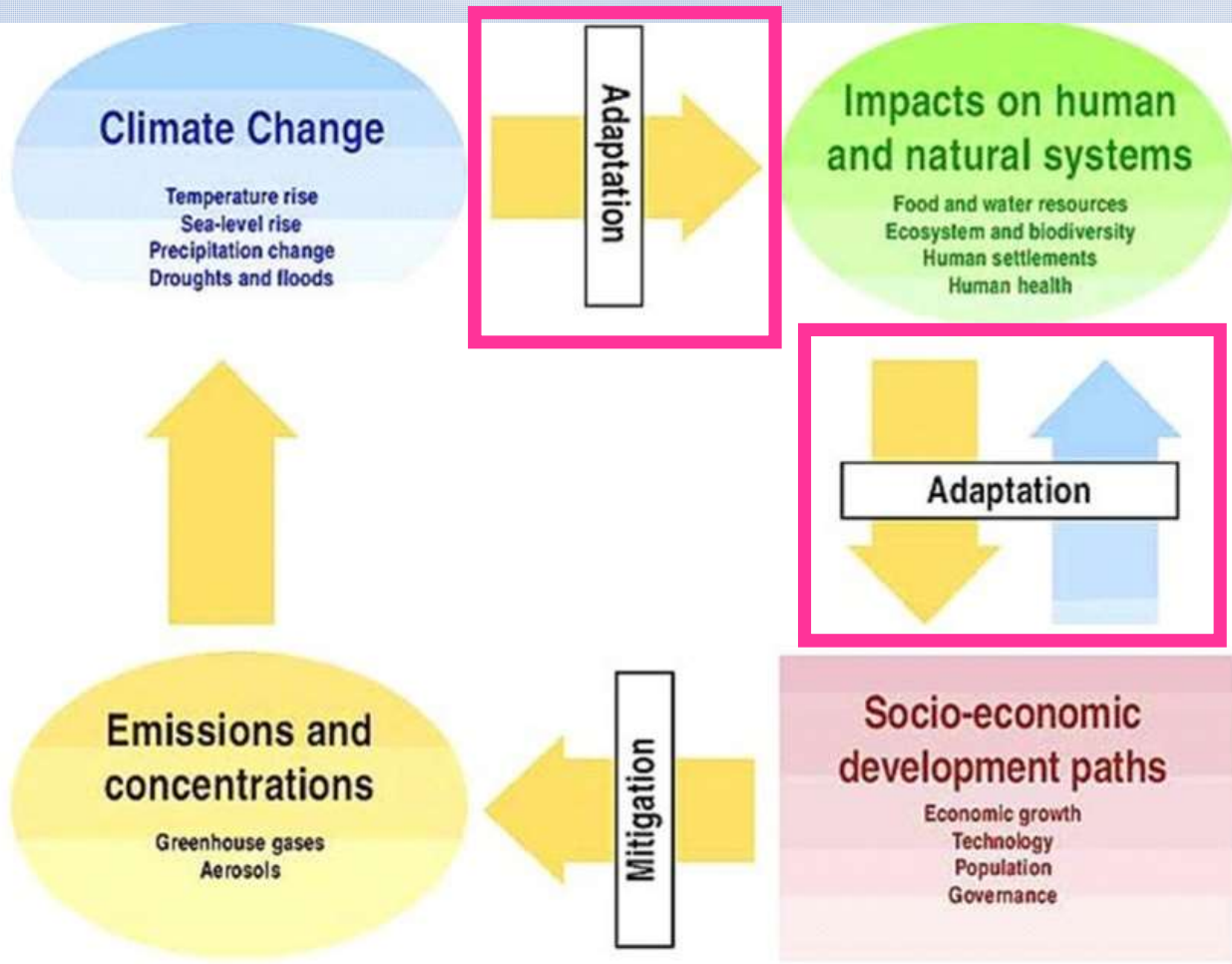




# **ATMO 102 Pacific Climates and Cultures**

## **Lecture 26: Pacific Agriculture and Climate**

# Climate Change Adaptation



- **Adaptation** consists of actions undertaken to reduce the adverse consequences of climate change, as well as to harness any beneficial opportunities.
- **Adaptation** actions aim to reduce the impacts of climate stresses on human and natural systems.



# Special role for Ecosystem-Based Adaptation



Source: [www.bestlibrary.org/newslaw/2008/07/welcome.html](http://www.bestlibrary.org/newslaw/2008/07/welcome.html)

*“Approaches that involve the services that biodiversity and ecosystems provide as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change are known as ecosystem-based approaches to adaptation. The underlying principle is that healthy ecosystems can play a vital role in maintaining and increasing resilience to climate change and in reducing climate-related risk and vulnerability.”* (Source: UNFCCC SSBSTA Report FCCC/SBSTA/2011/INF.8)

- Sustainably managing, conserving and restoring ecosystems so that they continue to provide the services that allow people to **adapt to climate change**.
- This approach builds on **traditional knowledge**
- Generates a range of **social, economic and cultural benefits** and helps to conserve biodiversity
- **Co-benefits** for climate change mitigation through improved retention and restoration of ecosystem carbon stocks
- **Community leadership** critical



# Unfair Share of the Impact



“People from Melanesia heavily rely on their land for their livelihoods. They depend on their environment for food and income from cash crops, for clean water, fertile soil, forests for building materials, medicine and for hunting. Compared to other countries, most Melanesians have very small ‘carbon footprints’ having contributed very little to global warming and climate change.

Unfortunately they will be among those most vulnerable to the impacts of climate change due to their high dependency on their immediate environment and close proximity to the coast.”

~Live & Learn Environmental Education



# Dietary Patterns

Dietary patterns vary to some extent among the Pacific Island countries. However, there are common diet items for people in rural and urban areas.

## Rural areas

*Staple food (energy food):* Roots and tubers: these are *taro, cassava, kumala* (sweet potatoes). Occasionally, rice and bread are also consumed.

*Protein food:* Fish, beef, chicken, eggs. Some tinned meat is also consumed from time to time.

*Other food:* Sugar, biscuits, papaya, banana, breadfruit, butter, green leafy vegetables, coconut drink.

## Urban areas

*Staple food (energy food):* Rice, *roti*, bread, is also consumed in addition to roots and tubers.

*Protein food:* Tinned fish and meat, chicken, eggs, cheese, dried peas, milk and fresh items.

*Other food:* Sugar, tea, coffee, biscuits, porridge, fruits and vegetables

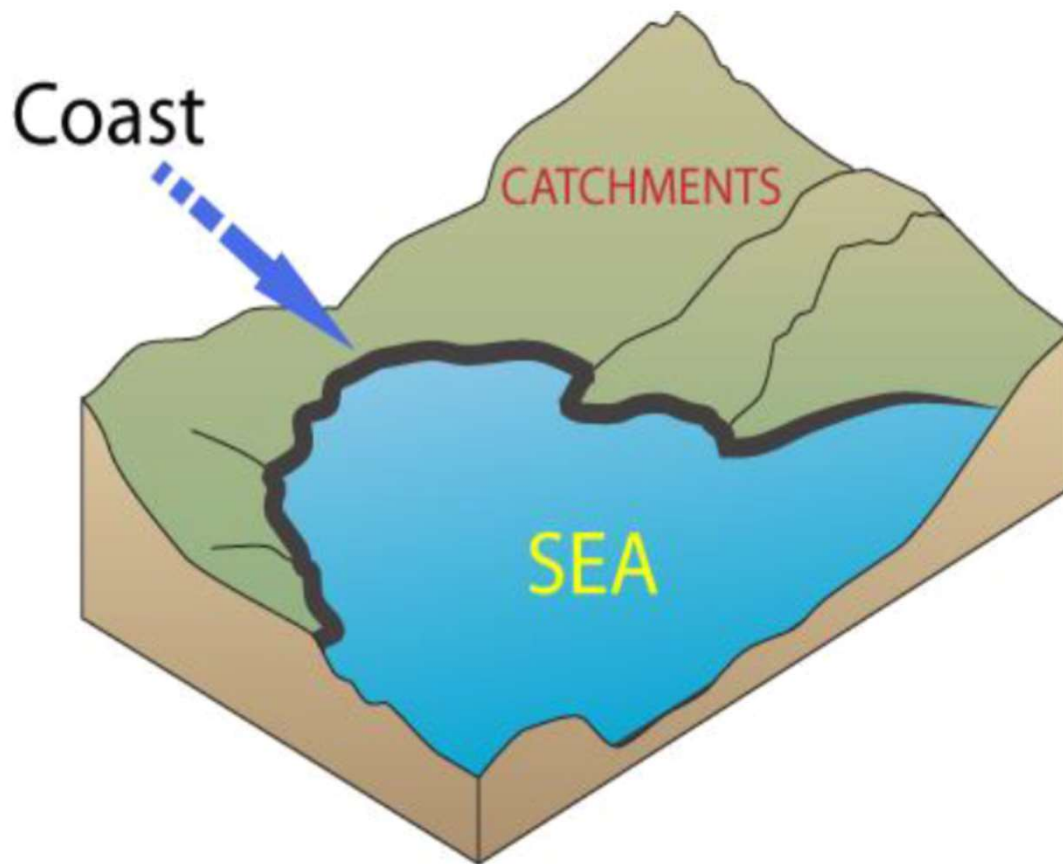


Crops-grown on land accessed through customary land tenure arrangement or leased from traditional land owners





# Ecosystem-Based Adaptation Methodology



## • Ecosystem Characterisation

- Developing a hierarchical classification method for characterising the linked terrestrial and marine system. This describes, at several scales, the biophysical/climatic drivers, the variety of islands and environment types together with their associated biophysical processes, and the key ecological features in each of the regional subsystems.

## • Identify Ecological Assets

- Applying an integrated framework for mapping coastal and near-shore ecosystem assets (features, habitats or species), and ecological and human use links across the terrestrial-marine interface. Ecosystem assets included a "first cut" assessment of values (such as biodiversity, species or habitat rarity, subsistence and economic resources etc).

## • Map Threats and Stressors

- Producing spatial predictions scenarios of climate change and human stressors. This task produces downscaled global and regional climate change models and human impacts to produce spatial predictions of likely impacts.

## • Asset-Threat Matrix of Potential Impacts

- Assessment of potential future cumulative impacts. This task uses an asset threat matrix to identify and score potential impact risks to ecosystem assets based on a range of possible threat/impact scenarios.

Source: Skewes et al. (2011) Melanesian coastal and marine ecosystem assets: assessment framework and Milne Bay case study. CSIRO.











# Examples of Ecosystem-Based Adaptation Measures that Provide co-benefits

Adaptation measure	Adaptive function	Social and cultural	Economic	Biodiversity	Mitigation
<b>Mangrove conservation</b>	Protection against storm surges, sea-level rise and coastal inundation	Provision of employment options (fisheries and prawn cultivation) Contribution to food security	Generation of income to local communities through marketing of mangrove products (fish, dyes, medicines)	Conservation of species that live or breed in mangroves	Conservation of carbon stocks, both above and below-ground
<b>Forest conservation and sustainable forest management</b>	Maintenance of nutrient and water flow Prevention of land slides	Opportunities for ✓ Recreation ✓ Culture ✓ Protection of Indigenous peoples and local Communities	Potential generation of income through: ✓ Ecotourism, Recreation ✓ Non-wood forest products	Conservation of habitat for forest plant and animal species	Conservation of carbon stocks Reduction of emissions from deforestation degradation

Source: Convention on Biological Diversity. *Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change*. Technical Series No. 41. Montreal: Convention on Biological Diversity



# Costs of Adaptation: Example in Lami Town, Fiji

Adaptation option	Cost (1000 FJD)	
	10-years	20-years
 Replant mangroves	\$1,781	\$3,016
 Replant stream buffer	\$935	\$1,584
 Monitoring & enforcement	\$89	\$155
 Reduce upland logging	\$65	\$114
 Reduce coral extraction	\$44	\$78
 Build sea walls	\$12,377	\$15,188
 Reinforce rivers	\$1,975	\$2,424
 Increase drainage	\$1,348	\$1,655

Source: Rao N.S., Carruthers T.J.B., Anderson P., Sivo L., Saxby T., Durbin, T., Jungblut V., Hills T., Chape S. 2013. An economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands. A technical report by the Secretariat of the Pacific Regional Environment Programme. – Apia, Samoa : SPREP 2013

- Small Islands, like Fiji, don't have huge economies.
- **Note: The dollar amounts are x 1000!!!**
  - \$1,781 = \$1,781,000!!!!
  - \$12,377 = \$12,377,000!!!
- To implement all of these changes would be a huge strain on such a small island's economy
  - **\$18,614,000 (~18.5 million FJD\$)**



# Regional Priorities

## 1. Accessing Climate change adaptation finance

- ✓ Mitigation a funding opportunity e.g. diesel generators, REDD

## 2. Harmonisation & prioritization of regional climate change mitigation & adaptation projects & programs

- ✓ National priorities (e.g. PNG VBD)
- ✓ Shared problems (coastal zone management, tourism, water security)
- ✓ Trans-border issues (migration/displacement, fisheries)

## 3. Capacity building of early career practitioners & researchers in country line-departments and regional bodies

## 4. Mainstreaming climate change responses into sustainable development, green economy & national/community planning

- ✓ Scenarios → Strategies → Options → Actions





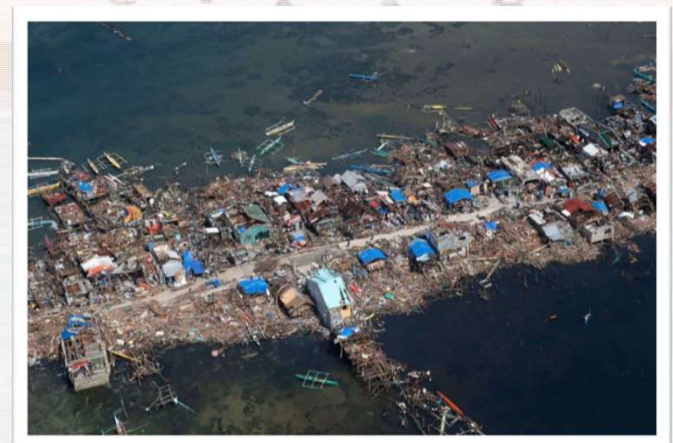
# Pacific Island Agriculture – Climate Impacts





# Review of Projected Climate Changes

- Warmer
- Wet season gets wetter & dry season gets drier
- Heavy rainfall gets more intense
- More sea level rise
- Fewer tropical cyclones, but more intense
- Cloud cover reduction
- For Pacific region: **no more than 1.5° warming**





# Key Priority Area 1- CC Impacts on Forests



- Changes in the **flowering and fruiting patterns** of certain forestry crops
- **Disruption/permanent loss of fundamental ecosystem** goods and services (e.g. freshwater retention and provision, natural hazard regulation, biodiversity)
- **Increased incursions of invasive species and pests & diseases** - in some high elevation island areas, warming has already led invasive species to overtake native species
- Coastal forests (including mangroves) under threat from **sea-level rise, cyclones and storm surges**
- **Loss of cloud forests due to increasing temperatures in high altitudes**





# Forests & Climate Change

- **Deforestation and forest degradation contributes to GHG emissions** – the Agriculture and Forestry Sector contributes about 24% of global GHG emissions
- In the Pacific deforestation (conversion of forests into other land use types) is largely caused by **agriculture expansion**
- **Forest degradation** (reduced services provided by the forest) from unsustainable logging and local utilisation
- **REDD+** is a mechanism aimed at addressing the drivers of deforestation and forest degradation + promoting the conservation of forest carbon pools, sustainable management of forests and enhancing forest carbon stocks
- **Fiji (Ambassador Amena Yauvoli)** as Chair of G77 in Warsaw COP19 facilitated the adoption of the Warsaw Framework on REDD+







# Some issues to be considered

- Recognize that REDD+ will also ensure **sustainable utilization of forest resources**
- Performance-based payments must be **permanently attractive for stakeholders**
- **Co-benefits from REDD+** are as important (if not more) as GHG emission reductions/removal
- **Recognize that customary landownership in the Pacific is different from other REDD+ regions**
  - Ethnic people are not the minority in the Pacific (like in South America)
  - Structures and framework protecting the interests of indigenous Pacific Islanders are largely in place

## REDD+

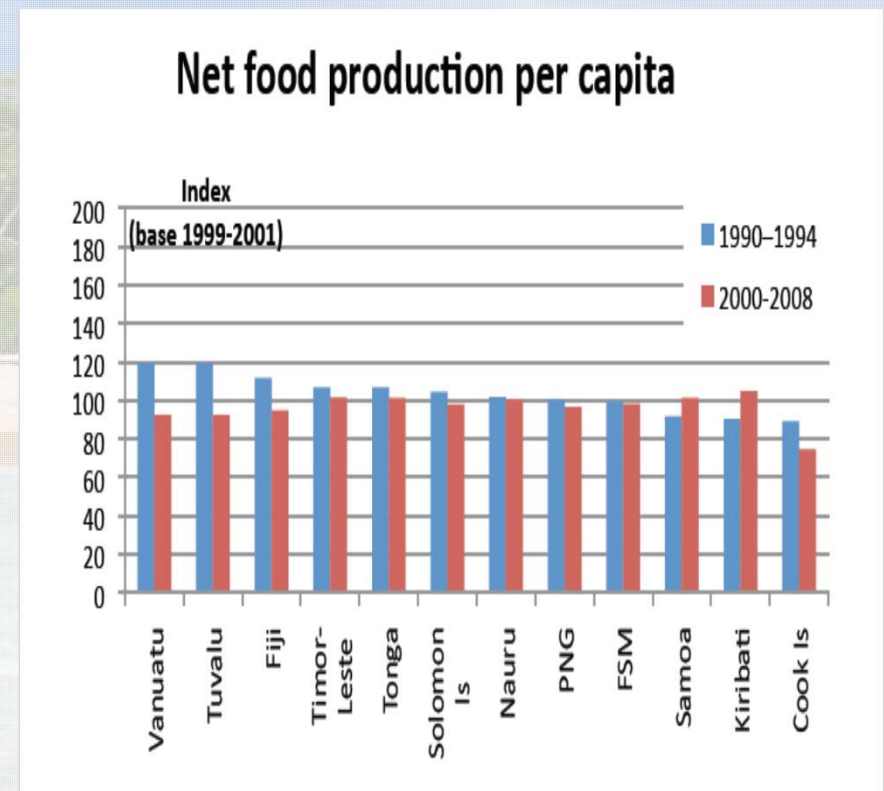
REDD+ helps to mitigate climate change through forests, and provides social and environmental benefits. It includes these essential components: creating incentives for not clearing standing forests, maintaining and expanding forest cover, sustainably managing forest and recovering degraded lands.





# Key Priority Area 2 - Impact on Food Security

- *Food security refers to access by all people at all times to sufficient, safe and nutritious food for a healthy and active life.*
- Net food production is facing an **overall decline** across most of the Pacific region due to:
  - Unsustainable land use & land tenure
  - Urban migration & Diet change
  - Loss of crop biodiversity
- **Climate change risks and threats exacerbate challenges already faced by the sector**





# Key Issues

- **Short Term** – Direct loss and damage resulting from frequent and more intense extreme weather events (Cyclone, Flood, Drought,)
- **Fiji & Samoa** - TC Evan 2012 (US\$97m & US\$26m),
- **Tonga** - TC Ian 2014 (US\$18 m),
- **Vanuatu** – TC Pam 2015 (US\$56 m)
- **Solomon Islands** - Flood 2014 (US\$18m)
- **Fiji** - Drought 1998 (US\$70 m)
- **PNG** – Frost/Drought 2015 (60,000 people affected)

Saltwater Intrusion Destroys Crops



- **Long Term** – Low production resulting from slow onset events (high temperature, changing rainfall patterns, inundation, salt water intrusion, coastal erosion)
- **PNG** - Tuber formation in sweet potato was significantly reduced at temperatures above 34 °C
- **Vanuatu** - Some plants flowering earlier than usual while others are fruiting much later than normal
- **Kiribati** – Pandanus trees are lost through coastal erosion due to sea level rise
- **Tuvalu** - Taro pits on some islands and atolls have been contaminated by salt water intrusion