# Data Collection and modelling for adaptation

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#### **Presentation Outline**

- Background info
- Geography
- Climate of Samoa
- Impacts of Climate Change (CC) in Samoa
- CC Adaptation in Samoa
- Data Observation Network (Data collection)
- Modeling used in Samoa
- Responses to Climate Change in Samoa
- Samoa Climate Early Warning System (CLEWS)



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# **Background Information**

- Samoa, officially the Independent State of Samoa (formerly known as Western Samoa and German Samoa), is a country governing the western part of the <u>Samoan Islands</u> in the South Pacific Ocean.
- It became independent from New Zealand in 1962.
- The two main islands of Samoa are <u>Upolu</u> and one of the biggest islands in Polynesia <u>Savai'i</u>.
- The capital city <u>Apia</u> and <u>Faleolo International Airport</u> are situated on the island of Upolu.
- The 1960 <u>Constitution</u>, which formally came into force with independence from New Zealand in 1962, is based on the British pattern of <u>parliamentary democracy</u>, modified to take account of Samoan customs
- The unicameral legislature (Fono) consists of 49 members serving 5-year terms. Forty-seven are elected from territorial districts by ethnic Samoans; the other two are chosen by non-Samoans with no chiefly affiliation on separate electoral rolls

#### Geography

 The country is located east of the international date line and south of the equator, about halfway between Hawai'i and New Zealand in the Polynesian region of the Pacific Ocean. The total land area is 2934 km<sup>2</sup> (1133 sq mi) (slightly smaller than the U.S. state of <u>Rhode Island</u>), consisting of the two large islands of Upolu and Savai'i which account for 99% of the total land area, and eight small islets: the three islets in the <u>Apolima Strait</u> (<u>Manono Island</u>, <u>Apolima</u> and <u>Nu'ulopa</u>), the four <u>Aleipata Islands</u> off the eastern end of <u>Upolu</u> (<u>Nu'utele</u>, <u>Nu'ulua</u>, <u>Namua</u>, and <u>Fanuatapu</u>), and <u>Nu'usafe'e</u> (less than 0.01 km<sup>2</sup> - 2<sup>1</sup>/<sub>2</sub> acres - in area and about 1.4 km (0.9 mi) off the south coast of Upolu at the village of Vaovai).[1] The main island of Upolu is home to nearly three-quarters of Samoa's population, and its capital city is Apia.



#### Samoa Islands

## **Climate of Samoa**

- The climate is tropical, with an average annual temperature of 26.5°C (79.7°F).
- The hot and rainy season (wet) from November to April, also the Topical Cyclone Season.
- About 70% of total rainfall is recorded during this time
- Cool and dry season is from May to October.
- Driest month is August.



#### **Impacts of CC in Samoa**

- Samoa is vulnerable to CC because 77% of its population and infrastructure are located in low lying coastal areas
- Sea level rise causing coastal erosion
- Higher frequency and severity of tropical cyclones
- Higher frequency of droughts incl Forest Fires
- Depletion of quality water for consumption and energy production
- Impacts on agricultural production
- Impacts on biodiversity (terrestrial and marine)
- Higher frequency of health problems (water and air borne diseases)



# **Impacts of Natural Disasters**

#### • Tsunami 29 Sept 2009 (143 killed)



#### **Samoa's Policy response to CC**

There are two approaches in which Samoa has responded to CC and its impacts:

1. Adaptation

2. Mitigation



#### **Data Collection**

Climate Observation Network
 42 manual rainfall obs stations
 8 full climate stations
 16 automated weather obs stations
 4 agricultural met stations
 1 tide gauge

 Hydrology Observation Network 40 tipping bucket rain gauges (automated)

### **Parameters for modeling**

- Rainfall
- Air Temperature
- Solar radiation
- Relative humidity
- Sunshine hours
- Soil temperature
- Leaf Wetness
- Sea level
- Wind / Direction
- Evaporation
- Soil Temperature and Soil Humidity

#### **Apia station**

- Main station
- More than 120 years of meteorological data
- Ideal for climate change research and analysis
- The other 7 climate stations have more than 40 years of data
- Cost of operating the Climate network is WST\$17,400.00 per annum without hydro power and petrol.

## **Climate Change Modeling**

- 2 Types of modeling

   (a) Statistical (SCOPIC)
   (b) Dynamic
- Samoa Meteorological Services uses the statistical model SCOPIC to issue seasonal climate and ENSO forecasts.
- Climate reports are guided by Dynamic models from regional organizations such as Japan Met Agency (JMA), UK Met Office (UKMO), National Centre for Environment Prediction (NCEP), NASA, European Centre for Medium-Range Weather Forecasts (ECMWF).





Figure 5 Best estimate of projected increase in mean sea level for Apia, along with the uncertainty envelope as given by the maximum and minimum estimates using all possible combinations of the available global climate models and emission scenarios.

#### **Projected Sea Level**



Figure 12 Best estimate of projected change in mean annual rainfall for Apia, along with the uncertainty envelope as given by the maximum and minimum estimates using all possible combinations of the available global climate models and emission scenarios.

**Rainfall Projection** 



Figure 18 The number of months per year for which the precipitation for Apia is projected to be below the 1961-1999 ten percentile for the relevant month. Also shown are the averages over ten years, based on the observed (1957 to 2005) and modelled (1961 to 2100) data. Modelled data are from the Canadian GCM, with an A2 and B2 emission scenarios and best estimates for GCM sensitivity.

#### **Drought Projections**

#### Meteorology Component – Integrating Climate Early Warning System (CLEWS)



## Faafetai lava (Thank you)