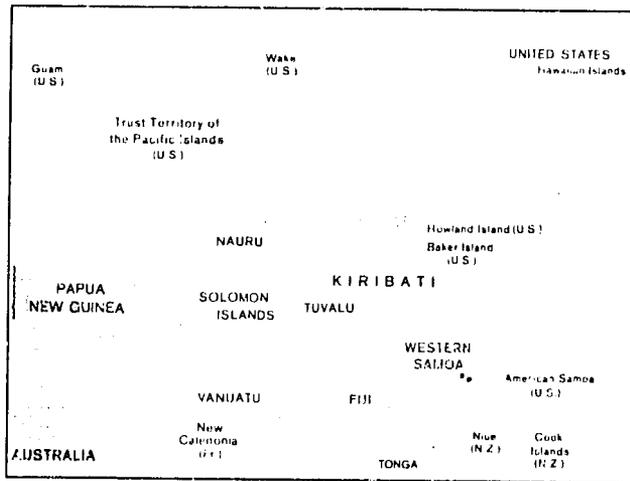


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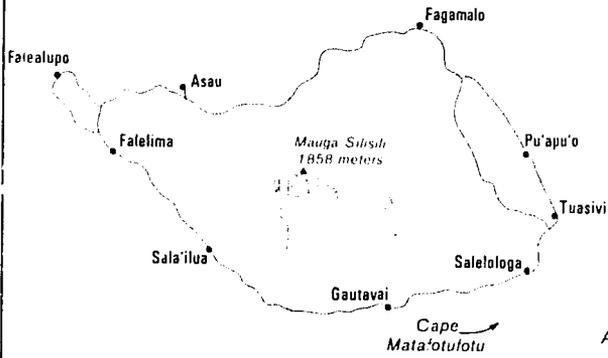
Western Samoa

A Country Profile

Office of Foreign Disaster Assistance
Agency for International Development
Washington, D.C. 20523

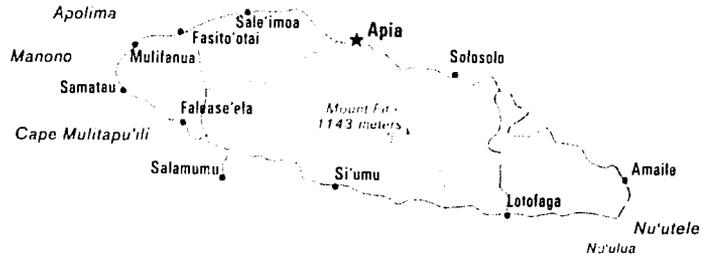


Savai'i



SOUTH PACIFIC OCEAN

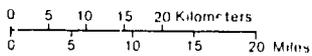
Upolu



Western Samoa

★ National capital

— Road



WESTERN SAMOA: A COUNTRY PROFILE

prepared for

The Office of U.S. Foreign Disaster Assistance
Agency for International Development
Department of State
Washington, D.C. 20523

by

Carol Skowron

Evaluation Technologies, Inc.
Arlington, Virginia
under contract AID/SOD/PDC-C-3345

The country profile of Western Samoa is part of a series designed to provide baseline country data in support of the planning and relief operations of the Office of U.S. Foreign Disaster Assistance (OFDA). Content, scope, and sources have evolved over the course of the last several years and the relatively narrow focus is intentional.

We hope that the information provided will also be useful to others in the disaster assistance and development communities. Every effort is made to obtain current, reliable data; unfortunately it is not possible to issue updates as fast as changes would warrant.

We invite your comments and corrections. Address these and other queries to OFDA, A.I.D., as given above.

June 1987

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1. General Information1.1 Geographic Codes

| | |
|--------------|---------|
| AID Standard | 491 |
| AID Regional | ANE/EA |
| State Region | EAP/PIA |

1.2 Host Mission to the U.S.

Western Samoa maintains a mission in New York in conjunction with the Permanent Mission to the United Nations. The Ambassador, who serves both the U.S. and Canada, is resident in Apia.

Permanent Mission of the Independent Nation
of Samoa to the United Nations
820 Second Avenue, Room 800 D
New York, NY 10017
Tel. (212) 599-6196

New Zealand acts as a channel of communications with governments and international organizations outside of the Pacific Islands area, when requested to do so by the Government of Western Samoa. New Zealand's Embassy in the United States is located at:

37 Observatory Circle, N.W.
Washington, D.C. 20008
(202) 382-4800

1.3 U.S. Mission in Western Samoa

The U.S. Ambassador in Wellington, New Zealand is also accredited to Western Samoa. In addition, there is a Consular Agency in Apia.

Embassy of the United States
29 Fitzherbert Ter.
Thorndon, Wellington
Tel. 722-068

U.S. Consular Agency
P.O. Box 4463
Matautu-Uta, Western Samoa
Tel. 34336

Western Samoa is served by the A.I.D. South Pacific Regional Development Office (SPRDO) in Suva, Fiji, which is located at the same address as the U.S. Embassy.

South Pacific Regional Development Office
31 Loftus St.
P.O. Box 218
Suva, Fiji
Tel. 311-389
Telex 2255 FJ

1.4 Time Zones

EST -6
GMT -11

1.5 Currency (March 1987)

WS\$ 2.20 = US \$1.00
1 tala (WS\$) = 100 sene

All figures in this profile are in US dollars.

1.6 Travel and Visa Requirements

Passport and Visa: No visa is necessary for visits up to 30 days. A valid passport, round trip plane ticket, and confirmed hotel accommodations are required. An entry visa for longer visits may be obtained through the New Zealand Embassy.

Health Requirements: Vaccination for yellow fever is required of travellers over 1 year of age arriving from infected areas.

1.7 Holidays and Calendar

| | |
|-----------------------|--------------------------------------|
| New Year's Day..... | January 1 |
| Good Friday..... | Varies |
| Easter Monday..... | Varies |
| ANZAC Day..... | April 25 |
| Independence Day..... | January 1, celebrated June 1-3 |
| White Sunday..... | 2nd Sunday in October |
| Arbor Day..... | November 7 |
| Christmas..... | December 25 |
| Boxing Day..... | December 26 |

1.8 Treaties and Agreements

Investment Guaranties
Peace Corps

1.9 Memberships in International Organizations

Asian Development Bank (ADB), Commonwealth, Economic and Social Commission for Asia and the Pacific (ESCAP), FAO, IDA, IFAD, IFC, IMF, South Pacific Commission (SPC), South Pacific Forum (SPF), South Pacific Bureau for Economic Cooperation (SPEC), U.N., WHO, World Bank

1.10 Geography

Western Samoa comprises the westernmost islands of the Samoan archipelago, located in the heart of Polynesia. Its nearest neighbors are other island nations: Tokelau to the northeast, the Cook Islands to the east, Tonga to the south, and Fiji to the southwest. New Zealand lies 2,900 km to the south and northern Australia 4,700 km to the west.

The country is composed of two large volcanically formed islands, Upolu and Savai'i and several smaller ones, most of which are uninhabited. It has a land area of 2,934 sq. km which is about the same size as the state of Rhode Island. The climate is characterized by wet and dry seasons and little variation in temperature.

For more information see 3.1 Physical Geography.

1.11 Ethnic Groups and Culture

The population is virtually homogenous within Western Samoa. Samoans comprise nearly 90 % of the population. The remainder are part-Samoan, who are mixed Europeans, Chinese, Fijians and Tongans.

The traditional Samoan way, "faa Samoa", has remained strong, despite long exposure to European influences. The "aiga", or extended family, is the essential unit of the traditional social system. Each aiga is headed by a "matai", a chief chosen by consensus of family members. The matai have authority over land held in common by the aiga and are responsible for the welfare of family members. The matai also serve on village councils, which have wide powers. Most activity is organized around the villages, which tend to be politically, socially, and economically self-sufficient.

Samoans have retained many traditional social practices which guide behavior and maintain the Samoan way of life. Many aspects of collective communalism, in which family welfare takes precedence over individual rights, are still strong. Rituals and social conventions are fairly extensive, and may appear complicated to an outsider.

1.12 Language

Both Samoan and English are official languages in Western Samoa. Older Samoans often do not speak English and rural Samoans may speak it less well. English is used in government departments, in business transactions and in the commercial sector. Samoan is used in the Fono (parliament) with simultaneous translation into English.

1.13 Religion

Christianity was introduced in Western Samoa during the first half of the nineteenth century and was quickly integrated into the village social structure. Today, the Christian Church remains strong and religion is very much a part of everyday life. Pastors have an important place in the village political hierarchy. Church ritual and customs are taken seriously; Sundays are reserved almost exclusively for church services. About half of the people belong to the Congregational Church, 20 percent to Roman Catholic churches, 20 percent to Methodist churches, and the remainder to the Church of Jesus Christ of Latter-day Saints and Seventh-day Adventists.

1.14 History and Government

History:

Archaeological evidence indicates that Polynesians settled the Samoan islands as early as 1000 B.C. In its early history, Samoa was not a unified nation, but was a feudal, aristocratic society comprising villages ruled by matai. Samoa was occupied by Tonga from the 12th through the 16th centuries.

The first Europeans visited the islands in the 1700s and in 1830 the first missionaries arrived from the London Missionary Society. Within a few years of their arrival, they converted the islanders to Christianity. Throughout the nineteenth century, European trade with Samoa increased and westerners

became increasingly involved in internal affairs. Britain, Germany, and the United States all vied for control and after a brief period of joint responsibility, the islands were partitioned. The United States assumed control over the eastern islands, Britain withdrew in place of claims elsewhere, and Germany assumed control over the western islands, which are now known as Western Samoa.

At the outbreak of World War I, New Zealand forces took over Western Samoa and remained through World War II. At the conclusion of the war, the western Samoan Islands became a United Nations trust territory under New Zealand administration, with an understanding that the islands would eventually achieve independence. The Legislative Assembly was formed in 1947, a national constitution was completed in 1960, a plebiscite approved independence in 1961, and independence was attained January 1, 1962.

Government Structure: The islands are governed under a parliamentary system, which has been modified to accommodate Samoan traditions. The Parliament consists of the head of state, which is largely a ceremonial position, and the Legislative Assembly or "Fono". The current head of state holds his position for life, but in the future the head of state will be elected by the Fono. A Council of Deputies made up of not more than three members elected by the Fono serves as a deputy head of state.

The prime minister, who is appointed by the head of state and approved by the Fono, is the effective head of government. The prime minister chooses his own cabinet, which is considered to be the executive government. With the exception of two mixed or non-Samoan citizens, the 47 members of the Fono are matai, elected by matai suffrage (about 12,000 people) on a territorial basis. All terms of office are three years.

Administrative districts based on geographical regions have been established and are used primarily by the central government for operating health, education, police and agriculture services. Local government continues to be under the traditional system whereby matai in each village form a council which has authority over local affairs. Village councils generally have little contact with the central government.

1.15 Economy

General Situation:

The principal economic activity is subsistence agriculture, which is carried out within the extended family system in rural villages. Taro, yams, breadfruit, and pawpaws comprise the most common subsistence crops. Subsistence activities absorb as much as two-thirds of the total population and contribute 33% of the GDP. Additionally, cash crops are grown for the urban market and for export. The manufacturing sector includes light industries that make concrete products, industrial and household gases, cigarettes, beer, paints and building materials for the local market; as well as export products such as clothing, canned fruit, processed food, and handicrafts. The most important manufacturing operation is copra processing. Tourism also provides a source of revenue and accounts for about six percent of the GDP.

From 1980-1982, Western Samoa experienced serious economic difficulties due to deteriorating terms of trade, a rapid expansion of money supply, and drought. In 1983 the government implemented a wide-ranging financial stabilization program which considerably improved the country's fiscal situation. Expanded domestic production of some commodities and greater hydroelectric output thereby reducing oil imports contributed to the moderate recovery. The economy has also benefitted from substantial remittances from Western Samoans abroad and from the large number of foreign aid.

The GDP, using 1980 as a constant, dropped in 1981 and 1982, but started to pick up in the latter part of 1983. The GDP grew 2.1% in 1984 and 2.6% in 1985. In spite of recent improvements, inherent limitations in the economy, such as a small population, a lack of mineral resources, and great distances from markets will continue to restrict economic development. Moreover, until exports are diversified, the economy will be greatly affected by world market prices of its few export commodities.

Balance of Payments:

By 1981, Western Samoa was experiencing a critical balance of payments problem as import payments steadily rose and exports fell off. Growing demands for consumer products, the increased cost of imported energy, and import requirements of several large development projects contributed to the problem. The financial position, however, improved somewhat in 1983-1985.

In 1983 the government implemented an austerity program to reduce domestic demand, restrain imports, and curb inflation. The trade imbalance dropped from a deficit of \$36.4 million in 1982 to one of \$30.7 million in 1984. Greater export earnings due to higher prices of copra and cocoa contributed to the improvement.

Although Western Samoa is attempting to develop both the agriculture and manufacturing sectors, exports are not expected to increase dramatically considering the predominance of agriculture export items and the inexperienced manufacturing sector. Imports will also remain high, given the large share of consumption goods and limited possibilities for import substitution. The balance-of-payments deficit, therefore, should not improve significantly in the medium term.

Exports:

Agriculture has clearly dominated the export market. Three agricultural products account for 74% of export earnings (1985): coconut, taro, and cocoa. Coconut is by far the leading crop accounting for over half (53.5%)

of exported products. Where it was once primarily exported in the form of copra, it is increasingly processed into coconut oil and coconut cream. Bananas, once a major export, are no longer significant. Other exports include timber and veneer.

New Zealand has traditionally been Western Samoa's greatest export market. In 1984, it accounted for about 25% of total exports, followed by the U.S. (20%), Australia (13%) and the Federal Republic of Germany (18%).

Imports:

From 1982-84 imports have averaged about \$50 million. The estimated figure for 1985, \$51.2 million, is still more than three times export earnings.

Manufactured goods, food, live animals, fuel, machines, and transport equipment are the leading import commodities. Although the sources of imports have become more diversified in the past few years, most import items come from only a few countries. In 1984, Australia, Japan, New Zealand, and the United States together accounted for about three quarters of the total imports. The People's Republic of China, Fiji, and Singapore supplied the remainder.

External Debt:

Western Samoa had an external debt of \$62.6 million at the end of 1985. The debt-service ratio of 34.3% was down from 45.6% of the previous year.

1.16 Population

The last census was taken in November 1981, at which time there were 156,349 people; 43,150 on Savai'i and 113,199 on Upolu and adjacent islands. Apia, the sole urban area, had 33,170 people, or 21.2% of the total population.

The government estimate for the 1987 total population is 182,200, of which 41% are aged 0-14 years, 56% are aged 15-64 years and 3% are over 65 years. A steadily declining fertility rate has caused a relative decline in the youngest age group.

Western Samoa has a high rate of emigration, 16.8 people per 1,000 per year, which occurs primarily among young Samoans. Almost 200,000 Samoans live in New Zealand, Australia, and the U.S., a population even greater than that in the country itself. An additional 10,500 work in nearby American Samoa. The large number of emigrees is partially attributed to the growing pressure for employment. Although agriculture is still a primary employer, jobs in agriculture have fallen off. While manufacturing and service industry employment has risen, it is insufficient to fill the gap. Moreover, the growing 15-64 year age group has increased the demand for employment.

1.17 Health

Overall health has improved in recent years and is generally good. The infant mortality rate has dropped to 33 per 1,000 (1986) and life expectancy at birth has risen to 65 years. Immunization coverage has increased tremendously in the past decade. An immunization program was begun in 1980 with the goal of immunizing all children under 2 years old against childhood diseases. By 1984, an estimated 84% of the children had been immunized, versus 29% in 1979.

Diseases of the circulatory system are the primary cause of death. As the nutritional intake has changed with a modernization of the diet, cardiovascular diseases are becoming more prevalent. In many rural areas, the water supply is not clean, leading to the prevalence of gastrointestinal infections. These infections are a major cause of morbidity and mortality among children. Influenza is also very common. Tuberculosis and leprosy incidence have declined with improved control measures.

The prevalence of filariasis began to increase in 1980, but then dropped again in 1982 after mass drug administration.

Most health services are in the public sector and are administered under the authority of the Health Department. (For more information, see 3.5).

1.18 Education

Education is administered by the Department of Education and is compulsory and free for children aged 7 through 15. The system is based on the New Zealand system, and is divided into primary, intermediate, and secondary levels. There is also a primary teachers' college, a secondary teachers' college, and a school of Tropical Agriculture in Alafua which offers a degree course in agriculture. The agriculture school is currently affiliated with the University of the South Pacific, although in 1983 negotiations were begun to repossess the Alafua campus and establish an independent national university.

In addition to the government schools, there are church-run schools. Churches also operate theological seminaries which have trained pastors to serve in local churches and in other countries.

Instruction is in Samoan in primary school, with an introduction to English. In intermediate school, instruction is in English and Samoan is taught as a leading subject.

1.19 Communications

Radio:

All internal and external communications are under the authority of the Postal and Radio Department. It controls the Western Samoan Broadcasting Service, commonly referred to as 2AP, which broadcasts in English and Samoan 17 hours per day. Programs consist of entertainment, news, agriculture reports, school programs, and Legislative Assembly sessions; advertising is also accepted. The service also broadcasts telegrams to listeners in isolated villages not served by phone. Approximately 70,000 receivers

(1983) are in use throughout the islands. Of the shortwave radio broadcasts, the reception for Radio Australia is the best. BBC and VOA are clear at certain times.

Television: Western Samoa does not operate a television station, but WVUV and the American station, KVZK-TV are well received. There are an estimated 2,500 television sets (1983) in the country.

Telephones: There were 6,037 telephones in Western Samoa in 1984. Apia is served by an automatic telephone exchange; a manual exchange operates in rural areas.

1.20 Transportation

Roads: Western Samoa has more than 1,800 km of roads, of which 396 km are main roads, and 267 km are bitumen surfaced. Over 1,000 km are plantation roads.

Air: Two airfields serve the island of Upolu. The country's international airport is at Faleolo, about 40 km from Apia. A 623 meter airstrip at Fagali'i, about 4 km east of Apia wharf, is used by light planes.

Scheduled international flights provide service to Australia, American Samoa, Cook Islands, Fiji, French Polynesia, Nauru, Niue, New Zealand, and Tonga. Daily service between Apia and Pago Pago permit easy additional connections with flights serving American Samoa.

Ports: The Marine Department administers ports in Western Samoa. The principal, deep-water wharf is at Apia. A second deep-water port, located at Asau, is used primarily for timber shipments. Ferry service operates between Savai'i and Upolu, using Mulifanua and Salelologa as connecting points.

2. Disaster Vulnerability

2.1 Physical Environment

Western Samoa lies between 13° and 15°S latitude and 171° and 173°W longitude just to the east of the international dateline. The country's nearest neighbor, American Samoa, lies about 125 km to the east. Tonga's northern islands are 200 km to the south and Fiji is over 600 km to the southwest.

The Western Samoan islands consist of two main islands, Upolu and Savai'i, and several smaller ones, covering a total land area of 2,934 sq. km. Of the smaller islands only Manono and Apolima, located between Upolu and Savai'i, are inhabited. There are also five uninhabited islands off the coast of Upolu.

The islands were volcanically formed and are rugged, with level land only in coastal areas. Savai'i has a central core of volcanic peaks ringed by plateaus, lower hills, and a coastal plain. The highest peak, Silisili, rises to a height of 1,858 meters on the island of Savai'i. Upolu, less rugged, has a chain of peaks that run from one end of the island to the other, reaching a maximum height of 1,100 meters. The islands are ringed by coral reefs and shallow lagoons. An opening in the reef along Upolu's north-central coast is the country's major port and the location of the capital city Apia. Because the interior of the islands is rocky, thickly vegetated, and tends to be hot and humid, Samoan villages have traditionally been located in coastal areas.

The rocky islands have a thin covering of fertile soil which supports lush natural vegetation, but is readily exhausted by farming. A large part of Western Samoan land is used for agriculture and forestry purposes, which breaks down as follows:

| | |
|-------------------------------------|------------------|
| Tree crops (coconut, cocoa, banana) | 76,950 hectares |
| Food crops - taro | 2,025 hectares |
| - vegetables and fruits | 1,012 hectares |
| Forests | 162,000 hectares |

The tree crops are most likely to be damaged by strong winds, whereas vegetable crops are more easily affected by flooding. All crops are susceptible to drought but some of the traditional foods, such as wild yams and some mangoes are drought resistant.

The rivers which drain the highlands are short and swift, making them unusable for transportation but valuable for hydroelectric power. Water easily penetrates the porous soils and rocks; thus water sources are unreliable. Coastal wells are the only water source for much of the population.

Climate

In Western Samoa, wet and dry seasons add variation to a climate which has unusually constant temperatures. Two-thirds of the average annual rainfall (2870 mm/year) falls during the wet season, from October to March. The mean monthly temperature (26°C) varies less than 1°C. Southeast tradewinds prevail, although occasionally northerlies are present. The tradewinds cause more rainfall on the eastern and southern parts of the islands.

2.2 Cyclones

Serious cyclones are rare in Western Samoa because the nation is east of the main cyclone zone. According to records from 1939 to 1969 (Kerr, 1975) an average of two to three tropical storms and cyclones affect Western Samoa each year. Destructive tropical storms occur at a frequency of one or two per decade. They can occur any time between November and March although the highest incidence has been in January and March.

2.3 Earthquakes

Earthquake activity in Western Samoa is high, although earthquakes are seldom of a sufficient magnitude to cause severe damage. Annually, there are an average of 15 earthquakes of a magnitude great enough to be felt (4 to 6 on the Richter Scale). Historical records indicate that major earthquakes measuring greater than 8.0 R occur approximately twice each century.

The last severe earthquake, in 1917, measured 8.3 on the Richter Scale. The epicenter was only 60 to 80 km from Samoa and the tremors lasted for two minutes. The tremors damaged buildings, provoked landslides, and caused high seas to flood houses and plantations. In recent years, large earthquakes struck in 1975 (7.2 R) and 1981 (7.5 R), neither of which caused extensive damage.

The majority of the tremors that affect Western Samoa emanate from epicenters in the Tonga-Kermadec Trench. The northern termination of this trench, about 250-300 km to the southwest, is known as the Samoa Corner. It is characterized by a complicated mixture of thrust-faulting, hinge faulting, and strike-slip faulting within a relatively small area as well as a crowded nest of shallow earthquakes (See Figure 1). The Samoa Corner is the source of the largest earthquakes in the entire subduction zone (Tonga-Fiji-Vanuatu area).

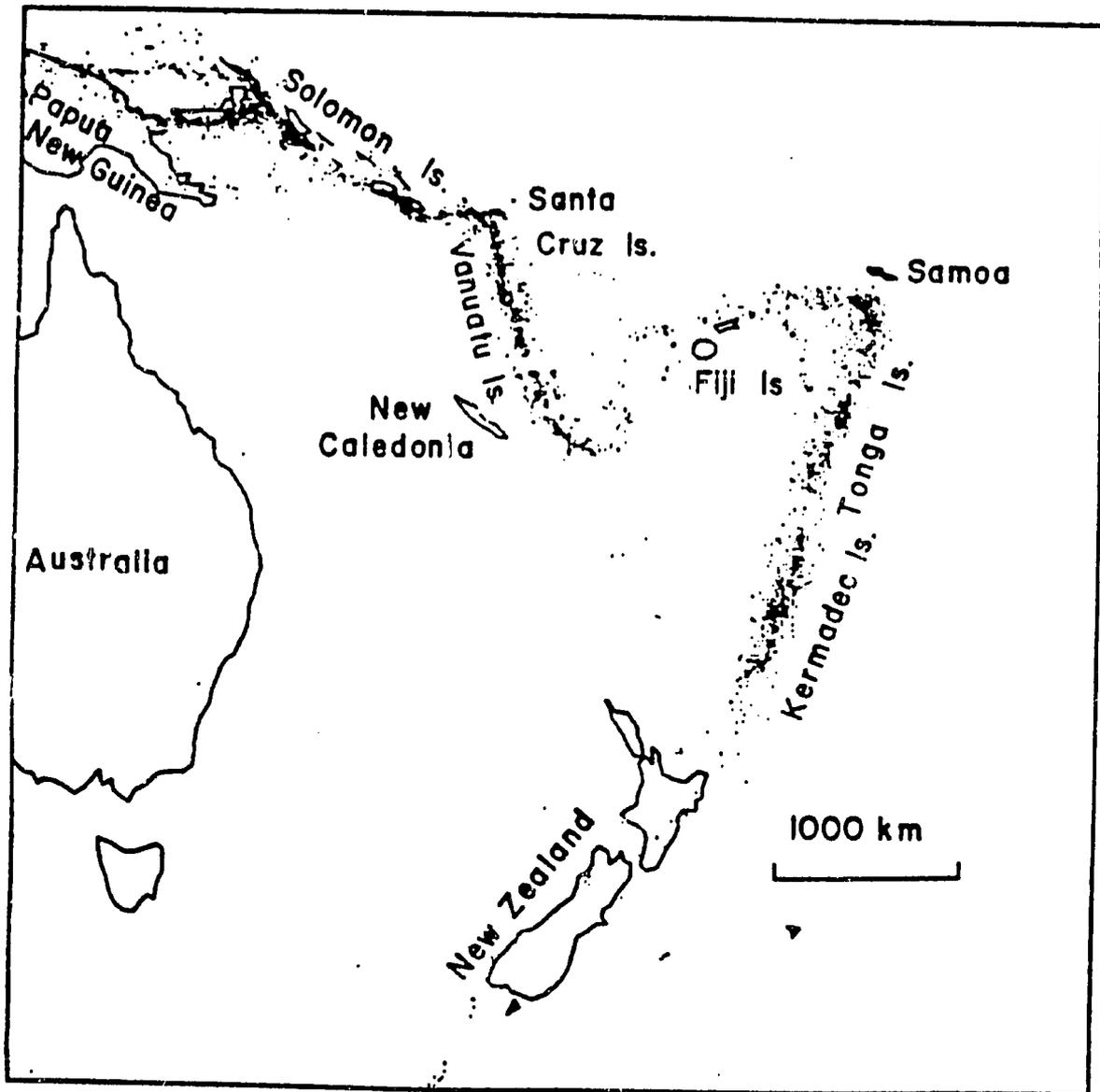


Figure 1. Shallow earthquakes (depth ≤ 70 km) located by the Worldwide Standardized Seismograph Network, 1961-1979.

Source: "Evaluation of Seismic Risk in the Tonga-Fiji-Vanuatu Region of the Southwest Pacific." Cornell University, Department of Geological Sciences, 1984.

In 1978 the Office of U.S. Foreign Disaster Assistance began funding a team of Cornell University seismic experts to undertake an evaluation of seismic risk in the Tonga-Fiji-Vanuatu region. The Cornell project included a detailed examination of the seismicity of the Samoa Corner over a period of eight years.

2.4 Tsunamis

One of the more serious consequences of earthquakes to many Pacific Island nations is the generation of tsunamis. Western Samoa has been affected by tsunamis originating in Central and South America, the Aleutian Islands, Japan, Kamchatka (U.S.S.R.), and the Philippines. Near-distance tsunamis generated by geologic movement along the Tongan Trench are potentially more serious because they arrive too quickly to issue warnings. (See Figure 2).

The force of the tsunamis is often mitigated by the protection of off-shore reefs which surround the islands. The land is most vulnerable in places where there is no reef or it is close to shore. The most damaging would be those arriving at high tide.

According to the International Tsunami Information Center, 60 tsunamis were recorded in Samoa between 1837 and 1980. Disastrous ones have occurred twice in this century. On June 26, 1917, a shallow tsunami with its epicenter just southwest of Western Samoa caused widespread damage along the southern shores of Upolu and Savai'i. A tsunami originating in Kamchatka on November 5, 1952, affected the northern shores of both islands.

2.5 Volcanoes

All of Western Samoa's mountains are of volcanic origin and several volcanoes are considered to be active. In historic times there have been eruptions on Savai'i in 1760 and from 1905 to 1911. In the latter eruption, Mt. Matavanu erupted intermittently, covering cultivated land with lava flows. Two villages were destroyed and the inhabitants had to be resettled on Upolu.

2.6 Floods

Torrential rains often accompany tropical cyclones and cause flooding. The greatest downpours may occur on the sides of mountains as storms are forced up over the higher elevations.

Recent storm-associated floods occurred in November 1974, January 1975, December 1976, and February 1982. In 1974, the northern slopes of both islands received concentrated rainfall. The floods that followed particularly affected Upolu, from Apia to Fagaloa. Landslides occurred in all valleys east of Apia. Constant rainfall over a period of nine days in 1975 caused extensive damage in Apia and surrounding areas. In 1976, storms produced heavy rains, primarily affecting eastern Upolu.

The worst floods in recent years followed exceptional rainfall in February 1982. Over a five-day period 670 mm of rainfall were recorded in Apia and 1,014 mm at Afiamalu in the hills to the south of Apia. Floods caused severe damage to property, roads, pipelines, and a bridge. The greatest hazard associated with the floods was polluted water from sewage which covered a section of Apia and posed a health hazard.

2.7 Drought

Droughts are frequent and usually minor, although prolonged droughts do occur. The western part of Upolu Island and Savai'i Island are the most vulnerable. In 1983 the worst drought on record affected Apia and northern Western Samoa in general. There were widespread water shortages in the higher elevations of Apia and the west coast supply areas.

2.8 Disaster History

Table 1
Selected Disasters (since 1900)

| <u>Type</u> | <u>Date</u> | <u>Location</u> |
|-------------|-------------|---------------------|
| Volcano | 1905-1911 | Mt. Matavanu |
| Earthquake | 06/26/17 | Entire country |
| Tsunami | 06/26/17 | Southern shores |
| Flood | 00/00/31 | Apia |
| Storm | 01/00/39 | Upolu |
| Tsunami | 11/05/52 | Northern shores |
| Earthquake | 04/14/57 | Entire country |
| Windstorm | 06/13/64 | |
| Cyclone | 01/29/66 | Entire country |
| Cyclone | 02/10/68 | Entire country |
| Flood | 11/00/74 | Northern Upolu |
| Flood | 01/00/75 | Apia |
| Flood | 12/00/76 | Eastern Upolu |
| Earthquake | 09/01/81 | Entire country |
| Tsunami | 09/01/81 | Southern coasts |
| Flood | 02/00/82 | Apia; central Upolu |
| Fire | 09/00/83 | Northwest Savai'i |
| Drought | 07-12/83 | Northern region |

3. Disaster Preparedness and Assistance3.1 Host Country Disaster Organization

The Constitution defines responsibility for the proclamation of an emergency, such as a natural disaster. An emergency is declared by the Head of State acting after consultation with the Cabinet. Thereafter it is brought before the Legislative Assembly. The proclamation allows the Head of State to issue emergency orders to secure public safety and essential supplies and services. The emergency may remain in force for up to 30 days.

Prior to 1986 the government had no disaster plan. In the event of a disaster, the first initiative was taken by the police commissioner who would convene an informal committee of the directors of the departments of Health, Transport and Public Works. This group would meet as necessary to coordinate relief.

In May 1986 a National Disaster Plan was completed and approved by the Cabinet in a vote taken that same month. The plan outlines the organizational structure of disaster planning and response (shown in Figure 2) and defines the responsibility of various government entities. It also calls for a National Disaster Management Office (NDMO) with a full-time disaster preparedness coordinator.

Under this new plan, the National Disaster Council (NDC), which is responsible to the Prime Minister, is the national coordinating body for disaster planning and response. Its responsibilities include coordinating disaster planning, organization, preparedness, operations, relief, rehabilitation, and mitigation. The activities of other government departments and agencies, districts, and non-governmental organizations are coordinated by the NDC.

The NDC is composed of the following members:

Secretary to Government (Chairperson)
Police Commissioner (Controller of Disaster Operations)
Attorney General
Financial Secretary
Director of Agriculture
Director of Health
Director of Public Works
Director of Education
Secretary, Department of Transport
Chief Government Information Officer
Superintendent, Apia Observatory
Chairperson, Rural and Internal Affairs Committee
Chief Fire Officer
Secretary, National Council of Women

Chairperson, Voluntary Organizations Disaster
Relief Planning Committee
President, Western Samoan Red Cross Society
National Disaster Management Officer (Executive Secretary)

The NDC may include additional members if the situation warrants their expertise. The NDC may also appoint special task forces as necessary.

Within the NDC is the Central Control Group, consisting of representatives of the Public Works, Transport, Health, and Finance departments. The police commissioner serves as the controller of the group. This group ensures that resources are allocated to operational tasks effectively.

Each district maintains a Pulenu'u Disaster Team. Under the direction of a team leader and deputy team leader, members are responsible for shelters, emergency feeding, clothing, first aid, damage assessment, and communications. At the local level, each village has a Village Action Team with an identical composition.

When emergency operations are required the NDC will activate the National Emergency Operations Center (NEOC) at the Police Headquarters in Apia. The role of the center is to circulate information relevant to disaster operations, to coordinate personnel and equipment deployment, to issue decisions made by the Prime Minister, and to keep records. Between disasters, the NDMO is responsible for maintaining contacts so that requests for assistance can be handled effectively when emergencies arise.

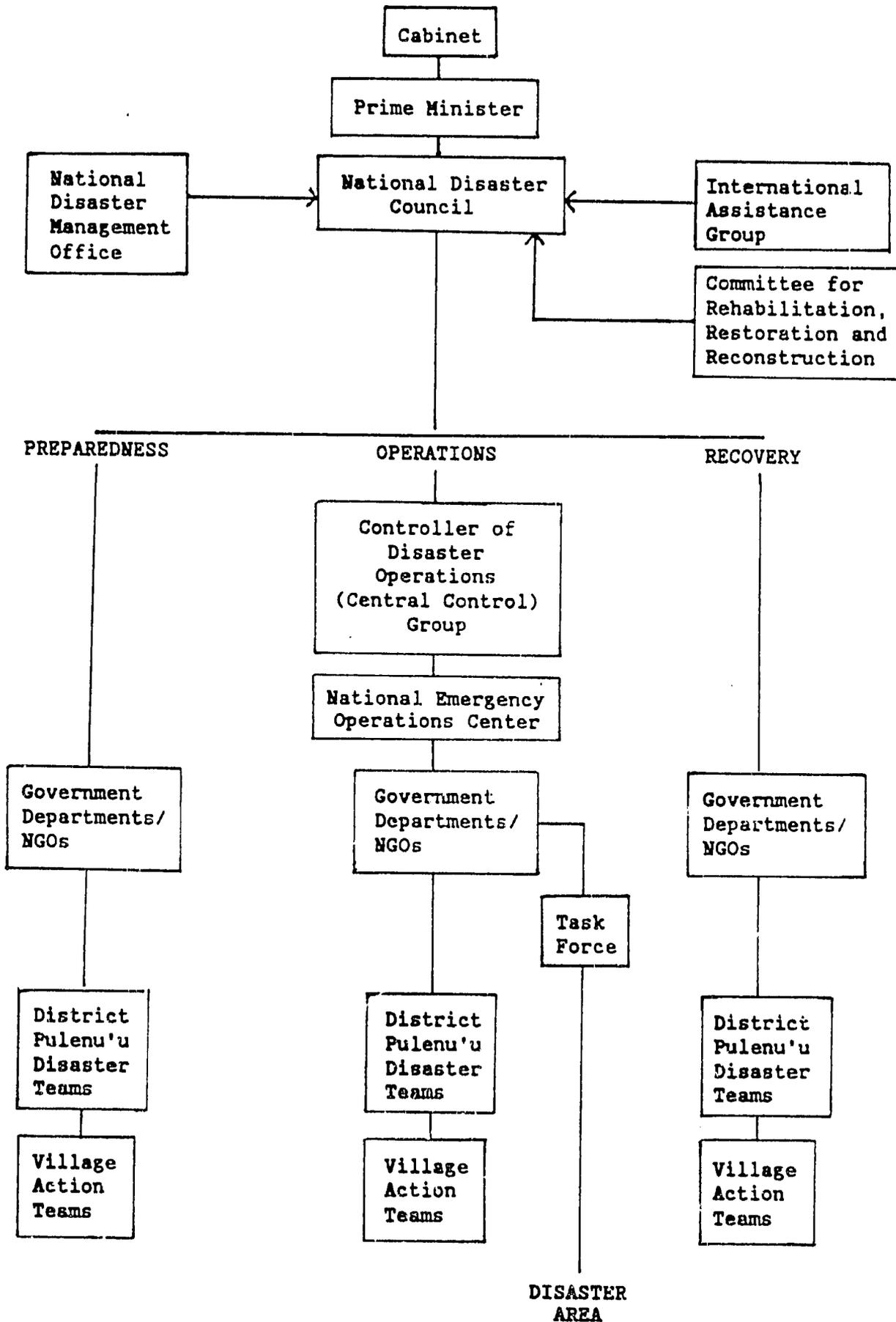
As the plan has been designed, when a disaster strikes, district officials will try to cope with the situation. If necessary, additional resources will then be mobilized and co-ordinated from the national level to support the affected district(s).

The Prime Minister initiates national disaster operations when circumstances indicate they are necessary (usually on the advice of the NDC). The Prime Minister then delegates most routine operational matters to the NDC. The NDC makes arrangements for survey and assessment, arranges for support personnel and equipment, and coordinates international assistance. The Central Control Group assembles and takes up its duties. The controller may delegate some responsibilities to District Pulenu'u Disaster Teams. The NDMO carries out disaster management as directed by the Chairperson of the NDC.

Requirements for international assistance are coordinated by the NDC in cooperation with the International Assistance Group (IAG). The IAG is chaired by the Secretary to the Government and is composed of the Police Commissioner, the Chief Immigration Officer, the Comptroller of Customs, and the National Disaster Management Officer. Members of potential donor agencies, the Western Samoa Red Cross, diplomatic missions and the U.N. may also participate. The group serves to assist the Prime Minister and the NDC on disaster-related international

Figure 3

Organizational Structure of Disaster Management



assistance. Formal requests for assistance are to be transmitted to assisting countries and organizations by the Prime Minister's Department. Tasking of overseas operational support units such as helicopter surveys is normally the responsibility of the Central Control Group. The Ministry of Finance handles accounting for overseas assistance.

The National Disaster Plan clearly describes Western Samoa's organizational structure for disaster planning and response. The system is new and untested, however, so the authors do not know how well it will work or what changes may be needed.

3.2 Host Country Voluntary Agencies

The Government of Western Samoa strongly encourages non-governmental organization (NGO) participation in disaster activities and has included them in the National Disaster Plan. As shown in Figure 2, NGOs, play a role in preparedness, operations, and recovery.

DSO

At the request of the Prime Minister's Office the Disaster Support Organization (DSO) was formed in July 1986 as the coordinating body for disaster preparedness and response by NGOs. Representatives of NGOs in Western Samoa met in September 1986 to discuss DSO's role in disaster response and identify its structure and function. At that time, they prepared an initial draft of a DSO Plan which outlined DSO objectives, organization, procedures, and resources. Exact responsibilities and coordination with the national and local governments remain to be clarified.

VODRPC

Prior to the formation of DSO some 60 NGOs were organized under the Voluntary Organization Disaster Relief Planning Committee (VODRPC). It was created in 1982 after severe flooding had occurred and included churches, service clubs, and the Peace Corps. VODRPC was named in the National Disaster Plan as the organization that the national government would use as its contact with NGOs. It is unclear whether VODRPC will continue to function after DSO becomes operational, however.

VODRPC has been particularly active in preparedness projects. In July and October 1985, VODRPC helped set up disaster simulation exercises, a plane crash and a sea rescue. A crew from a New Zealand naval ship assisted in the operation and acted as a "referee". In July, VODRPC also arranged for a New Zealand Air Force helicopter to be available and, working together with government officers, learned how to conduct medical evacuations. Further national disaster exercises were planned for September 1986, again with the help of New Zealand.

VODRPC launched a campaign a few years ago to improve public education in disaster preparedness. The campaign included the preparation of a disaster preparedness manual for school children, a national poster competition, and public education in the form of radio programs.

VODRPC has also been active in relief activities. After the 1983 fires in northwest Savai'i, the GOWS tasked it to provide rations to 500 people for a period of six months. The food was provided by the Australian Overseas Disaster Response Organisation (AODRO), Seventh-Day Adventists, and Rotary.

Western Samoa Red Cross Society (WSRCS)

The Western Samoa Red Cross Society (WSRCS) has its headquarters in Apia and an office at Salelologa on Savai'i. An additional office is planned for the western part of Savai'i. In a disaster, WSRCS supports government efforts and usually performs tasks such as providing first aid and tracing missing persons. In past disasters, such as the bush fire in 1983, WSRCS supplied food.

Churches

Several churches are also involved in disaster relief activities, including the Congregational Christian Church, Methodists, Catholics, Mormons, and Seventh-Day Adventists. These church groups usually provide assistance at the village level since they are normally already established and have a network in place. They are likely to provide food, clothing, and shelter.

3.3 Warning System

Tropical Cyclone and Storm Warnings

Tropical cyclone and storm warnings are issued from the Tropical Cyclone Warning Center in Nadi, Fiji, maintained by the Fiji Meteorological Service. The Center is the World Meteorological Organization (WMO) designated warning center for the area from the equator to 25°S, and from 160°E to 140°W. It has advanced cyclone tracking and prediction capabilities and issues warnings when cyclones appear to be forming in the region. Periodic progress reports continue to be issued as necessary.

The Superintendent of the Apia Observatory issues warnings under four classifications: Class A - strong winds, Class B - gales, Class C - storms, and Class D - hurricanes. When warnings are issued, the information is passed to those listed in Table 2. Warnings are disseminated to the public via Radio 2AP. If the NEOC is in operation, warnings must be approved prior to broadcast. Radio 2AP remains on the air full-time as required.

Table 2
Warning Relay Organization

| <u>Warnings issued to:</u> | <u>Responsibility</u> |
|--|---|
| Secretary to Government | Inform Prime Minister, NDC Chairperson, Police Commissioner, Minister for the district concerned, and all agencies |
| Broadcasting: Director of Broadcasting, Chief Government Information Officer, Duty Officer 2Ap | Broadcast precautions; maintain continuous hourly broadcasts |
| Apia Radio (Supervisor) | Advise Telecommunications Controller; maintain continuous Nadi/Apia circuit; schedule extra communication with weather stations; broadcast to ships |
| Telephone Exchange | Supply warning information to all who make telephone inquiries |
| Police (Police Chief) | Provide messenger warnings outside Apia |
| Fire Officer | Warn populace by long blasts on fire siren; inform departments |
| Airport Manager | Inform all concerned with aviation; inform vessels at Mulifanua wharf |
| Aviation Coordinator | Inform aviation offices |
| Transport Officer | Dispatch transport to: Station 2Ap, Harbor Master, Apia Observatory, Apia Radio |
| Secretary, Chamber of Commerce | Notify commercial establishments |
| Secretary, Public Service Commission | Inform departments |

Source: Disaster Preparedness and Disaster Experience in the South Pacific. Pacific Islands Development Program, East-West Center, August, 1985.

Earthquake Warnings

Apia Observatory, located at the end of the Mulinu'u Peninsula about 2.5 km from Apia, was established by the Germans in 1902 and was one of the earliest seismic stations in the Pacific. Since its inception seismographs have provided reliable and continuous seismic information. In 1957, the Weichert seismographs were replaced by Wood-Anderson instruments. Since 1963, the Observatory had been operated jointly by the Samoan Government and the Department of Scientific and Industrial Research (DSIR), New Zealand. In 1979, a simple strong motion accelerograph was installed (see Figure 4). It is a low-gain seismograph that is triggered by seismic events of a sufficient magnitude. As of the end of 1984, only one event had triggered the instrument.

There is also a Worldwide Standard Seismographic Station at Afiamalu, about 10 km inland from Apia. It is part of the USG geodetic and seismographic survey network. Digital recording equipment was added in 1980 to upgrade the station to the status of Global Digital Seismic Network station. Seismic records are permanently stored at DSIR in Wellington.

Regional seismic monitoring is improving. A new seismograph station in Tonga will substantially improve earthquake location in the "Samoa Corner" of the Tonga Trench. Seismic data from Western Samoa and other stations in the region are improving earthquake hazard assessment and mitigation efforts.

Tsunami Warnings

Tsunamis warnings are not possible for locally generated tsunamis. Warnings of tsunamis of a distant origin are received through the Pacific Tsunami Warning System based in Hawaii. The Apia Observatory maintains two tide gauges as a part of this system.

3.4 Mitigation Efforts

In the past, Western Samoa has taken some steps to eliminate or reduce the effects of certain disasters and to prepare the population for others. For example, it is expected that completed and currently planned projects to improve drainage and water supply will mitigate future flooding, particularly in the Apia area. Housing codes have been instituted so that houses should better withstand cyclones, storms, and possibly earthquakes. Other activities are intended to educate and inform the public. Modest educational materials have been distributed through schools and public agencies. Radio programs have also been produced.

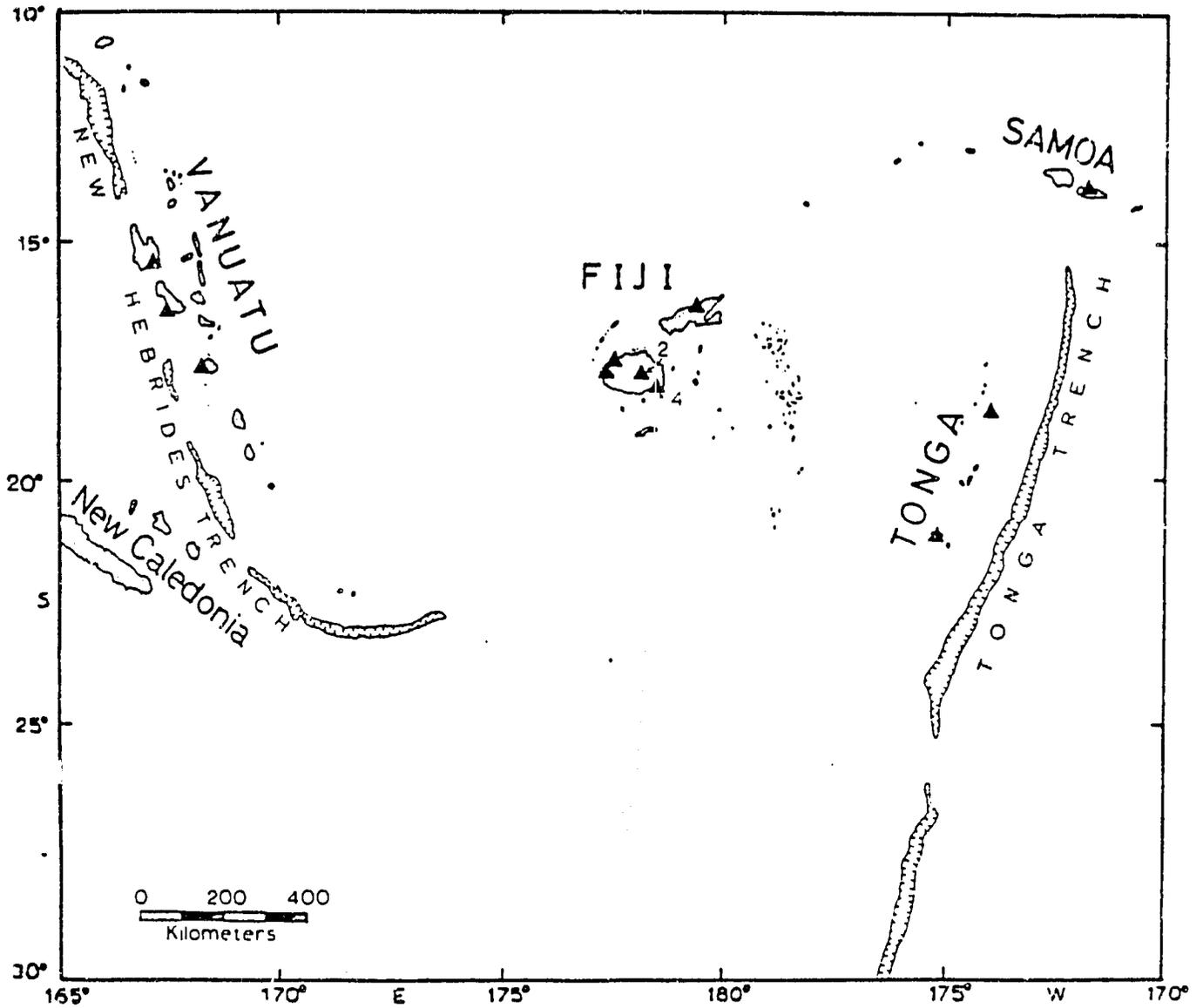


Figure 4. Regional network of accelerograph station. Triangles indicate strong-motion accelerographs.

Source: "Evaluation of Seismic Risk in the Tonga-Fiji-Vanuatu Region of the Southwest Pacific." Cornell University, Department of Geological Sciences, 1984.

Western Samoa is connected with international tsunami and cyclone warning systems (See 3.2 Warning System). If warnings are received and disseminated quickly enough, some of the effects of these natural events may be reduced. Earthquakes and near-centered tsunamis could strike without warning, however, and only preparedness activities may be appropriate. Good historical information on the Savai'i volcanoes is lacking and further research to assess the risks of volcanic eruption is needed.

Mitigation and preparedness activities have been haphazard. The new National Disaster Plan, however, calls for mitigation and preparedness activities to be co-ordinated through the NDC. Because the plan has just recently been developed, specific programs have not yet been formulated.

3.5 Health

Health care is provided through a hierarchical system which includes one national hospital, seven district hospitals, nine health centers, and fourteen sub-centers. Figure 5 shows the location of some of these health facilities. Each village also has a women's committee to promote health activities in the local community. The national hospital at Apia has 335 beds and provides service for the residents of the capital as well as taking referrals from the rest of the country. District hospitals have been expanded and it is hoped that this will relieve some of the burden from the national hospital.

In 1983, the number of hospital beds available in the country was 1,029. Table 3 is a breakdown of this number by health district. (Upolu, Savai'i, Manono, and Apolima comprise 230 villages which are subdivided to form health districts - six in Savai'i and 9 in Upolu.)

There were 46 physicians in the public service in 1983 and five in private practice. The doctor to patient ratio is approximately 1:3,000. Additional medical staff includes 300 registered nurses in government health service (1983), 182 student nurses and aides (1982), and 31 dental personnel (1982). The shortage of skilled personnel is a major constraint in providing health care. Physicians and many other health care professionals must be trained overseas, and many do not return after the completion of their courses.

Western Samoa operates under a Bulk Drug Purchase Scheme. Medicines are regularly purchased from overseas so that a two-month supply of four major vaccines is maintained at the laboratory at the National Hospital in Apia where cold storage facilities are available. District hospitals, health centers, and sub-centers have kerosene-burning refrigerators for vaccine storage. If an epidemic occurs, Fiji is asked to supply drugs. An expanded immunization program (EPI) is in operation, with drugs and refrigerators supplied by UNICEF.

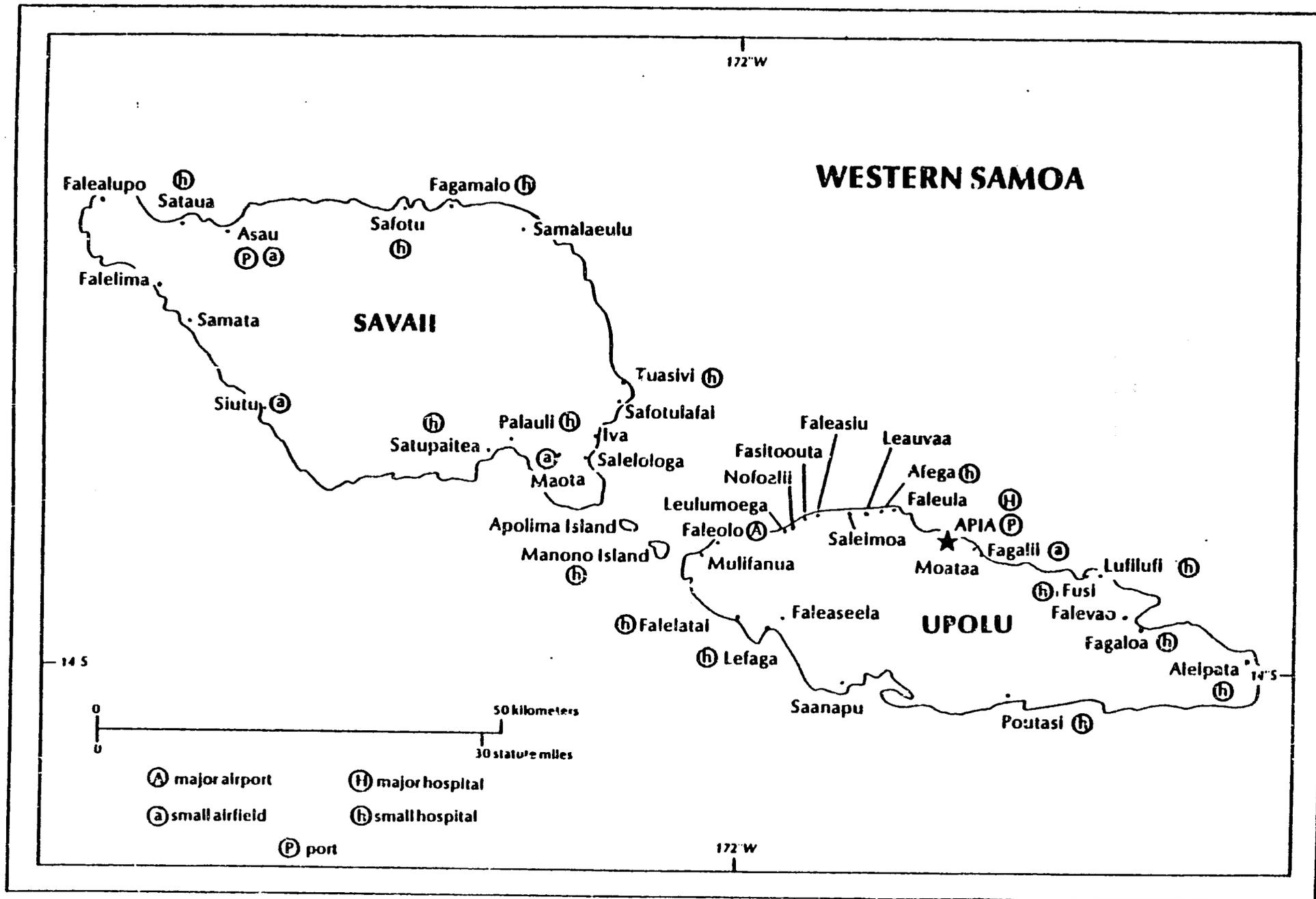


Figure 5. Airport, hospital, and port facilities.

Source: *Disaster Preparedness and Disaster Experience in the South Pacific*, PDDP, East-West Center, Honolulu, 1982.

Table 3
Number of Hospital Beds and Estimated Population Served in 1983,
By Health District

| <u>Health District</u> | <u>% Dist. of pop</u> | <u>1983 Est. pop</u> | <u># of Beds</u> | <u># of Beds per 1,000 people</u> |
|------------------------|-----------------------|----------------------|------------------|-----------------------------------|
| <u>Apia Area</u> | 29.1 | 45,978 | 335 | 7.3 |
| <u>Upolu</u> | 43.6 | 68,888 | 199 | 2.9 |
| Afega | 9.2 | 14,536 | 25 | 1.7 |
| Aleipata | 4.9 | 7,742 | 24 | 3.1 |
| Leulumoega | 8.4 | 13,272 | 20 | 1.5 |
| Falelatai/ Manono | 5.2 | 8,216 | 30 | 3.7 |
| Lefaga | 2.4 | 3,792 | 24 | 6.3 |
| Fusi | 4.6 | 7,268 | 26 | 3.6 |
| Lufilufi | 4.9 | 7,742 | 10 | 1.3 |
| Fagaloa | 1.0 | 1,580 | 10 | 6.3 |
| Poutasi | 3.0 | 4,740 | 30 | 6.3 |
| <u>Savai'i</u> | 27.3 | 43,134 | 148 | 3.4 |
| Fagamalo | 2.4 | 3,792 | 20 | 5.3 |
| Foalalo | 4.4 | 6,952 | 10 | 1.4 |
| Safotu | 3.5 | 5,530 | 24 | 4.3 |
| Sataua | 4.8 | 7,584 | 20 | 2.6 |
| Satupaitea | 4.6 | 7,268 | 24 | 3.3 |
| Tuasivi | 7.6 | <u>12,008</u> | <u>50</u> | <u>4.2</u> |
| Totals | | 270,022 | 1,029 | 3.8 |

Source: Ministry of Health Annual Report, 1983.

A network of radio telephones connects the hospitals and centers in remote areas to the National Hospital in Apia. Severe medical cases that cannot be handled at the National Hospital are medivaced overseas, commonly to New Zealand. The local Red Cross usually helps with medivac cases.

Severe injury from flying debris and drownings are the most common cause of death in cyclones or flooding disasters. Dengue fever apparently is not a concern after these types of disasters. The last major outbreak of Dengue occurred in 1968.

Vector control is the responsibility of the Ministry of Health. Control programs are underway to prevent filariasis as well as to control mice, rats, and other vermin.

The Western Samoa Fifth Development Plan, 1985-1987 includes plans to improve health care. The plan calls for expanding dental services, establishing a health information system, obtaining equipment for the new national laboratory, and improving health education.

3.6 Water Supply and Sanitation

Water Supply

Water is obtained from a variety of sources, including streams, springs, bores, and roof catchments. Coastal springs were traditionally the primary source of water, but most are now polluted or saline. Good surface water is not available at the western end of each island due to geologic conditions. Western Upolu relies on bore water; on Savai'i, even bore water is too saline and unusable.

The type of water supply used on the two islands is shown in Table 4. Although 95% of the population receives water from a piped supply system, actual service is not good. Many people must go without water for a portion of the day, often the daytime hours. Breakdowns in pumps and pipelines may cut off supply for several days at a time.

Table 4
Water Supply 1984
(percentages)

| | <u>Savai'i</u> | <u>Upolu</u> | <u>Total</u> |
|-----------------------|----------------|--------------|--------------|
| Pumped and piped | 40 | 30 | 32 |
| Gravity and piped | 52 | 66 | 63 |
| Rainwater and springs | <u>8</u> | <u>4</u> | <u>5</u> |
| | 100 | 100 | 100 |

One of the reasons for inadequate water delivery is excessive leakage within the system, which reduces supply 50% or more. The design of the system also makes it easy to interfere with supply. Where the water distribution is in a linear design, villages close to the source may use or waste excessive amounts of water or close off valves, thus preventing villages further down the pipeline from getting their share. Vandalism has also contributed to the deterioration of the system.

Not only is supply a problem, but water quality is also inadequate. Surface water generally does not meet World Health Organization water quality standards. Contaminated water is the source of gastrointestinal infections causing diarrhea, particularly among infants and children.

The present system has become expensive for the government, which bears much of the cost. Due to increasing fuel prices, costs for pumped water schemes are going up.

Western Samoa's Fifth Development Plan (1985-87) includes plans to improve the water supply. One important project is the replacement of the Apia Water Supply Scheme. The existing system, established in 1920, draws water from the Vaisigano and Fuluason rivers. Because adequate storage and treatment facilities are lacking, water passes directly from the source into the distribution network. The Apia Water Supply Project, funded by West Germany, New Zealand and Saudi Arabia, is scheduled to begin in 1986 and be completed in 1989. New treatment plants and reservoirs will be built and existing reservoirs will be upgraded. Supply lines will be expanded or upgraded and individual house connections will be checked. A public education campaign will attempt to lower the high per capita consumption of water by encouraging conservation.

Other scheduled projects include drilling a new borehole to secure a better water supply to the national hospital. In rural areas, a UNDP project will establish bores and diesel pumps in the northwest area of Savai'i and on the west coast of Upolu. New bores will also be drilled at Sasina and Faleasiu and old ones rehabilitated at Sataua and Auala.

Sewage and Drainage

Drainage is not a problem in rural areas, but is confined mostly to certain areas of Apia. Existing drains have an inadequate capacity and are generally in poor condition. In particular, the Fugalei and Saleufi areas, Viatele Street, the Vaisigano River area, and Apia Park are susceptible to drainage problems. Apia's sewage system is also inadequate and poses a health risk. A master plan to improve both Apia's drainage and sewage system will be developed in conjunction with the Apia Water Supply project. A drainage scheme has already been instituted in Fugalei to ease the problem there.

3.7 Communications

There are two communication systems available to the police: a High Frequency (HF) long range link and a Very High Frequency (VHF) short-range system. HF equipment can link all police stations in the country. The antennae can be collapsed during a cyclone and the equipment can be moved and reinstalled in approximately one or two hours. Solar panels are used to charge the batteries. VHF equipment includes 30 mobile radios (for vehicles), 30 hand portable radios, and eight high

power base stations, available in the Apia area. There are also five amateur radio operators in the country who could assist with inter-island communications during a disaster.

Most local ships have radios, and a continuous radio link with Faleolo Airport is available. Distress frequencies for ships at sea are constantly monitored. The emergency frequency for radio telegraphy is 500 kHz. The normal working frequency is 483 kHz and 512 kHz is also available. For HF radio telephony, 2182 kHz and 621 kHz are monitored for distress calls. In 1979, Apia Radio's coast station 5WA was re-equipped with new HF and VHF transmitting and receiving stations, with remote control from the communications center in Apia. A VHF radio-telephone station was built at an elevation of 914 meters on Mt. Fiamoe in central Upolu.

The Postal and Radio Department is responsible for all internal and external communications. It maintains sub-post offices under the control of the Director of Post Office and Radio at Apia. The Central Radio Station in Apia is linked with eight radio outstations staffed by trained Samoan operators via radio-telephone and telegraph. It is also the primary link to overseas communications. Radio-telephone calls can be connected into the local telephone network.

Telecommunication facilities were expanded in 1979-1980. A new 4,000-line automatic telephone exchange and an automatic telex exchange were established. An INTELSAT standard B earth station plus a spur system from the earth station to the central telephone exchange provide direct dial telephone service and improved telex capabilities. The improved telecommunication services has fostered much greater demand.

The current system remains deficient in rural areas. Asau and Salelologa on Savai'i are especially in need of expanded services. Plans have been developed under the South Pacific Telecommunications Development Programme to establish an automatic telephone exchange for the Faasaleleaga District and Asau and to expand basic telephone services in rural areas to help alleviate the problem.

One constraint in telecommunication services has been the lack of qualified staff. Outside technical assistance has provided critical assistance in system operation. A training center established in 1977 has not been effective due to a shortage of instructors and materials. A program to upgrade instruction and improve selection of students for training was scheduled to begin in 1986.

3.8 Road Transport

Western Samoa has a road system which appears to adequately serve its needs. The longest road circles Savai'i; however only a small portion of it is paved. The longest paved road is on Upolu and extends

from Falelatai to Falefa Falls along the north and west coasts (see Figure 6). At the end of 1985, there were 4,537 vehicles in Western Samoa, 4,071 on Upolu, and 476 on Savai'i.

During the past decade the government has given priority to construction of roads in remote and isolated areas. The road network was expanded from 821 km in 1970 to 2,042 km in 1980. Approximately 78% of the increase was for access roads.

Under the Fourth Development Plan (1982-1984), the Savai'i South Coast Road, access roads to the Western Samoa Trust Estates Corporation (WSTEC) plantation, and other access roads were constructed. The focus of road projects was shifted from road building to maintenance of existing roads when many access roads were found to be in poor condition. Originally it was the responsibility of villages served by the access road to perform maintenance, but most of the work has now been assumed by the Public Works Department.

The current plan, the Fifth Development Plan (1985-1987), emphasizes repair and maintenance of the existing road network, including plantation access roads. It also calls for improvements in the airport road, built in 1973. The construction of a new airport at Faleolo brought heavy traffic and rapid deterioration of the surface. This project has a high priority and is scheduled to be completed in 1987.

3.9 Air Transport

Faleolo Airport is Western Samoa's international airport (See Figure 4). Located 32 km from Apia, it is connected to the town by the West Coast Road. The airport was originally established by the U.S. Marine Corps and was later used for civilian traffic. Between 1969 and 1973, the Faleolo Airport was reconstructed with a new runway adjacent to the old grass strip. New terminal facilities that furnish all major services were completed at the same time.

Due to increased tourism and freight handling requirements, the GOWS decided in 1983 to embark on a project to further extend the airport's facilities and runway. The total length of the extended runway will be 2,700 m, with construction to be completed in 1987. The terminal and freight buildings will also be expanded to cope with the expected increase in air traffic.

Fagalii on Upolu also has a small airstrip measuring 623 m. The airstrips on Savai'i at Asau Siutu and Maota are no longer functional.

Five regional airlines use Faleolo Airport: Polynesian Airlines, Air New Zealand, South Pacific Island Airways, Air Pacific, and Air Nauru. Polynesian Airlines provides domestic services in addition to its regional service.

3.10 Marine Transport

Table 5 lists the major shipping services to and from Western Samoa. Of the companies listed, the Pacific Forum Line is headquartered in Apia, offering regular services to other Pacific Islands, Australia, and New Zealand. Three tugboats are available at Apia: 460 HP, 400 HP, and 120 HP.

Samoa Shipping Services operates three vehicular/passenger ferries between Mulifanua and Salelologa.

Table 5
Shipping Services

| <u>Services connecting:</u> | <u>Company</u> |
|-----------------------------|--|
| Europe | Columbus/Bank Line |
| U.S.A. | Polynesia Line Pacific Islands Transport Line South Seas Shipping Line |
| Japan | Bali Hai Service Kyowa Line |
| Australia, New Zealand | Pacific Forum Warner Pacific Line |

3.11 Ports

Apia is the principal international port of Western Samoa and the only port of entry. The port is located on reclaimed land on a reef-protected natural harbor, situated at 13° 50'S and 171° 45.5'W. The single wharf constructed of reinforced concrete is 184.7 meters long and 13 meters wide. The approach channel is dredged to a depth of 11 meters. There is also a small ship berth 80 meters long and a mooring buoy for petroleum tankers. The port area has four main sheds. Forklifts are available but there are no wharf cranes. A project to improve facilities for handling containerized cargo is scheduled to begin during the latter half of 1987.

Apia port is well-protected from May to November, when southeast tradewinds are present. From November to March, winds come from the north and waves, swells, and surges enter the harbor.

A deep water wharf is located at Asau on Savai'i. It caters mainly to the export of timber from the local sawmill situated on Savai'i. Wharves are also located at Mulifanua (Upolu) and Salelologa (Savai'i) and are currently being upgraded. During the Fifth Development Plan, the entrance channels and turning basins at both wharves will be widened to accommodate the growth in traffic between the two main islands resulting from major developmental efforts on Savai'i.

3.12 Energy

Energy in Western Samoa is supplied by diverse sources: biomass, hydropower, solar power, and petroleum. Although imported petroleum is required to meet certain energy needs, the government has taken steps to increase self-sufficiency to fulfill energy requirements. By 1983, petroleum accounted for 29.8% of energy consumption, an 11% drop in five years (see Table 6). The use of biomass increased in that same time period.

The majority of households in Western Samoa cook with wood and coconut residues. Biomass is also used for copra drying and other industrial requirements. For example, coconut husks and shells are used to fire a boiler to supply energy to the Samoa Coconut Products Ltd. (SCPL). The Cocoa Board of Western Samoa has retrofitted diesel-fired driers with wood-fired hot-air generators.

The Electric Power Corporation (EPC), a government-owned corporation, is responsible for electricity. About 80% of Western Samoa's electricity comes through the EPC, with a small number of businesses supplying the remainder. Diesel generators are used to produce some of the electricity, but they are being replaced by hydropower and diesel supply electricity. Ninety-seven percent of the public power supply is generated on this island. Savai'i has a smaller diesel-based power system.

Hydropower has become an important source of electricity since the recent completion of a number of hydropower projects. The Samasoni hydro scheme (1,650 kW capacity) and the Fale Ole Fee project (1,560 kW capacity) were completed in 1983. The Sauniatu hydro, expected to be completed in 1985, would add another 3,500 kW of capacity. These hydro projects have made Western Samoa almost self-sufficient in electricity during the wet season. Hydropower output is variable because of rainfall patterns, however, and must be supplemented during the dry season.

A number of projects have been designed to improve dry season electricity capacity. The proposed Afulilo Hydroelectric Project will include the construction of a dam and a large reservoir in the Afulilo basin. The large water reservoir will help provide better dry-season electricity supply. Other projects rely on biomass to improve dry-season output. A wood-fuel steam project in the Tanumalala area is designed to draw on plantation and sawmill residues. Another project, scheduled to begin in 1986, will install a large-scale wood gasification plant with 750 kW capacity.

The Western Samoa Energy Committee (WSEC) reviews and approves energy policy measures. A working group (WSEC-WG) executes the decisions and the Energy Planning Unit (EPU) formulates policy and works with EPC.

Table 6
Summary of Energy Consumption (Terajoules)

| | <u>Electricity</u> | <u>Petroleum</u> | <u>Biomass</u> | <u>Total Energy</u> |
|------|--------------------|------------------|----------------|---------------------|
| 1979 | 310.7 (12.9%) | 986.5 (41.0%) | 1108.8 (46.1%) | 2406.0 |
| 1980 | 308.8 (11.5%) | 971.3 (36.0%) | 1412.9 (52.5%) | 2693.0 |
| 1981 | 297.8 (10.4%) | 865.1 (30.0%) | 1717.0 (59.6%) | 2879.9 |
| 1982 | 266.5 (9.4%) | 837.0 (29.3%) | 1749.0 (61.3%) | 2852.5 |
| 1983 | 271.4 (9.3%) | 866.7 (29.8%) | 1770.0 (60.9%) | 2908.1 |

Source: Western Samoa's Fifth Development Plan 1985-1987, Department of Economic Development, December 1984.

3.13 Housing

The primary threat to housing is from cyclones and earthquakes. New Zealand codes for earthquake resistant designs and fire prevention measures are applied to all new construction by the Public Works Department. Many of the older homes are not built to these standards, however. Moreover these standards were made for different tectonic, geologic, economic, and cultural conditions. If a storm should pass directly over Western Samoa or a large earthquake strikes, many homes may be destroyed.

Most village houses are built in the traditional Samoan style, known as "fales", or modifications thereof. Fales are built in two styles: the fale afolau is a long house, whereas the fale tele is round. They consist of a thatched roof supported by posts, with no permanent walls. The sides have pandanus mats that can be rolled down in the evening or during rainy weather. The platform is customarily made of stone which is then covered by finely broken coral or black pebbles. Woven mats cover the floor.

Current trends in housing construction employ modern materials to build variations of the traditional fale. Corrugated galvanized iron is used in place of thatch for roofs and concrete is poured for the foundation. Others have permanent walls in place. In Apia there are a few multi-story concrete buildings.

3.14 USAID Mission and Other USG Resources

The USAID program in Western Samoa is under the direction of the USAID/South Pacific Regional Development Office (SPRDO) located at the American Embassy in Suva, Fiji. In addition to Western Samoa, SPRDO administers the USAID program in nine other Pacific countries. SPRDO assistance is focused on agriculture, fisheries, health, and development administration. Training and private enterprise development are major themes in these programs. To date, the bulk of SPRDO assistance to the Pacific nations has been implemented indirectly through PVOs, regional organizations, and a small grant "Accelerated Impact" program with the Peace Corps. SPRDO has a continuing relationship with OFDA, given the region's proclivity to natural disasters.

Mission Disaster Relief Plan

A South Pacific Regional Mission Disaster Relief Plan was written in 1983. The plan identifies the responsibilities of the Chief of Mission, Mission Disaster Relief Officer (MDRO), and the Emergency Action Committee. The current SPRDO staff also attempt to maintain an updated list of resources and local contacts in Western Samoa in times of disasters.

The Peace Corps is active in Western Samoa with 60 volunteers as of May 1987. Peace Corps Volunteers have been involved in disaster preparedness training and the Peace Corps Director has worked with representatives of other NGOs to organize a coordinated response to a disaster. In the event of a disaster, the Peace Corps Volunteers would be ready to assist in assessment, distribution of relief supplies, and other activities as needed.

3.15 U.S. Disaster Relief and Preparedness Activities

Emergency Activities

Since the establishment of the Office of U.S. Foreign Disaster Assistance in 1964, the USG has responded to two disasters in Western Samoa. After a cyclone struck on February 1, 1966, the U.S. donated \$25,000 toward relief activities. After another cyclone two years later, on March 22, 1968, the U.S. made a cash donation of \$20,000 toward materials and equipment to rehabilitate damaged schools.

Preparedness Activities

In an effort to improve the cyclone early warning system for the South Pacific, OFDA funded the installation of a satellite direct readout station at the Nadi Weather Forecasting Center at Nadi airport in Fiji. High resolution satellite receiving equipment was provided which processes, analyses, and displays data from GOES and GMS satellites. The installation was completed in August 1986.

In 1984, OFDA gave a grant to the East-West Center's Pacific Island Development Program for a community preparedness and development program in the South Pacific. The project objectives were to provide written reports on the state of preparedness and vulnerability of island nations such as Western Samoa and to conduct workshops geared toward assisting national governments in planning and developing their own disaster response programs.

OFDA also gave a grant to Cornell University for an evaluation of seismic risk in the Fiji-Tonga-Vanuatu region of the Southwest Pacific. Earthquakes in this zone have the potential for disaster in Western Samoa. The objective of the project was to develop a seismicity information base to help in regional earthquake prediction, building design, and civic planning. The project began in 1978 and was completed in 1985.

3.16 Regional Organizations

The South Pacific Bureau for Economic Cooperation (SPEC) is a regional organization with 11 South Pacific country members, including Western Samoa. SPEC's role is to encourage and promote regional cooperation in the expansion of trade and economic development. In 1977, SPEC was given a mandate by member governments to coordinate a regional disaster relief and preparedness strategy, and a regional disaster fund was set up to supplement locally available relief resources. However, the evolution of SPEC as a regional disaster focal point has not occurred, although a disaster advisor was hired in 1984 on a short-term contract to disseminate information and set up preparedness programs.

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Interviews

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Mika Fepule'a, Regional Medical Officer
Ministry of Health

George Schuster, Acting Director of Health
Ministry of Health

Seiuli Atepera Lee, Chief Engineering Officer
Ministry of Works

PVOs

Valda Ioane, Secretary
VODRPC

Maka Sapolu, Secretary General of the WSRC

Isaia Tualapini, Chief Field Officer, WSRC

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Consultants

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Pollard J. Moore, Maritime Consultant

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