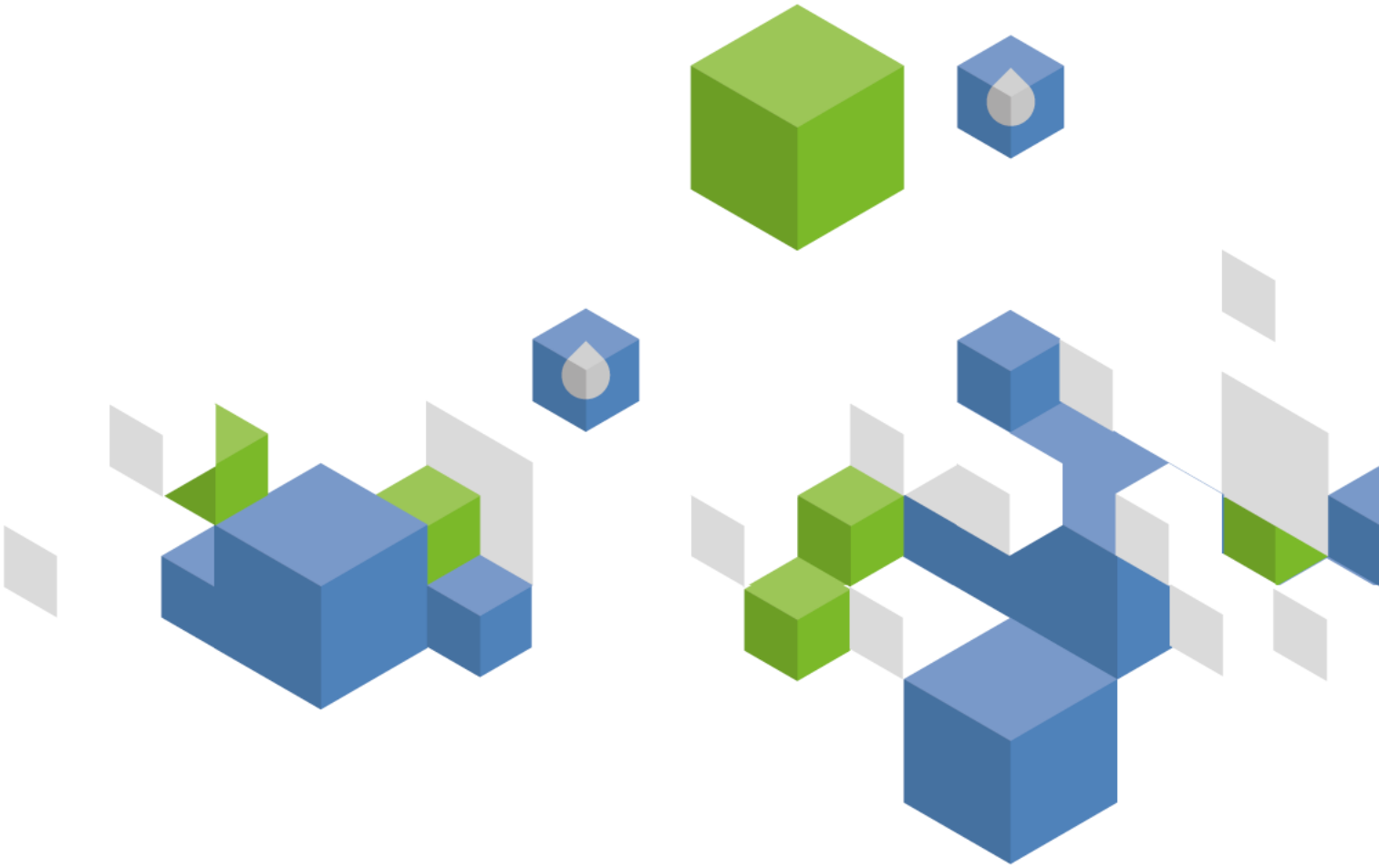
Food and Agriculture Organization
of the United Nations

FAO
AQUASTAT
Reports

Country profile – Fiji

Version 2016



Recommended citation: FAO. 2016. AQUASTAT Country Profile – Fiji.
Food and Agriculture Organization of the United Nations (FAO). Rome, Italy

Fiji

GEOGRAPHY, CLIMATE AND POPULATION

Geography

Fiji is a country in the South Pacific Ocean composed of 332 islands of which only 110 are inhabited. The country has total area of 18 270 km^2. The two major islands, Viti Levu and Vanua Levu, with total areas of 10 429 km^2 and 5 556 km^2, represent 57 percent and 30 percent of the total area of the country respectively. Two smaller islands, Taveuni with a total area of 435 km^2 and Kadavu with a total area of 408 km^2, account for a further 4.6 percent of the land area, and most of the remaining islands are very small. For administrative purposes, the country is divided into 14 provinces and 1 dependency (Rotuma). The capital city is Suva.

The agricultural area, which is the sum of arable land, permanent crops and permanent meadows and pasture, is estimated at 425 000 ha, which is 23 percent of the total area of the country. In 2013, the total physical cultivated area was estimated at 250 000 ha, of which 66 percent (165 000 ha) consisted of temporary crops and 34 percent (85 000 ha) of permanent crops (Table 1).

TABLE 1
Basic statistics and population

Physical areas:			
Area of the country	2013	1 827 000	ha
Agricultural land (permanent meadows and pasture + cultivated land)	2013	425 000	ha
• As % of the total area of the country	2013	23	%
• Permanent meadows and pasture	2013	175 000	ha
• Cultivated area (arable land + area under permanent crops)	2013	250 000	ha
- As % of the total area of the country	2013	14	%
- Arable land (temp. crops + temp. fallow + temp. meadows)	2013	165 000	ha
- Area under permanent crops	2013	85 000	ha
Population:			
Total population	2015	892 100	inhabitants
- Of which rural	2015	46	%
Population density	2015	49	inhabitants/km^2
Economy and development:			
Gross Domestic Product (GDP) (current US$)	2014	4 030	million US$/year
• Value added in agriculture (% of GDP)	2013	12	%
• GDP per capita	2014	4 543	US$/year
Human Development Index (highest = 1)	2014	0.727	-
Gender Inequality Index (equality = 0, inequality = 1)	2014	0.418	-
Access to improved drinking water sources:			
Total population	2015	96	%
Urban population	2015	100	%
Rural population	2015	91	%

FIGURE 1
Map of Fiji

FIJI

FAO - AQUASTAT, 2016

The islands form a group of high islands of volcanic origin, with barrier reefs, atolls, sand cays and raised coral islands. Both Viti Levu and Vanua Levu are mountainous, with peaks rising to 1 323 m and 1 032 m above sea level respectively. The uplands of both islands were formerly covered in tropical rainforest, but much of this has now been replaced with secondary forest and grassland on the lower slopes. Farmland occupies most flattish lowland, and large areas on both islands are under cultivation for sugarcane. In fact, more than half of the cultivated area consists of three crop types only: coconuts (26 percent), sugarcane (17 percent), roots and tubers (10 percent) (FAO, 2015).

The different geological origins and climates of the islands and their isolation from other islands have all contributed to provide Fiji with a large number of different ecosystems with a very rich diversity of flora and fauna (SOPAC, 2007).

Climate

Fiji has a tropical marine climate. The wet and tropical cyclone season are from November to April. The dry season is from May to October. Only 20 percent of the rain falls during this period, unevenly distributed over time and location. The average annual temperature in the country is 27°C, while the highest temperature is 32°C and the lowest temperature 18°C (WAF, 2015). Average annual rainfall ranges from 1 500 mm on the smaller islands to over 4 000 mm on the larger islands.

Population

In 2015, the total population was about 892 100, of which around 46 percent was rural (Table 1). Population density is 49 inhabitants/km^2. The average annual population growth rate in the 2005-2015 period was 0.8 percent. The two major islands, Viti Levu and Vanua Levu, account for 87 percent of the population (WAF, 2015). The two major urban areas are Nadi and its peri-urban area in the west of Vita Levu and the Suva-Nausori corridor in the southeast of Viti Levu (SOPAC, 2007).

In 2014, the Human Development Index (HDI) ranks Fiji 90 among 188 countries, while the Gender Inequality Index (GII) ranks it 87 among 155 countries, for which information was available. Life expectancy is 70 years and the under-five mortality is 22 per 1000 births, both progressing from 66 years and 27 per 1000 in the 1990s. With no significant distinction between boys and girls, around 97 percent of the children in 2012 are enrolled in primary education and 83 percent in secondary education (World Bank, 2015). In 2015, 96 percent of the population had access to improved water sources (100 and 91 percent in urban and rural areas respectively) and 91 percent of the total population had access to improved sanitation (93 and 88 percent in urban and rural areas respectively) (JMP, 2015).

ECONOMY, AGRICULTURE AND FOOD SECURITY

In 2014, the gross domestic product (GDP) was US$ 4 030 million and agriculture accounted for 12 percent of GDP, while in 1994 it accounted for 21 percent.

Subsistence farming and sugarcane production have traditionally been the pillar of Fiji's agriculture. Over the past ten years, these subsectors have shrunk while the shares of other crops, livestock, and the public sector have increased. The "other crops" subsector is mainly driven by the root crops and horticulture industry.

Fiji's export of sugar, fish, crude coconut oil, root crops, and horticultural crops is facing international competition. The country is still importing many of its basic food requirements such as rice, meat and milk. The country's transformation from subsistence to commercial agriculture is slow. The government is working to generate the fund and attract investment necessary to finance the modernization of Fiji's agriculture (MoA, 2014). The Ministry of Agriculture identifies fruits and vegetables amongst the priorities for export promotion (Fink et al, 2013).

Beef and dairy production dominates the livestock subsector. Both industries have been in decline in the past decade due to low private sector investment, diseases, and poor quality breeding and milking stock.Pork, poultry and goat production, on the other hand, have performed reasonable well (MoA, 2014).

In recent years, a strong tourism industry has driven the economic growth in Fiji (PACC, 2015).

WATER RESOURCES

Surface water and groundwater resources

Fiji's islands have considerable differences in their water resources. The large islands are mountainous and have significant permanent surface water sources, while many small islands with low elevation have little or no permanent surface water and rely on groundwater and rainwater only.

The major river on Viti Levu is Rewa river which originates in Tomanivi, the highest peak in Fiji, and flows southeast for 145 km to Laucala Bay, near Suva. The Rewa river is fed by two large tributaries, the Wainibuka and the Wainimala. Other important rivers on this island are the Nadi, Navua, Ba, and Sigatoka. The main river on Vanua Levu is the Dreketi river.

Total renewable surface water resources are estimated at 28 550 million m^3/year. The renewable groundwater resources are estimated at about 5 273 million m^3/year, which are considered to be drained entirely by the surface water network (overlap). The total annual renewable water resources in the country are thus estimated at 28 550 million m^3 (Table 2).

TABLE 2
Renewable water resources

Renewable freshwater resources:			
Precipitation (long-term average)	-	2 592	mm/year
	-	47 360	million m^3/year
Internal renewable water resources (long-term average)	-	28 550	million m^3/year
Total renewable water resources	-	28 550	million m^3/year
Dependency ratio	-	0	%
Total renewable water resources per inhabitant	2015	32 003	m^3/year
Total dam capacity	2015	133	million m^3

Lakes and dams

There are no important natural lakes in Fiji.

The most important dam in the country, constructed to produce hydroelectric power, is the Monasavu dam on the Nanuku river. It was completed in 1983 with a total capacity of 133 million m^3. It is located just above the Monasavu Falls. Water from the dam is diverted through nearly 5.4 km of tunnels to the Wailoa Hydro Power Station on the Wailoa river, which supplies up to 60 percent of the country's energy needs.

The Nadarivatu dam, also known as the Korolevu dam, is located on the upper reaches of the Sigatoka river and has a total capacity of 36 000 m^3. The dam diverts water from the Sigatoka river through a 3 225 m long tunnel to a power station along the Ba river to the southwest. The power station was commissioned in 2012.

The Vaturu dam, in the drier west of Viti Levu, has some small hydroelectric energy generation benefits.

In 2015, total dam capacity in the country is estimated at 133 million m^3 (Table 2).

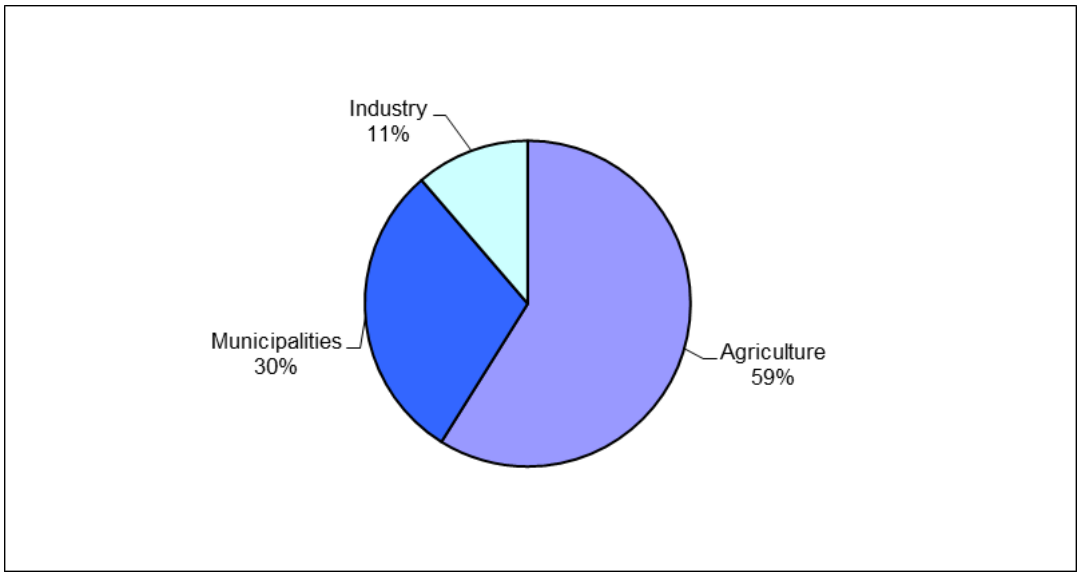
Water use

In 2005 total water withdrawal was estimated at 84.9 million m^3, of which 50 million m^3 (59 percent) was for agriculture, 25.3 million m^3 (30 percent) for municipalities and 9.6 million m^3 (11 percent) for industries (Table 3 and Figure 2).

TABLE 3
Water use

Water withdrawal:		
Total water withdrawal	2005	84.9 million m^3/year
- Agriculture	2005	50 million m^3/year
- Municipalities	2005	25.3 million m^3/year
- Industry	2005	9.6 million m^3/year
• Per inhabitant	2005	103 m^3/year
Surface water and groundwater withdrawal (primary and secondary)	2005	84.9 million m^3/year
• As % of total renewable water resources	2005	0.3 %
Non-conventional sources of water:		
Produced municipal wastewater	-	- million m^3/year
Treated municipal wastewater	-	- million m^3/year
Direct use of treated municipal wastewater	-	- million m^3/year
Direct use of agricultural drainage water	-	- million m^3/year
Desalinated water produced	-	- million m^3/year

FIGURE 2
Water withdrawal by sector
Total 84.9 million m^3 in 2005



Surface water is the main source of water supply for all major towns on the larger islands of Fiji that have higher elevation, as well as for industrial and irrigation uses. Groundwater use in large islands is primarily for rural water supply and for increasing some town water supplies. In recent years, some industries have begun to exploit groundwater.

Surface water availability is a problem in some islands with low elevation, which rely exclusively on groundwater and may or may not attempt to use rainwater. Rainwater harvesting using roof catchment systems with a communal standpipe are very popular in rural Fiji. Because of high annual rainfall, installed storage tanks are normally small and do not yet take into account the possibility of extreme climate events and drought.

One commercial use of groundwater has been the water bottling for export that has attained considerable political and public attention (SOPAC, 2007).

IRRIGATION AND DRAINAGE

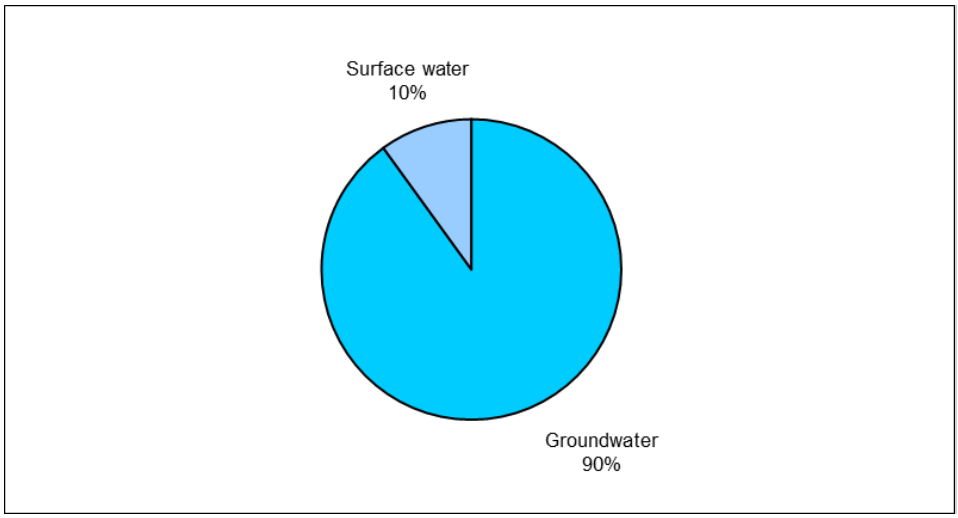
Evolution of irrigation development

In 1998, the area equipped for irrigation was equal to 3 000 ha. In 2003, it was estimated at 4 000 ha, of which 90 percent was irrigated by surface water and the remaining 10 percent by groundwater (Table 4 and Figure 3). Of this area of 4 000 ha, around 3 000 ha or 75 percent is dedicated to rice. The remaining 1 000 ha or 25 percent are upland crops, the majority of which are irrigated by sprinkler systems using both surface water and groundwater resources (Table 4). It is estimated that all the area equipped for irrigation is actually irrigated.

TABLE 4
Irrigation and drainage

Irrigation potential	-		ha
Irrigation:			
1. Full control irrigation: equipped area	2003	4 000	ha
- Surface irrigation		-	ha
- Sprinkler irrigation		-	ha
- Localized irrigation		-	ha
• Area equipped for full control irrigation actually irrigated	2003	4 000	ha
- As % of area equipped for full control irrigation	2003	100	%
2. Equipped lowlands (wetland, ivb, flood plains, mangroves)		-	ha
3. Spate irrigation		-	ha
Total area equipped for irrigation (1+2+3)	**2003**	**4 000**	**ha**
• As % of cultivated area	2003	2	%
• % of area irrigated from surface water	2003	90	%
• % of area irrigated from groundwater	2003	10	%
• % of area irrigated from mixed surface water and groundwater		-	%
• % of area irrigated from non-conventional sources of water		-	%
• Area equipped for irrigation actually irrigated	2003	4 000	ha
- As % of total area equipped for irrigation	2003	100	%
• Average increase per year	1998-2003	6	%
• Power irrigated area as % of total area equipped for irrigation		-	%
4. Non-equipped cultivated wetlands and inland valley bottoms		-	ha
5. Non-equipped flood recession cropping area		-	ha
Total agricultural water managed area (1+2+3+4+5)	**2003**	**4 000**	**ha**
• As % of cultivated area	2003	2	%
Size of full control irrigation schemes: **Criteria**:			
Small schemes < - ha		-	ha
Medium schemes > - ha and < - ha		-	ha
large schemes > - ha		-	ha
Total number of households in irrigation		-	
Irrigated crops in full control irrigation schemes:			
Total irrigated grain production		-	metric tons
• As % of total grain production		-	%
Harvested crops:			
Total harvested irrigated cropped area			ha
• Temporary crops: total			ha
- Rice			ha
- Other crops			ha
Irrigated cropping intensity (on full control area actually irrigated)			%
Drainage - Environment:			
Total cultivated area drained		-	ha
• Non-irrigated cultivated area drained		-	ha
• Area equipped for irrigation drained		-	ha
- As % of total area equipped for irrigation		-	%
Area salinized by irrigation		-	ha
Area waterlogged by irrigation		-	ha

FIGURE 3
Source of irrigation water on area equipped for irrigation
Total 4 000 ha in 2003



Role of irrigation in agricultural production, economy and society

According to the Ministry of Agriculture (MoA), there is no need to increase the existing rice production areas in Fiji for the country to become self-sufficient in rice. It can be reached through the rehabilitation of existing irrigation systems (MoA, 2014).

In 2014, MoA initiated a project in the Nadroga and Navosa province that should boost potato production in Fiji. The project covers about 64 ha (Chaudhary, 2015).

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

Institutions

Several national and local institutions are involved in water resources management:

- The Ministry of Agriculture (MoA) is responsible for irrigation and flood control.
- The Water Authority of Fiji (WAF) is responsible for the overall operation and management of water and wastewater services in a sustainable manner. It is responsible for the construction of infrastructure for rural water supply and sanitation, whereas the local communities, at village level, are responsible for the management of this infrastructure when constructed.
- The Ministry of Environment is responsible for the environmental protection.
- The Fiji Energy Authority (FEA) is the national commercial energy provider and responsible for the major hydropower installations.
- The municipalities are responsible for urban drainage, although the Public Works Department has been the constructing agent of major drainage schemes.

The Pacific Islands Applied Geoscience Commission (SOPAC) is an intergovernmental, regional organization including 18 Pacific island countries and territories, as well as Australia and New Zealand. SOPAC's work is carried out through its Secretariat, based in Suva. While the initial focus of its work was on marine mapping and geosciences, during recent years other scopes such as hazard assessment and risk management, environmental vulnerability, oceanography, energy, water and sanitation have been included.

Water management

An inadequate legislation, a lack of detailed policy, a lack of coordination and a serious deficit of technical and scientifically qualified staff are a barrier for the implementation of integrated water resources management (IWRM) in Fiji (SOPAC, 2007).

Some conflicts have occurred between different water sectors in some basins, such as the Sigatoka basin. The conflicts arise in part because there is no coordinating mechanism to ensure water use for the different sectors, and especially the agriculture and irrigation sector. Coordinating between the different sectors should be improved, including measures for dealing with low flow and drought conditions, where priorities need to be allocated among various conflicting water users (SOPAC, 2007).

The key political groundwater management issue in Fiji has been the abstraction of groundwater for bottling and export by a private enterprise. There have been conflicts over the potential of other bottling enterprises (SOPAC, 2007).

The Nadi river has been subjected to severe flooding over the past few years, resulting in significant damage. Thus, the Nadi basin has been identified as the first priority for an IWRM demonstration project in Fiji. The basin is an immensely valuable resource for Fiji and sustains the agricultural, drinking water, forestry, and tourism sectors. A catchment management plan to address some of the causes of flooding (e.g. inappropriate land use or tree clearance) has been implemented, which is providing direct protection for the communities affected (UNDP, 2015b).

Finances

There are no water charges in Fiji. The water infrastructure installed by government. Once commissioned and operational, the users are responsible for its operation and maintenance.

Policies and legislation

No overall national policy or legislation that deals with water, its uses and IWRM exists. However, there is a number of jurisdictions related to different aspects of water use and management:

- the Water Supply Act
- The Irrigation Act
- the Rivers and Streams Act
- the Native Lands Act
- the Electricity Act
- the Agricultural Landlord and Tenants Act
- The Environment Management Act

Groundwater is however presently not covered under any specific legislation.

ENVIRONMENT AND HEALTH

The quality of water in the major rivers and streams is believed to be good, although data are not organized or coordinated. Human activities have affected water quality over the years and sources of pollution are industry, forestry and agriculture, as well as the growth of urban areas. This pollution damages native fisheries and aquatic life in streams and rivers.

Very little data is available for the assessment of groundwater quality. Groundwater may be polluted by the infiltration of chemicals, which are disposed by the sugarcane farmers and other agro-producers. On larger islands groundwater contamination is a major source of concern, but also on smaller islands some problems may occur due to local waste disposal that may pollute groundwater. (SOPAC, 2007).

A close connection exists between waste disposal, water quality and health, especially in rural areas. The most common waterborne diseases in the country are leptospirosis, diarrhoea, dysentery and typhoid (SOPAC, 2007).

Water Authority of Fiji has 43 water treatment plants and facilities throughout the country providing safe and clean drinking water (WAF, 2015).

Fiji has experienced both drought and flooding. Regular drought results from El Niño climate conditions and low-lying islands are particularly susceptible to extended dry periods. Flooding regularly occurs throughout various parts of the country, where some larger towns including Nadi, Ba, and Labasa have developed in highly flood prone areas. Development of agriculture in the floodplain and progressive deforestation for agricultural purposes may cause flood peaking to become more extreme in the future.

PROSPECTS FOR AGRICULTURAL WATER MANAGEMENT

Fiji recognizes the importance of improving water management in the country. The implementation of IWRM requires a number of features to be developed simultaneously (SOPAC, 2007):

- Policy development on key water management issues
- Continuation with already started legislative changes
- Establishment of much improved linkages between sectors
- Technical and human resources capacity building
- Identification of sources of finance
- Approaches to water protection
- Responses to water threats and vulnerabilities

MAIN SOURCES OF INFORMATION

Chaudhary, F. 2015. *Irrigation to boost production.*

UNCCD and Ministry of Agriculture. 2006. *Desertification. Fiji. Third national report on implementation of the United Nations Convention to Combat Desertification (UNCCD), Republic of the Fiji Islands.* United Nations Convention to Combat Desertification.

FAO. 2015. *FAOSTAT*. http://faostat3.fao.org/download/Q/QC/E. Food and Agriculture Organization of the United Nations, Rome, Italy.

Fink, A., Neave, S., Hickes, A., Wang, J.F. and Nand, N. 2013. *Vegetable production, postharvest handling and marketing in Fiji*.

GEF. Undated. *Mid-Term Report of the Fiji GEF Pacific IWRM demonstration project: "Environmental and socio-economic protection in Fiji: Integrated flood risk management in the Nadi river basin"*. Global Environment Facility. Draft.

JMP. 2015. *Progress on drinking water and sanitation – 2015 Update and MDG Assessment*. WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation.

MoA. 2014. *Fiji 2020 Agriculture Sector Policy Agenda.* Ministry of Agriculture.

New Zealand Aid Programme. 2011. *Sustainable water solutions in Fiji.*

PACC. 2015. *Demonstration guide: Building resilience to climate change in lowland farming communities in Fiji*. Pacific Adaptation to Climate Change Programme.

Pacific Water. *Catalogue of rivers for Pacific Islands*. Fiji.

SOPAC. 2007. *National integrated water resource management diagnostic report. Fiji Islands*. The Pacific Islands Applied Geoscience Commission.

SOPAC. 2015. *Website of SOPAC*. Pacific Islands Applied Geoscience Commission.

UNDP. 2015. *Human Development Reports: Data.* United Nations Development Programme. New York.

UNDP. 2015b. *Implementing Sustainable Water Resources and Wastewater*. United Nations Development Programme

WAF. 2015. *Water Authority of Fiji Profile*. Water Authority of Fiji.

WAF. 2015b. *Website of WAF*. Water Authority of Fiji.

World Bank. 2015. *World Development Indicators. World DataBank*. World Bank. Washington.