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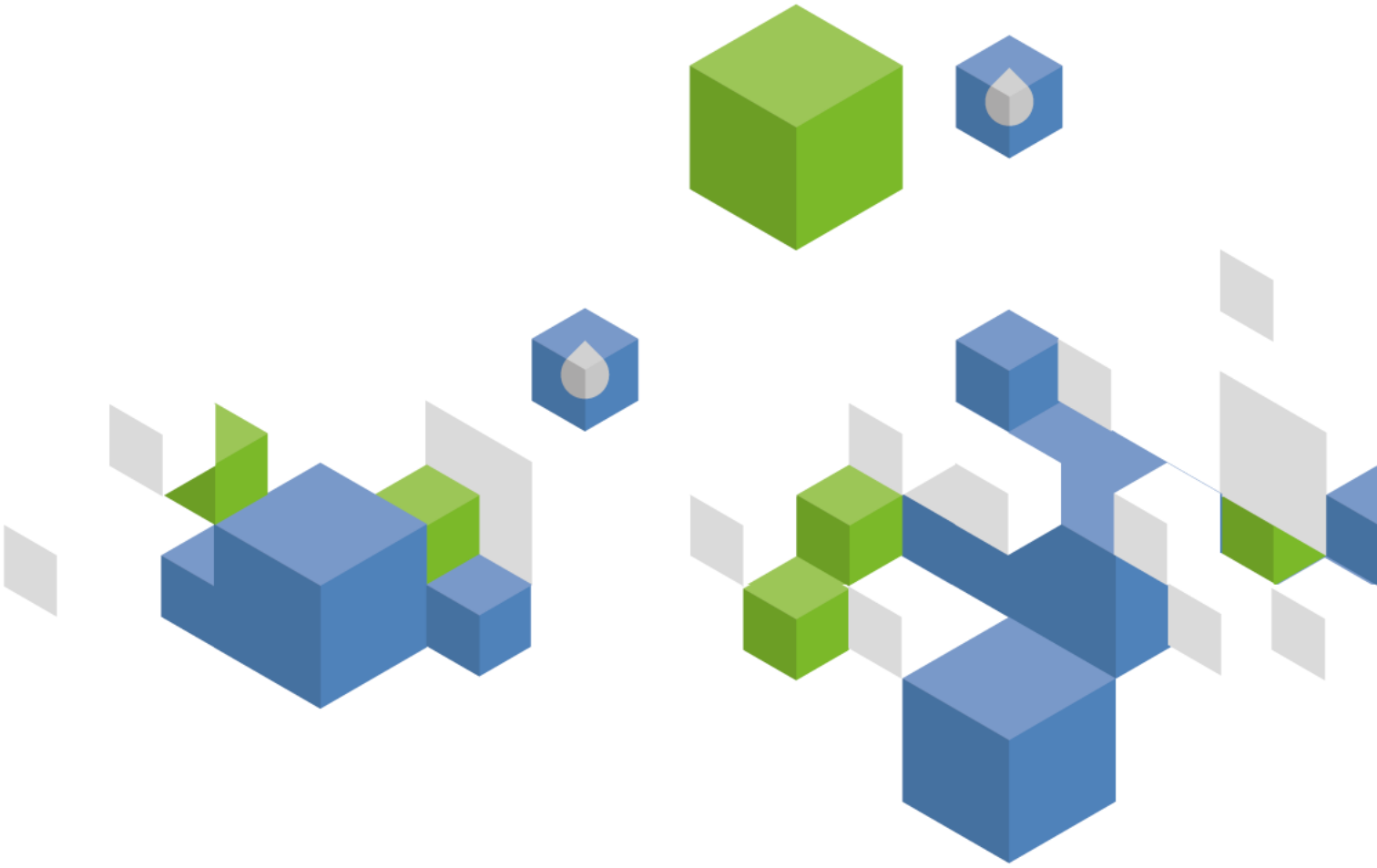

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Solomon Islands

GEOGRAPHY, CLIMATE AND POPULATION

Geography

The Solomon Islands is a country in the South Pacific Ocean, lying to the east of Papua New Guinea and northwest of Vanuatu, composed of around 1000 islands of which approximately 350 are inhabited. The country has total area of 28 900 km^2. The major islands are Guadalcanal (5 120 km^2) where the capital Honiara is located, Malaita (4 310 km^2), Makira (San Cristobal) (3 190 km2), Santa Isabel (3 000 km^2), Choiseul (2 970 km^2) and New Georgia (2 037 km^2). These islands vary in length from 145 to 190 km and in width from 35 to 50 km. The remaining are smaller islands and atolls (SOPAC, 2007; Sullivan and Guglielmi, 2007). The country is divided into ten administrative areas: nine provinces and the capital city Honiara.

The agricultural area, which is the sum of arable land, permanent crops, and permanent meadows and pasture, is estimated at 108 000 ha, which is 4 percent of the total area of the country. In 2013, the total physical cultivated area was estimated at 100 000 ha, of which 20 percent (20 000 ha) consisted of temporary crops and 80 percent (80 000 ha) of permanent crops (Table 1).

TABLE 1
Basic statistics and population

Physical areas:			
Area of the country	2013	2 890 000	ha
Agricultural land (permanent meadows and pasture + cultivated land)	2013	108 000	ha
• As % of the total area of the country	2013	4	%
• Permanent meadows and pasture	2013	8 000	ha
• Cultivated area (arable land + area under permanent crops)	2013	100 000	ha
- As % of the total area of the country	2013	3	%
- Arable land (temp. crops + temp. fallow + temp. meadows)	2013	20 000	ha
- Area under permanent crops	2013	80 000	ha
Population:			
Total population	2015	583 600	inhabitants
- Of which rural	2015	78	%
Population density	2015	20	inhabitants/km^2
Economy and development:			
Gross Domestic Product (GDP) (current US$)	2014	1 158	million US$/year
• Value added in agriculture (% of GDP)	2006	36	%
• GDP per capita	2014	2 021	US$/year
Human Development Index (highest = 1)	2014	0.506	-
Gender Inequality Index (equality = 0, inequality = 1)	-	-	-
Access to improved drinking water sources:			
Total population	2015	81	%
Urban population	2015	93	%
Rural population	2015	77	%

FIGURE 1
Map of Solomon Islands

SOLOMON ISLANDS **FAO - AQUASTAT, 2016**

The islands vary considerably, from a small tiny atoll island to a high mountainous heavily dense rain forested island; the highest point on the islands is the Mount Popomanaseu at 2 310 m on the island of Guadalcanal. Flat land is restricted to the coasts and is of limited extent, except in the north-central part of Guadalcanal, referred to as the Guadalcanal Plains. Approximately 80-85 percent of the total land area are natural forest (SOPAC, 2007).

Climate

The Solomon Islands have a tropical monsoon climate with a relatively high and uniform temperature, high humidity and abundant rainfall. Temperatures fluctuate between 25ºC to 32ºC during the day and some degrees less during the night. The mean annual rainfall is estimated at about 3 000 mm, ranging from 1 500 to 5 000 mm and with a total exceeding 8 000 mm on high peaks. This wide variation depends on topography, latitude and orientation of the islands to prevailing winds. The dry season is from April to November and the wetter north-west monsoon season from November to April, with a tendency of reduced rainfall during February when the equatorial trough is normally furthest south (SOPAC, 2007; Sullivan and Guglielmi, 2007; Wairiu and Powell, 2006).

Population

In 2015, the total population was about 583 600, of which around 78 percent was rural (Table 1). Population density is 20 inhabitants/km^2. The average annual population growth rate in the 2005-2015 period has been estimated at 2.2 percent. Approximately 350 islands are inhabited including the six main islands of Guadalcanal, Malaita, Makira, Santa Isabel, Choiseul and New Georgia (Wairiu and Powell, 2006).

In 2014, the Human Development Index (HDI) ranks the Solomon Islands 156 among 188 countries. Life expectancy is 68 years and the under-five mortality is 28 per 1000 births, both progressing from 60 years and 37 per 1000 in the 1990s. With no significant distinction between boys and girls, around 81 percent of the children in 2007 were enrolled in primary education, but only 31 percent for secondary education (WB, 2015). In 2015, 81 percent of the total population had access to improved water sources (93 and 77 percent in urban and rural areas respectively) and 30 percent of the total population had access to improved sanitation (81 and 15 percent in urban and rural areas respectively) (JMP, 2015).

ECONOMY, AGRICULTURE AND FOOD SECURITY

In 2014, the gross domestic product (GDP) was US$ 1 158 million. In 2006, agriculture accounted for 36 percent of GDP, while in 1996 it accounted for 41 percent.

The Solomon Islands is an agriculturally based society. Agriculture commodities have been the major exports from the Solomon Islands since the country attained its independence. Coconut products are traditionally the main agricultural output. The main industries in the country are copra, timber, palm oil, fish, cocoa and beef cattle. Main exports are timber, fish, copra, cocoa and palm oil/kernel.

The country is relatively rich in mineral and forest resources. The logging industry is the dominant sector within the economy but uncontrolled and destructive activities have resulted in serious problems with irreparable damage to the environment, the forests and the country's economic future. However, only about 10 percent of the forested area is considered suitable for commercial exploitation. The non-commercial areas are located on steeply sloping land or scattered across many small islands and are presently not economically feasible to log. The government has undertaken some steps to avoid illegal forestry (SOPAC, 2007; Sullivan and Guglielmi, 2007).

WATER RESOURCES

Surface water and groundwater resources

Freshwater availability varies considerably across the archipelago. On the large volcanic islands, water resources with river systems are abundant due to the mountainous topography and weather conditions. The low coral atolls and islets have no perennial surface water resources and rely on rainwater and thin fresh groundwater lenses (ISF-UTS, 2011; SOPAC, 2007).

The longest river is Lunga river on Guadalcanal Island with a catchment area of 377 km^2 (Sullivan and Guglielmi, 2007). Aquifers on the islands are small and depend mainly on precipitation for recharge (ISF-UTS, 2011).

Total renewable surface water resources are estimated at 44 700 million m^3/year. The renewable groundwater resources are estimated at about 11 920 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 44 700 million m^3 (Table 2).

TABLE 2
Renewable water resources

Renewable freshwater resources:			
Precipitation (long-term average)		3 028	mm/year
		87 510	million m^3/year
Internal renewable water resources (long-term average)		44 700	million m^3/year
Total renewable water resources		44 700	million m^3/year
Dependency ratio		0	%
Total renewable water resources per inhabitant	2015	76 594	m^3/year
Total dam capacity	-	-	million m^3

Lakes and dams

Lake Tegano on Rennell island is the largest lake in the country, and consists of a mixture of brackish freshwater and salt water.

There are no important dams and there is limited hydropower development in Solomon Islands. There is only one single micro-hydropower plant (150kW) and about a dozen pico-hydropower installations in the rural areas which can sustain a small community. There is substantial potential for hydropower from water resources on at least seven islands but little effort has been made so far to evaluate the resource (SOPAC, 2007; Wairiu and Powell, 2006).

Water use

Drinking and household use in both rural villages and in urban centres account for the largest water withdrawal in the country. There is limited agricultural water demand because most crops are rainfed. The industrial sector withdraws water for fish processing cannery, palm oil factory, mining operations and some small manufacturing industries. Although the demands for industry are still relatively small there is considerable potential for future growth (SOPAC, 2007).

On the larger islands, surface water in the form of streams, springs or rivers is the main source of drinking water. Some communities on the higher volcanic islands also use groundwater for domestic purposes. The major users of groundwater resources are the capital city Honiara and the Guadalcanal Plains. Approximately 20-30 percent of Honiara water supply is sourced from groundwater. The Guadalcanal Plains on the northeast coast of Guadalcanal have abundant potential for groundwater. In areas where surface water supply is not available for farming, groundwater is used if available.

In urban areas, piped water accounts for 75 percent of total water withdrawal, rain water tanks account for 22 percent, bore hole/spring/wells account for 1 percent, and other sources account for 2 percent.

On the small atoll islands and islets where water is scarce, rainwater is collected for drinking and brackish water from shallow hand-dug wells is utilized for most of their other domestic needs. Dug wells have been used to collect water but due to its relative poor quality (saline) rainwater is used for drinking and cooking. (ISF-UTS, 2011; SOPAC, 2007).

Desalination of water is limited, except for private resorts and boats mainly for tourists.

IRRIGATION AND DRAINAGE

Evolution of irrigation development

In 2007, rice was the only crop using irrigated agriculture in the Solomon Islands, all other crops were rainfed. There were six irrigated rice projects with a total area of 35.4 ha (Table 3) (SOPAC, 2007):

- ROC Farm, King George VI School (3 ha)
- PEFA land King George VI School (15 ha, with only 4 ha was being used)
- Don Bosco Tetere (6.4 ha, planned to be extended to 20 ha)
- Tenaru School (3 ha, planned to be extended to 10 ha)
- Loa farm Malaita province (5 ha currently not in operation due to management conflict)
- Fiu rice farm Malaita province (3 ha).

The National Rural Rice Development Programme, started in 2006, aims to establish a total of 150 ha of irrigated rice fields throughout the country in five years. Plans are also underway to rehabilitate the 200 ha Metapona Rice Project in the Guadalcanal plain (SOPAC, 2007). It is not known whether these areas have been developed already and whether the schemes are functional. The agricultural developments of Guadalcanal plains have shown the potential for irrigation especially in the small holder rice farming activities.

TABLE 3
Irrigation and drainage

Irrigation potential	-	-	ha
Irrigation:			
1. Full control irrigation: equipped area	2007	35.4	ha
- Surface irrigation	-	-	ha
- Sprinkler irrigation	-	-	ha
- Localized irrigation	-	-	ha
• Area equipped for full control irrigation actually irrigated	2007	26.4	ha
- As % of area equipped for full control irrigation	2007	75	%
2. Equipped lowlands (wetland, ivb, flood plains, mangroves)	-	-	ha
3. Spate irrigation	-	-	ha
Total area equipped for irrigation (1+2+3)	**2007**	**35.4**	**ha**
• As % of cultivated area	2007	0.04	%
• % of area irrigated from surface water	-	-	%
• % of area irrigated from groundwater	-	-	%
• % of area irrigated from mixed surface water and groundwater	-	-	%
• % of area irrigated from non-conventional sources of water	-	-	%
• Area equipped for irrigation actually irrigated	2007	26.4	ha
- As % of total area equipped for irrigation	2007	75	%
• Average increase per year	-	-	%
• 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)	**2007**	**35.4**	**ha**
• As % of cultivated area	2007	0.04	%

TABLE 3 (continued)
Irrigation and drainage

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

Women and irrigation

Women are the main collectors of water for domestic uses in Solomon Islands. As a result, they are the ones who are mostly affected by water sector developments, especially in the rural areas. Where communities have been relocated due to logging or mining, water sources are often far away, increasing the burden of work for women. Provision of improved water and wastewater services in the rural areas benefits women as they are able to do other important activities without the constraints of water collection (ISF-UTS, 2011; SOPAC, 2007).

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

Institutions

The main institutions related to water resources management are (SOPAC, 2007; Nexus, 2015):

- The Ministry of Mines and Energy: is responsible for providing national coverage related to water resources assessment, management and the development of groundwater.
- The Solomon Islands Water Authority (SIWA): is responsible for providing management and development of water resources and sewerage services in the capital Honiara and main urban areas, while provincial governments are free to choose SIWA or to operate their own supply.
- The Environmental Health Division of the Ministry of Health and Medical Services: is responsible for providing safe water and sanitation to rural populations in Solomon Islands.

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 (Fiji). 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

In Solomon Islands there is an increasing demand for water which therefore needs proper management and development. In urban areas population has drastically increased over the years with limited expansion in the water supply sector. Similarly, rural populations have experienced deterioration in freshwater quality due to logging and agricultural practices.

Successive governments in the country have prioritized the water sector, especially provision of safe and reliable water supplies to rural communities and urban centres. However, there was little emphasis on water resources management and infrastructure rehabilitation and development of water and wastewater services.

In 2004, the United Nations Development Programme (UNDP) and Global Environment Facility (GEF) signed an agreement with SOPAC to develop an innovative programme on Sustainable Integrated Water Resources Management (IWRM) for Pacific Island countries. This programme supports the Pacific Small Island Developing States (SIDS) in the implementation of the Pacific Regional Action Plan that addresses sustainable water management (SOPAC, 2007).

Finances

Water tariffs for the services of SIWA must take into account cost recovery to ensure reliability and sustainability of the services it provides and must be affordable to all users. SIWA is currently investigating possibilities to reduce energy costs. Rural water supply and sanitation is subsidized through government funding and overseas donors, mainly Australia, New Zealand, European Union, Canada, Japan and China. (SOPAC, 2007).

Policies and legislation

The Solomon Island's Draft National Water Policy (NWP), developed under the EU-funded Solomon Island's Water Governance Project, addresses water resource management, water supply and sanitation. It sets out a vision for universal coverage of water of adequate quality and quantity (ISF-UTS, 2011).

The legislation in the country related to water resource management includes (SOPAC, 2007):

- Waters Ordinance (1969): provides measures for watershed control in relation to rivers only and regulates the use of designated river water through permit applications
- Environment Act (1988): provides for the protection, preservation and conservation of the environment, including the prevention and control of water pollution
- Public Health Ordinance (1970): authorizes inspections to be conducted for the regulation of water pollution
- Water Authority Act (1992): provides for the establishment of SIWA for provision of proper management and development of urban water and wastewater services throughout the country
- Environmental Health Act and Provincial Ordinance: provides for the control and management of water and sanitation services in the rural area of the country
- Draft Water Resources Act (2006): for provision of water resources management in Solomon Islands.

ENVIRONMENT AND HEALTH

There is evidence that the quantity and quality of freshwater is in decline but there is a lack of adequate reliable hydrological data and funds to collect detailed data. Furthermore, common practices such as logging and the traditional slash and burn method of farming have gradually destroyed the rivers and streams, threatening key catchment areas. Aquifers are also highly vulnerable to the effects of human-caused contamination as well as sea level rise and saltwater intrusion related to climate change (ISF-UTS, 201; SOPAC, 2007; Sullivan and Guglielmi, 2007). Salinization of groundwater is increasing in

most coastal villages and atoll islands due to ingression of seawater during extreme weather events or as an ongoing trend (SPREP, 2015).

The mining activities on Guadalcanal pollutes nearby rivers and catchment areas. As well, the commercial palm oil development on Guadalcanal plains has a high usage of chemicals and fertilizers that affect groundwater and surface water sources (SOPAC, 2007).

Solomon Islands are vulnerable to major droughts and flooding, both of which are expected to be strongly exacerbated by climate change which will affect rainwater patterns. In 1986 water completely inundated a major part of Guadalcanal Plain, claiming more than 100 lives. In 1995 parts of Solomon Islands experienced too little rain causing severe water shortages (ISF-UTS, 2011; SOPAC, 2007).

Climate change is expected to be characterized by wetter wet seasons and dryer dry seasons (SIWA, 2013).

PROSPECTS FOR AGRICULTURAL WATER MANAGEMENT

The country needs an integrated approach to improved water management in order to address threats to the water resources in the near future (SOPAC, 2007).

The protection of water resources may be achieved through (MMERE, 2007):

- Development and implementation of improved water resource management
- Improved policies and regulations addressing water supply and demand
- Conjunctive use of surface water and groundwater as adaptive measure to addressing the impacts of climate variability/change
- Management of pollution threats to freshwater
- Institutional and capacity building
- Environmental monitoring programs relating to water resource and wastewater management

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