



ATMO 102 Pacific Climates and Cultures

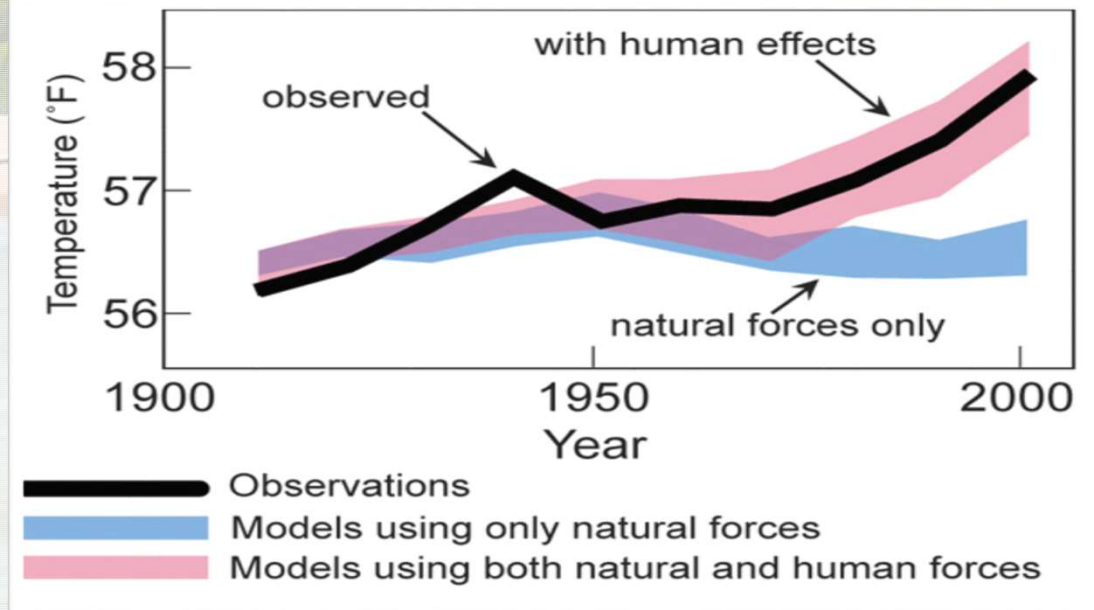
**Lecture: Pacific Island Climate
Vulnerability**

Human Forced, Climate Change is an Empirical Scientific Fact

Two necessary responses:

1. **Mitigation** – reducing GHG emissions to a safe level
2. **Adaptation** – adapting to impacts of unavoidable climate change

When we look at observed temperature (black) and compare it to simulations without human actions (blue) they temperature don't match. When we include human activity (pink), the temperatures since 1950 track very well.



International Recognition of Climate Change as a Security Issue



Make no mistake... climate change not only exacerbates threats to peace and security, it is a threat to international peace and security

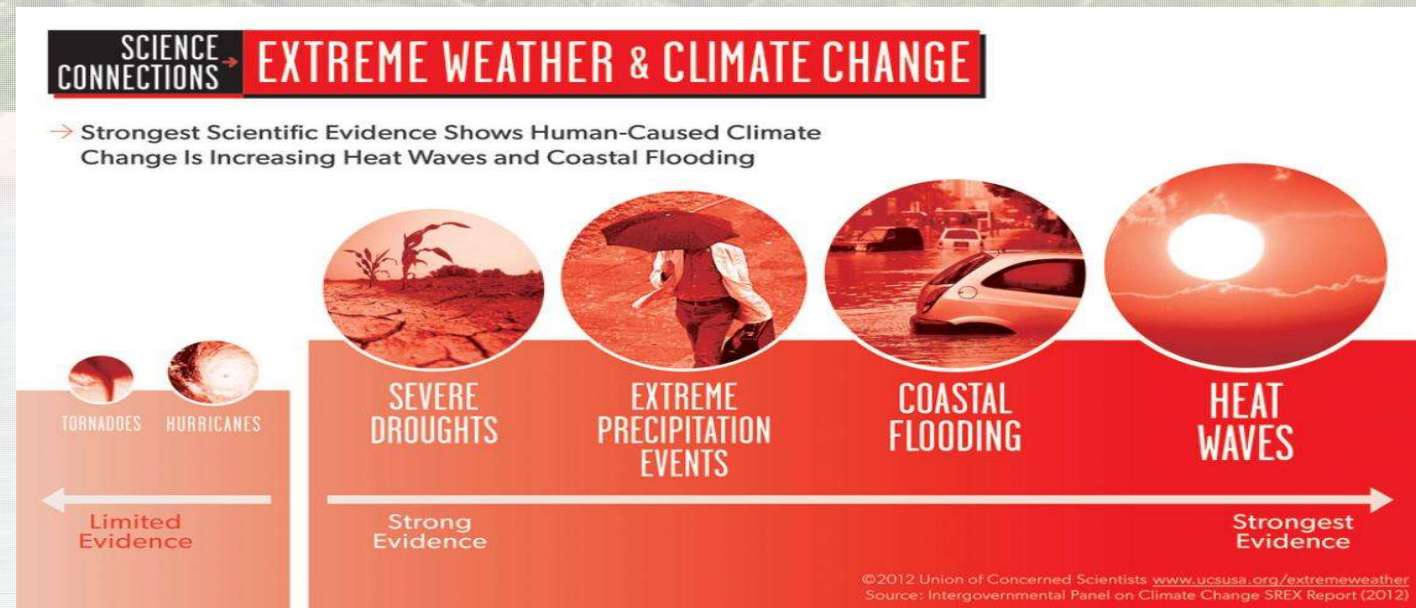
Ban Ki-moon, UN Secretary-General

- *Climate change has very real implications for international peace and security*
 - Susan Rice (US Ambassador to UN)
- *Most national security establishments consider global warming as among the biggest security challenges of the century*
 - Peter Wittig (Permanent Representative of Germany to UN)

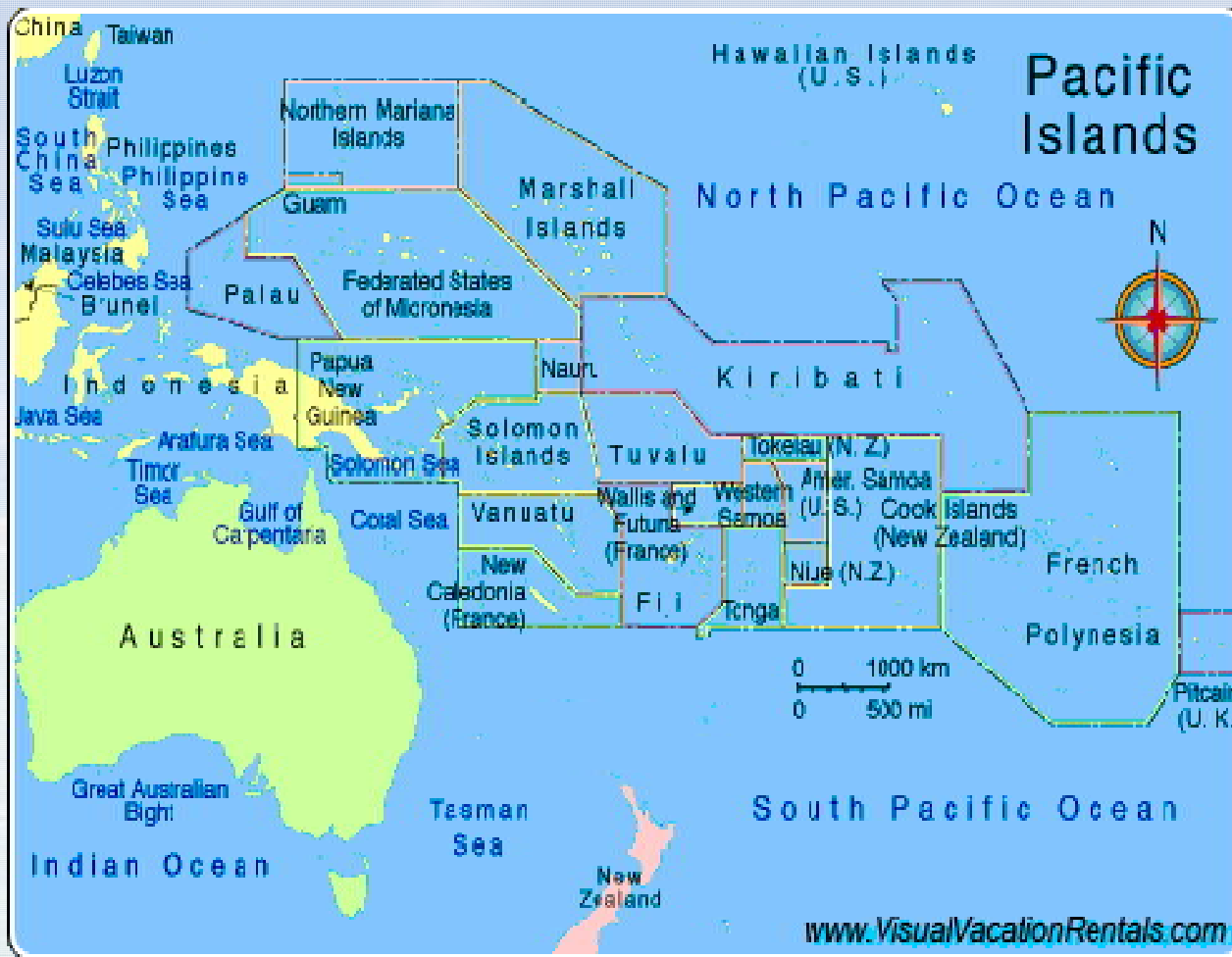


Future Climate Change Impacts

- **Rising sea levels** - storms surges, king tides, coastal inundation, ground water intrusion
- Increasing intensity and frequency of **extreme weather events** – more droughts & floods
- Increasing land and sea **temperatures**
- Ocean **acidification**
- **Shifting ocean currents**
- **Melting** of land ice



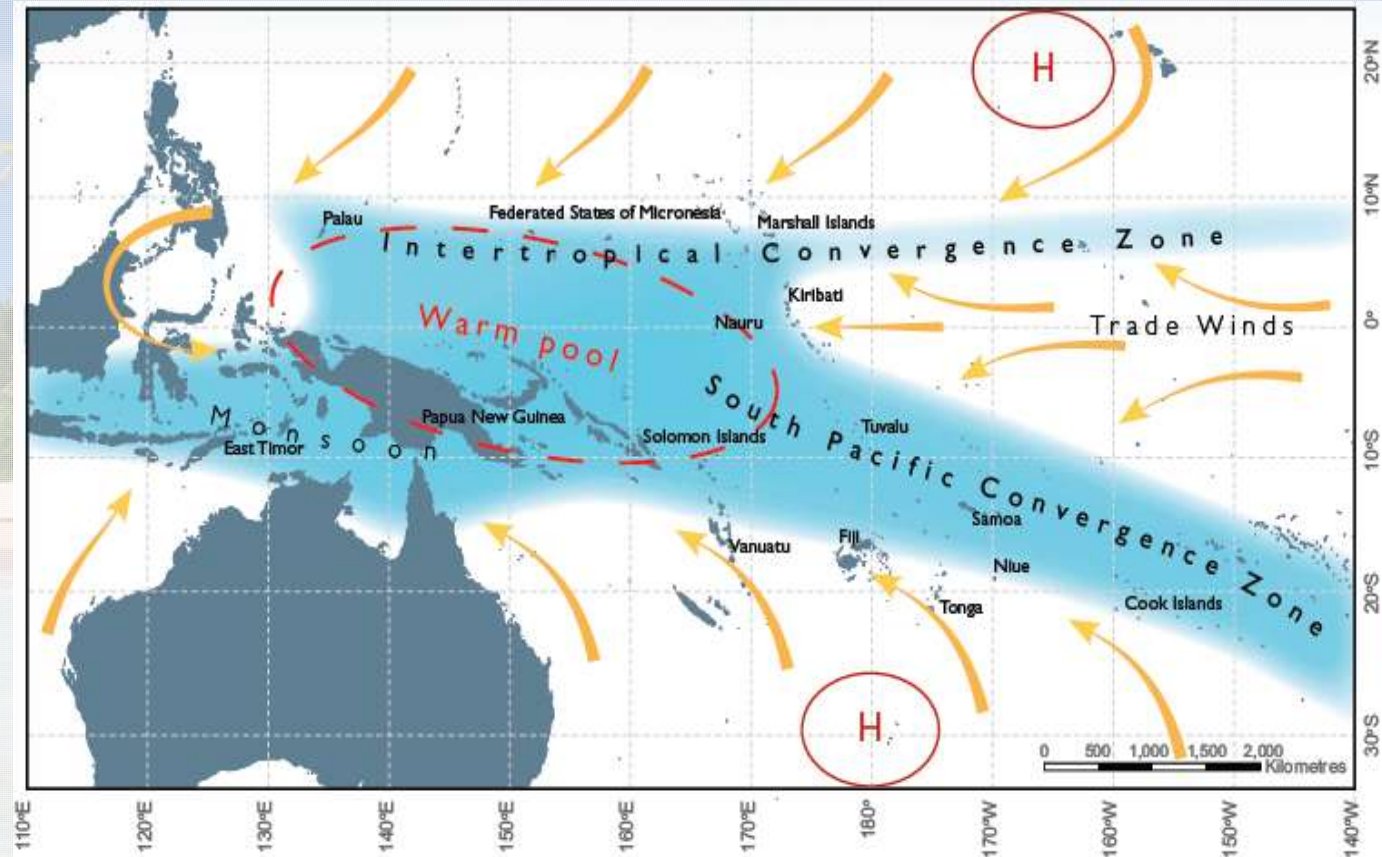
The Challenge for the South Pacific



- **South Pacific region:**
 - 22 Island Countries & Territories
 - 200 high islands
 - 2,500 low islands & atolls
- **Pop. 2010:** 9.9 million (15 million by 2035) 60% rural/40% urban

Summary of Regional Climate Change

- Temperatures increase
- More very hot days
- Sea level will continue to rise
- Changing rainfall patterns
- Ocean acidification continues
- Less frequent but more intense tropical cyclones
- Potential changes to ocean currents

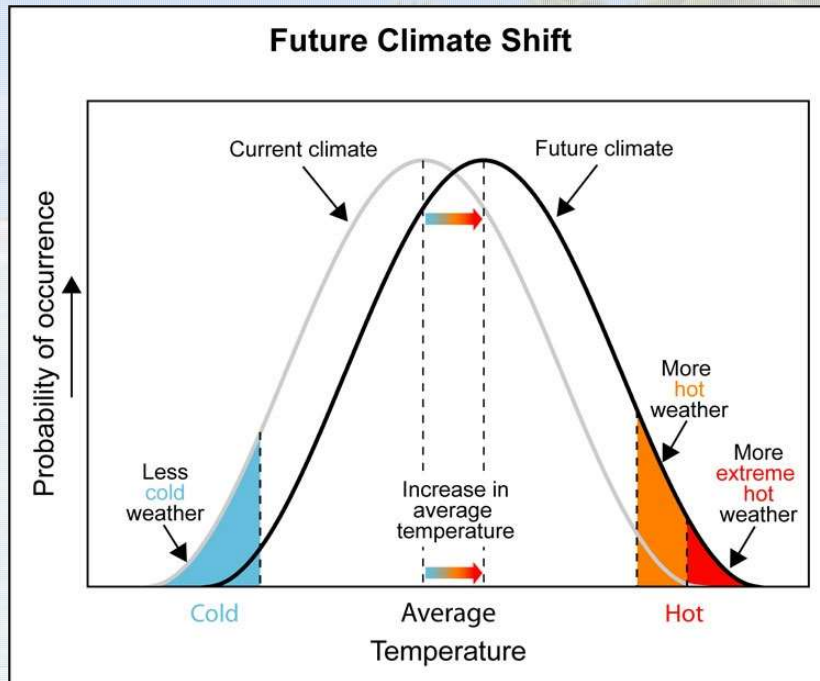


Source: *Climate Change in the Pacific: Scientific Assessment and New Research. Volume 1: Regional Overview. Volume 2: Country Reports.* Available from November 2011.

The average positions of the major climate features in November to April. The arrows show near surface winds, the blue shading represents the bands of rainfall convergence zones, the dashed oval shows the West Pacific Warm Pool and H represents typical positions of moving high pressure systems.

Increase in Local Extremes not just Means

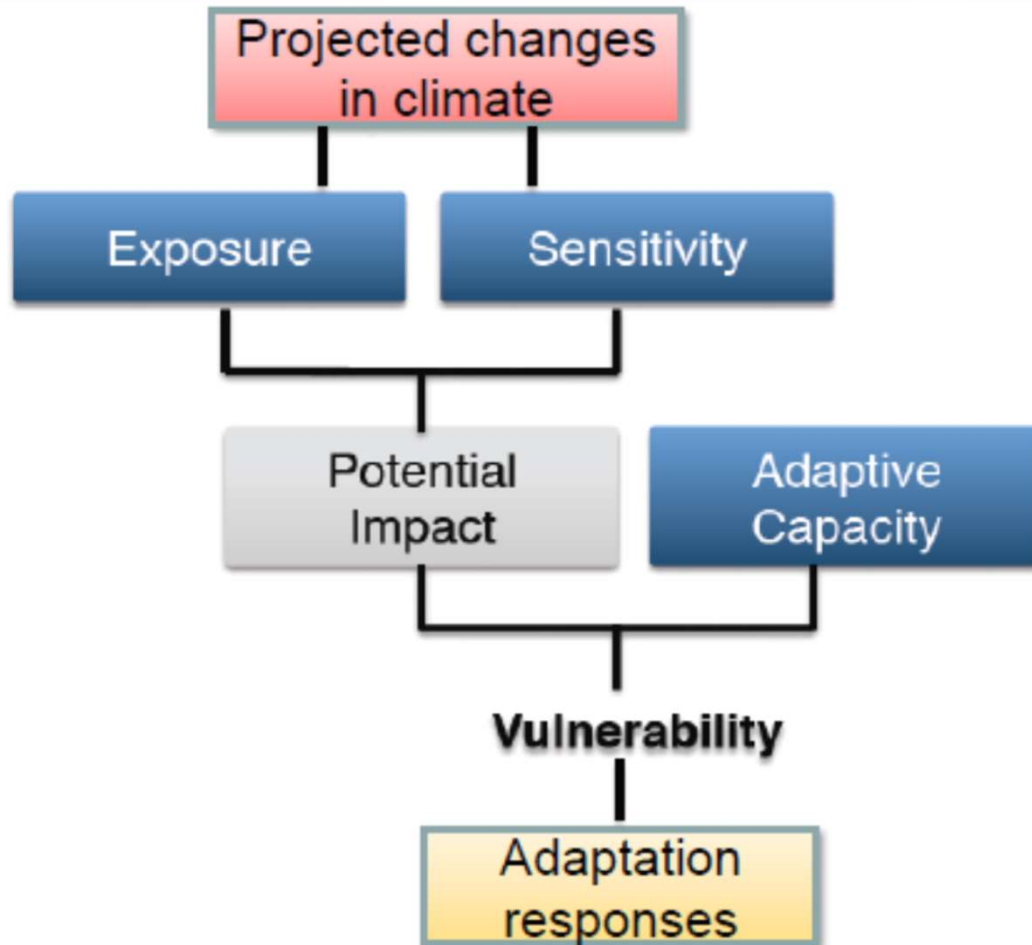
- Generally, increasing intensity & frequency of extreme events; floods, droughts, fires, cyclones (not earthquakes)



A changing climate leads to changes in **extreme weather** and **climate events**



Local Climate Changes



- No one lives in a place called “Average”
- *The question is how will the climate change where you live and work?*

Exposure is a Critical Factor

Increasing exposure of people and assets has been the major cause of changes in disaster losses



Pakistan floods, 2010
6 million left homeless



<http://www.crs.org/media-center/typhoon-haiyan-update>

- Super Typhoon Haiyan's devastation was directly related to the number of people and the infrastructure in its path.
- *As climate changes new risks will emerge for each island and sub-sections of islands.*

Adaptive Capacity Varies Within/Between Countries

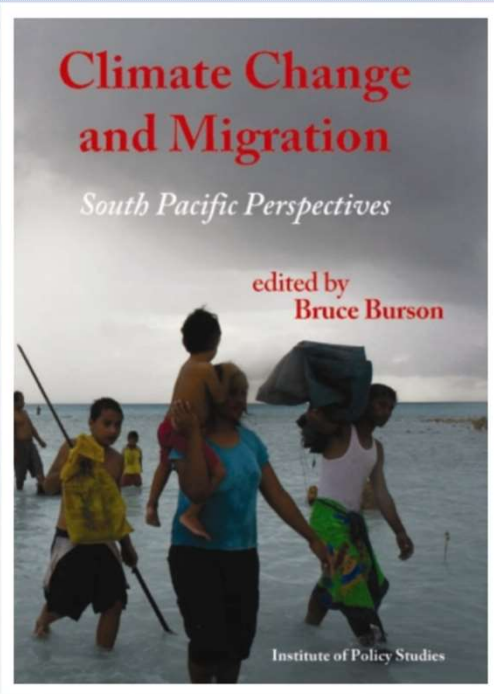
Source: <http://www.abc.net.au/news/2013-03-04/pacific-warriors-climate-change-action/4550898>



- **They have long been described as climate refugees:** the hundreds of thousands of people living on low-lying Pacific islands who may be forced to migrate if rising sea levels leave their homes uninhabitable.
- **But it is a term Pacific leaders say is loaded with political connotations and does not reflect the true dimensions of the problem.**



Migration, Displacement & Refugees



Book Access:

<http://igps.victoria.ac.nz/publications/publications/show/300>

- A number of dimensions of climate change have the potential – along with non-climatic environmental changes – to influence the drivers of migration
 - Internal and trans-boundary migration
 - Poses **logistical** challenges & **geo-political** challenges
 - Trapped populations
 - Cities are extremely vulnerable to future environmental change
 - Long term interactions critical

Source: *Foresight: Migration and Global Environmental Change* (2011) Final Project Report. The Government Office for Science, London

Climate Change Impacts on Fisheries



1. Changes in the distribution and abundance of tuna
2. Decline in coastal fisheries and coral reefs
3. Increases in freshwater fisheries production
4. Increased operating costs

- A range of adaptations can substantially reduce the risks and costs, but they need to be tailored to the circumstances

- **Planning for change is vital because fish are the single biggest source of animal protein in the Pacific diet.**

- Another 115,000 tonnes of fish needed to help provide good nutrition for the expanding population of the region by 2030 - an increase of 47%



Source: *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change*, published by the Secretariat of the Pacific Community (SPC)

Climate Change Impacts on Vector-Borne Diseases



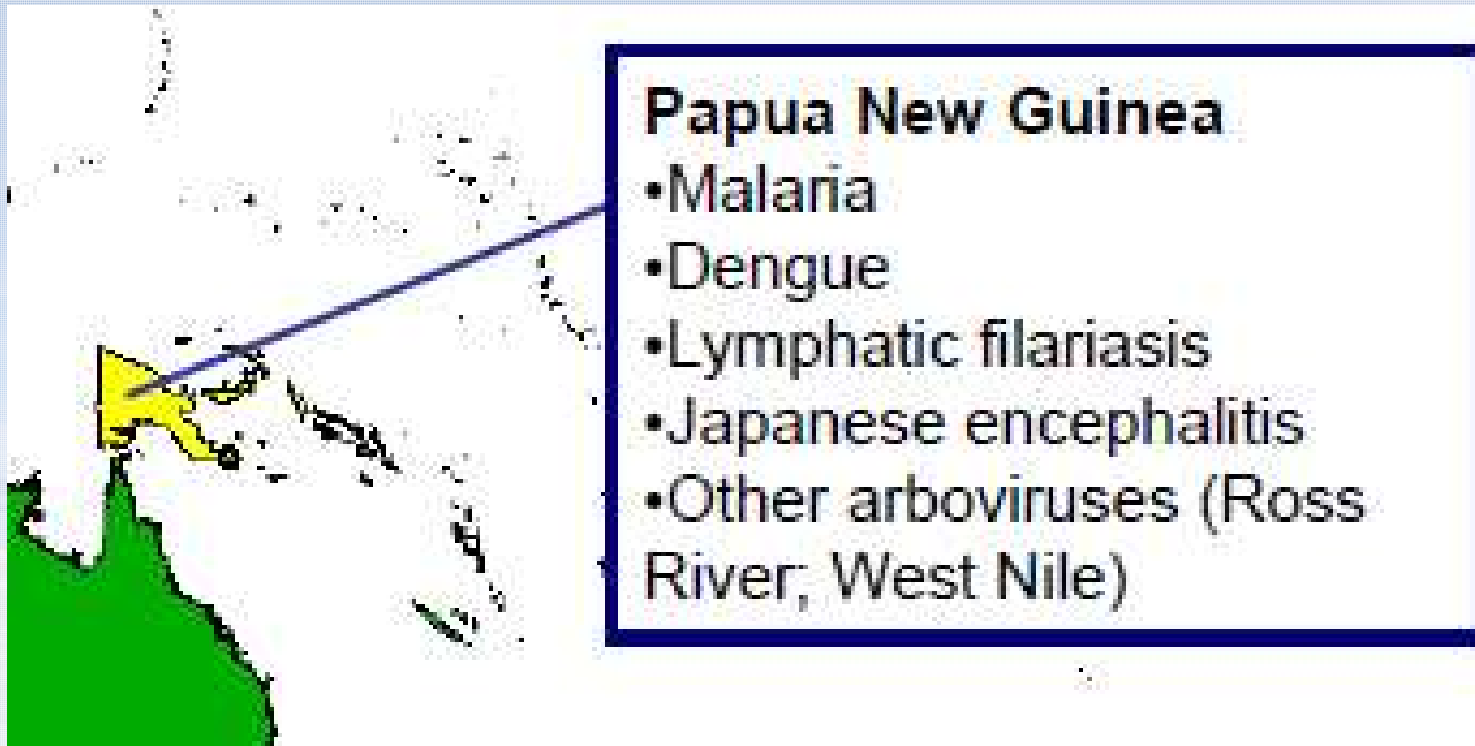
Countries or areas at risk of dengue, 2011.

The disease is currently distributed only in areas in which the temperature remains >10°C year-round.)

Source: Final project report: *Strengthen control of vector borne diseases to lessen the impact of climate change in the Western Pacific Region with focus on Cambodia, Mongolia and Papua New Guinea*. World Health Organization Western Pacific Region 2012; http://www.wpro.who.int/mvp/climate_change/en/

- VBDs such as malaria, **dengue**, tick-borne diseases and plague are particularly susceptible for a number of reasons that tend to favour warmer, wetter environments including:
 - geographical distribution
 - behaviour of vectors and their hosts are intimately associated with environmental determinants
 - transmission dynamics

Climate Change Impacts on Vector-Borne Diseases



- Historically experienced relatively few malaria outbreaks and the population has limited immunity to the disease and less awareness of its prevention than lowland populations.

- In recent years, cases of malaria reported at increasingly higher altitudes - the effects of climate change such as increased ambient temperature, rainfall affecting the availability of breeding sites and vector ecology and indirect effects on human behaviour, may be contributory factors

Source: Final project report: *Strengthen control of vector borne diseases to lessen the impact of climate change in the Western Pacific Region with focus on Cambodia, Mongolia and Papua New Guinea*. World Health Organization Western Pacific Region 2012;

http://www.wpro.who.int/mvp/climate_change/en/