production and development. Furthermore, sustainable development is a major aim of the country and several policy frameworks have been elaborated for its integration into the country's development.

Currently there are three recently implemented projects with water component, all related to the adaptation process to climate change, that range from US\$118 500 for the upgrading of plant protection services to farmers to US\$290 000 for strengthening sustainable on-farm research communication skills and enhancing information. Among the pipeline projects there is a Bankable Investment Project Profile with large water component for US\$7 million that focuses on the increase in production of fruits and vegetables.

# 1. CONTEXT

## 1.1 AGRICULTURE AND FOOD SECURITY

### Agriculture

In 2007 the Gross Domestic Product (GDP) was US\$728 million (current US\$), of which agriculture accounted for 3 percent. About 30 000 people, or 77 percent of the economically active population, are active in agriculture.

Agriculture in Seychelles is characterised by small farms with an average size of 0.5 hectares and rarely exceeding 2 hectares, employing various levels of technology and management. Currently 6000 hectares are under some form of agricultural production, of which only about 200 hectares are under intensive cultivation. The cultivation and exploitation of traditional crops like cinnamon and coconuts along with patchouli and vanilla have dropped considerably in the last 10 years and hence contribute insignificantly to the sector.

### Irrigation and water control

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.

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. 77 percent of the area equipped for irrigation is actually irrigated. Surface water is used for irrigation. All irrigation schemes are medium-scale schemes (2–70 ha) and state-owned.

The harvested, irrigated and cropped total consists of vegetables (208 ha), pulses (3 ha) and flowers (13 ha). 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.

### Food security

Seychelles portrays a moderate level of undernourishment with one out of ten persons classified as such. Both the proportion and the number of undernourished people have decreased from 1990-92 to 1999-2001 and the country records levels of undernourishment (10%) well below those registered in East Africa (39%) and Sub-Saharan Africa (33%).

Data shows that food energy requirements of the population average 2 200 kcal per person per day. Food consumption increased from 2 281 kcal per capita per day in 1979–81 to 2 434 kcal in 1999–01, reflecting an improvement in access to food. Although development plans have always given a high degree of priority to the attainment of food self-sufficiency, the country is unlikely to achieve this objective. At present, imports represent more than 40 percent of total food consumption. Total food requirements are expected to increase by slightly more than 1 percent a year, considering population growth and allowing for migration.

### Food and agriculture trade and import balance

The food import bill in the country has rapidly increased (see figure), at a growth rate higher than that of the population. In 2003 the value of the agricultural imports reached US\$42 million, after the peak attained in 2001 (US\$77 million). The agricultural exports, instead, remained very low and roughly stable over time, never exceeding the threshold of US\$5 million. Cereals are contributing to approximately 16% of the agricultural imports, while the largest share of imports is recovered by total oil fats (27%).



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.

## 1.2 WATER RESOURCES AND HYDROPOWER

The principle source of potable water on the main islands of Mahe, Praslin and La Digue in Seychelles are the numerous rivers and streams to be found on the islands, but most of them have only ephemeral flows. Moreover, due to the steep topography and low retention capacity of the soil and rocks of which the islands are composed of, the flows in the rivers and streams are erratic and fall to very low values during prolonged periods of drought.

Despite the abundant rainfall during the North West monsoon, it is estimated that about 2% of rainfall actually enters the groundwater for sustained infiltration into rivers and streams and about 5% of available water is actually abstracted for the three main purposes namely domestic, agriculture and industrial uses.

There are 38 catchments gauged periodically on Mahe, 11 on Praslin and 8 on La Digue representing 56 Km<sup>2</sup>, 8.6Km<sup>2</sup> and 1.2Km<sup>2</sup> of catchments areas respectively from which treated and untreated water is abstracted for domestic supplies and also for agriculture, commercial and industrial activities.

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 m<sup>3</sup>. The Rochon Dam, which collects its waters from the Rochon River, has a storage capacity of 0.050 million m<sup>3</sup>. Surplus water is forwarded to the La Gogue Dam, which has a storage capacity of 0.920 million m<sup>3</sup>.

In 2003, 8.8 million m<sup>3</sup> 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 m<sup>3</sup>/year. The remainder is being disposed of via septic tanks. Industry reuses about 0.006 million m<sup>3</sup>/year of the treated wastewater. About 1.0 million m<sup>3</sup>/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.

In none of the islands there is hydropower potential. Being more than one thousand kilometres from any neighbouring country, and deprived of any source of fossil fuel, Seychelles depends heavily on the import of refined petroleum to satisfy national needs as well as the demands for international marine and aviation bunkers. The import costs 10% of the Gross Domestic Product (GDP) and can be higher during periods of high oil prices. The energy demand in Seychelles increased from 58 000 tonnes of oil equivalent in 1988 to 102 000 tonnes in 1994. The usage of renewable energy is very marginal and limited to the use of solar water heating. The per capita electricity consumption is presently 1600 kWh/yr and there are nearly 21 000 consumers out of which 19000 are from the domestic/residential sector (36%), and 1,500 from government (14%), industry and commerce (50%).

## 1.2 CLIMATE CHANGE

Studies have shown that there has been substantial climate variability over the past hundred years in the Seychelles. The data analyzed show an increase in mean air temperature for the period 1972-1997. The warming in the Seychelles region is estimated to be of the range of 0.25° C. On Mahe the annual rainfall, rainfall regime, mean length of dry season and the frequency of dry periods have all significantly changed. High rainfalls occurred before 1905, from 1923 to 1937, from 1959 to 1970; much lower rainfalls characterised the intervening 1905-22 and 1938-58 epochs.

Arable agriculture is periodically affected by extreme meteorological events like tropical storms, floods and drought. To the extent that many small islands are susceptible to these phenomena, it is highly likely that crop production would be impacted by alterations in the patterns of these events, as a consequence of climate change. In August 1997, the Seychelles' agricultural sector suffered costly damages (estimated at US\$1.5 million) as a result of a severe storm resulting in heavy rain and extensive flooding in coastal areas. Several hundred tonnes of agricultural products were also lost.

With a rise in population and an increase in tourism, the consumption of food in the Seychelles will substantially increase over the next few years. Climate change would tend to shift national agricultural efforts, and a decrease in self-sufficiency would place more emphasis on imported agricultural products. The main direct effect will be through changes in temperature, rainfall and timing of extreme or critical threshold events related to crop development. A rise in sea level will contaminate coastal land and thus render the soil unsuitable for cultivation. Other effects are expected to include, *inter alia*, the potential detrimental changes in diseases, pests, and weed propagation, the impacts of which are not yet well studied in the Seychelles.

## 2. NATIONAL STRATEGIES FOR WATER, AGRICULTURE AND ENERGY

### 2.1 POLICY CONTEXT

In its 2000–2010 **mission statement**, the Ministry of Agriculture and Marine Resources 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.

The vision of the government's **National Agricultural and Fisheries Policy 2003–2013 (NAFP)** is to achieve food security through sustainable agricultural production and development as follows. For the agricultural sector, the NAFP sets quantified targets for agricultural production, livestock production, agricultural Information, trade and marketing, human resource development, services and institutional support, enforcement of legislation. Considering in particular the agricultural land use optimization and agricultural production, the government strategy is detailed into the following objectives:

- To achieve at least 80 percent production of arable crops, in areas where there are comparative advantages, required for local consumption;
- To encourage the exploitation of spices, floriculture products, essential oils and of traditional plantation crops for export;
- To promote the production of organic crops;
- To promote and facilitate through training small-scale agro-processing both at household and district level so as to optimise the use of and absorb seasonal surpluses of fruits and vegetables.

Sustainable development is a major aim of the country and several policy frameworks have been elaborated for its integration into the country's development. For the Environmental sector the government has launched in June 2001 its second, ten year **Environment Management Plan (EMPS 2000-2010)**, replacing the EMPS 1990–2000. The primary goal of the EMPS 2000-2010 is the promotion, coordination and integration of sustainable development through its programs across all sectors. It

also contains 10 thematic areas of which Agriculture, Biodiversity and Forestry with specific programmed activities.

Other policy documents incorporating sustainable development as well as environmental protection principles include the Eco-tourism Strategy 2003 (SETS -21), the strategic document providing for general policy for eco-tourism development related to the natural environment and resources; the Social Development Policy Beyond 2000 developed by the Ministry for Social Affairs as well as regular updates on implementation of Agenda 21 in the country. The general legislative framework on environmental protection in the Seychelles is the Environment Protection Act (EPA) 199451.

**2.2 INVESTMENT ENVELOPE**

The investment envelope for the short, medium and long term is presented in the Table below and expressed in million US \$.

Time scale	Type of investment (million US\$)			
	Small scale water control	Rehabilitation of irrigation	Large scale hydraulic projects	Total
Short-term				
Medium-term				
Long-term				
<b>Total</b>				

*Note: no data available from CAADP.*

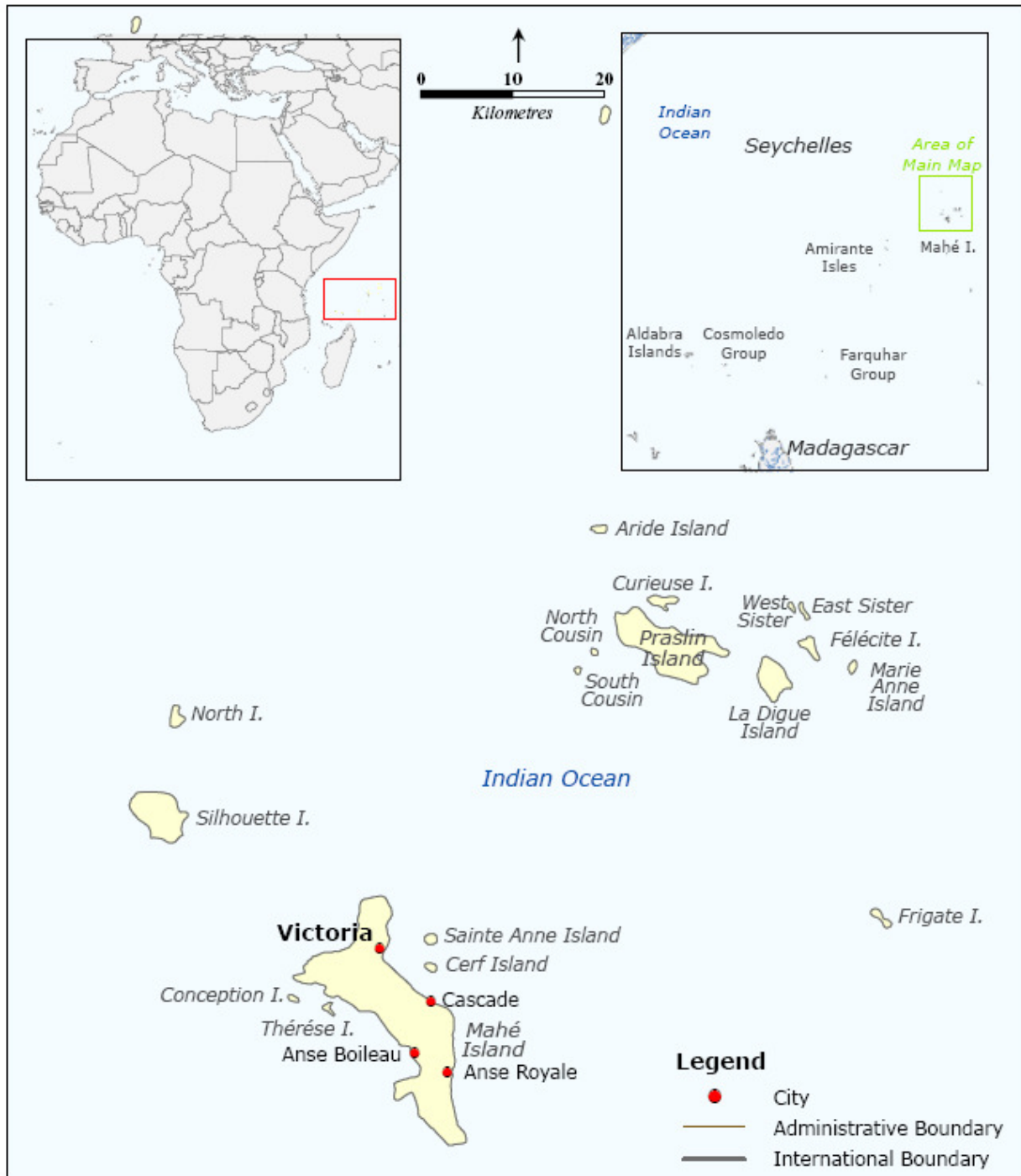
**2.3 PROJECT PORTFOLIO**

Section 3 presents recently achieved, active and pipeline projects related to the above investment envelope. Currently there are three recently implemented projects with water component, all related to the adaptation process to climate change, that range from US\$ 118 500 for the Upgrading of Plant Protection Services to farmers to US\$ 290 000 for Strengthening sustainable on farm research communication skills and enhancing information. Among the pipeline projects there is a Bankable Investment Project Profile with large water component for US\$ 7 million that focuses on the increase in production of fruits and vegetable, with the specific objective of improving current irrigation schemes.

### 3. PROJECT PROFILES (ON-GOING AND PROJECTED)

Project title	Funding Partners	Lifeline	Total Budget	Description
<b>I. PROJECTS RECENTLY IMPLEMENTED</b>				
Agriculture: Sustainable Agriculture Programme/Management and Conservation of Agriculture	Ministry of Environment	2000-2001	US\$ 258 000	
Strengthening sustainable on farm research communication skills and enhancing information	Ministry of Environment	2000-2001	US\$ 295 000	
<b>II. ON-GOING PROJECTS</b>				
<b>III. PIPELINE PROJECTS</b>				
Bankable Investment Project Profile: Sustainable Vegetable and Fruit Production	FAO-NEPAD		US\$ 7.096 million	The overall objective of the project is to increase the production of fruits and vegetables (by 2013, 80% would be produced locally) so as to reduce importation of the crop where comparative advantage exist, to increase the gross domestic production and to enhance the food security. The project will have a number of specific objectives, in particular to improve the present irrigation scheme for more effective and efficient management of water for irrigation.

**ANNEX 1: MAP OF WATER CONTROL IN SEYCHELLES:**



## ANNEX 2: COUNTRY STATISTICS

<b>Country and population</b>								
Area of the country	2005	46	1000 ha					
Cultivated area as % of the total area of the country	2005	13	%					
Total population	2005	81	1000 inhab					
• of which rural	2005	49	%					
Population economically active in agriculture	2005	39	1000 inhab					
• as % of total economically active population	2005	76	%					
• female	2005	49	%					
• male	2005	51	%					
<b>Economy and Development</b>								
Gross Domestic Product (GDP) (current US\$)	2007	728	million US\$/yr					
• value added in agriculture (% of GDP)	2006	3	%					
• GDP per capita	2007	8565	US\$/yr					
<b>Access to improved drinking water sources</b>								
Total population	2006	-	%					
Urban population	2006	100	%					
Rural population	2006	-	%					
<b>Water Resources and management</b>								
Average precipitation	2007	0.9	10 <sup>9</sup> m <sup>3</sup> /yr					
Total actual renewable water resources	2007	0	10 <sup>9</sup> m <sup>3</sup> /yr					
Dependency ratio (transboundary rivers)	2007	0.0	%					
Total actual renewable water resources per inhabitant	2007		m <sup>3</sup> /yr					
Total dam capacity	1989	0.00097	10 <sup>9</sup> m <sup>3</sup>					
Total water withdrawal	2003	0.0123	10 <sup>9</sup> m <sup>3</sup> /yr					
• as % of total actual renewable water resources		-	%					
<b>IRRIGATION AND DRAINAGE</b>								
Irrigation potential	2007	1	1000 ha					
<b>Water Management</b>								
Area equipped for irrigation: full control - total	2003	0.26	1000 ha					
Equipped lowlands	2003	0.00	1000 ha					
<b>Total area equipped for irrigation</b>	2003	0.26	1000 ha					
• Area equipped for irrigation as % of cultivated area	2003	4.3	%					
• Annual increase rate		-	%					
• Power irrigated area as % of area equipped for irrigation		-	%					
• Area actually irrigated as % of area equipped for irrigation	2003	76.9	%					
Non-equipped cultivated lowlands and flood recession	2003	0.00	1000 ha					
<b>Total agricultural water managed area</b>	2003	0.26	1000 ha					
• Agricultural water managed area: as % of cultivated area	2003	3.7	%					
• Drained cultivated area as % of total cultivated area	2003	0.25	%					
<b>Typology of irrigation schemes</b>								
Small-scale schemes	2003	0.0	1000 ha					
Medium-scale schemes (2 - 70 ha)	2003	0.26	1000 ha					
Large-scale schemes	2003	0.0	1000 ha					
<b>Irrigated crops</b>								
Pulses	2003	0.003	1000 ha					
Vegetables	2003	0.208	1000 ha					
Flowers	2003	0.013	1000 ha					
<b>ENERGY INDICATORS</b>								
Energy Production			Mtoe					
Net Imports			Mtoe					
TPES			Mtoe					
- TPES/Pop			toe/capita					
- TPES/GDP			toe/thousand 2000 US\$					
- TPES/GDO (PPP)			toe/thousand 2000 US\$ PPP					
Electricity Consumption			TWh					
- EC/Pop			kWh/capita					
<b>ENERGY SUPPLY AND CONSUMPTION</b>								
	Coal	Gas	Crude oil	Petroleum products	Hydro	Other Renewable & Waste	Others	TOTAL
Production								
Imports			2,203.15	202,447.3				
Exports								
International Marine Bunkers			2,736.45	112,551				
Stock Changes			-1,483.68	-16,505.9				
<b>Total Primary Energy Supply (TPES)</b>			950.38	106,402.7				

\* in tonnes. 1995. Ministry of Environment and Transport, Republic of Seychelles, October 2000. Seychelles: Initial National Communication Under the United Nations Framework Convention on Climate Change.

## REFERENCES

- AQUASTAT - FAO's Information System on Water and Agriculture.  
<http://www.fao.org/nr/water/aquastat/main/index.stm>
- AQUASTAT - FAO's Information System on Water and Agriculture. Country Profiles.  
<http://www.fao.org/nr/water/aquastat/countries/index.stm>
- NEPAD, FAO. 2004. National Medium Term Investment Programme.  
<ftp://ftp.fao.org/docrep/fao/008/ae705e/ae705e00.pdf>
- NEPAD, FAO. 2004. Bankable Investment Project Profile - Sustainable Vegetable and Fruit Production.  
<ftp://ftp.fao.org/docrep/fao/008/ae707e/ae707e00.pdf>
- Ministry of Environment and Transport, Republic of Seychelles, October 2000. Seychelles: Initial National Communication under the United Nations Framework Convention on Climate Change.  
<http://unfccc.int/resource/docs/natc/seync1.pdf>
- Ministry of Environment and Natural Resources, 2004. National Implementation Plan of the Stockholm Convention on Persistent Pollutant.  
[http://www.env.gov.sc/Seychelles\\_POps\\_NIP\\_all\\_sections\\_Feb\\_2007.pdf](http://www.env.gov.sc/Seychelles_POps_NIP_all_sections_Feb_2007.pdf)
- Ministry of Environment of the Seychelles, 2008.  
<http://www.env.gov.sc/index.html>
- Trends in Hunger Reduction for the Monitoring of the WFS and MDG targets, FAO Statistics  
[http://www.fao.org/ES/ess/mdg\\_kit/cy\\_level.asp#07](http://www.fao.org/ES/ess/mdg_kit/cy_level.asp#07)
- The Commercial Import/Trade and Food Security (TFS) database, FAOSTAT, 2004  
<http://faostat.fao.org/site/342/default.aspx>