

ATMO 102

Pacific

Climates

and Cultures

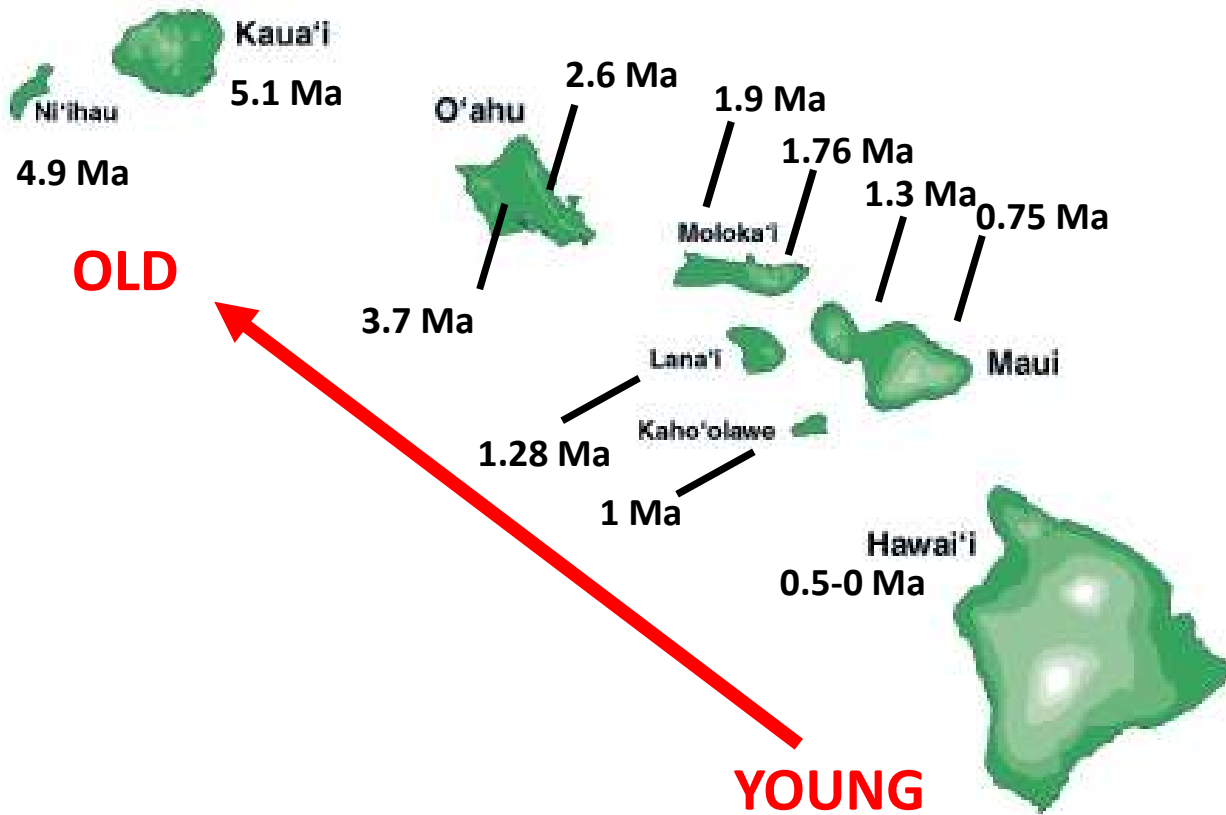
Lecture 2: Introduction to the Pacific Islands

General Island Locations

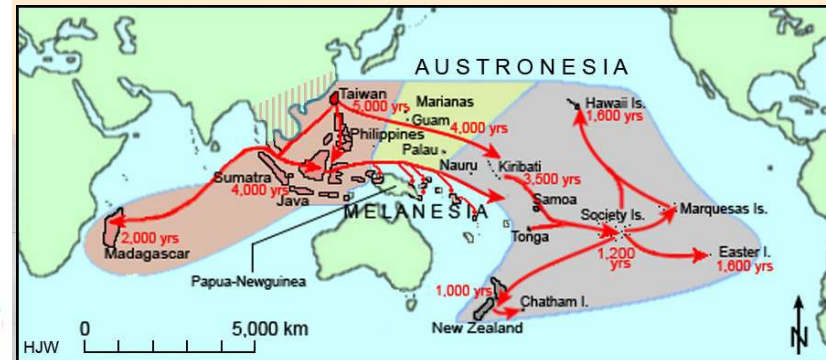
- Hawaiian Islands
- Tahiti (French Polynesia)
- Kiribati
- Marshall Islands
- Samoa
- New Zealand
- Fiji
- And more!!!

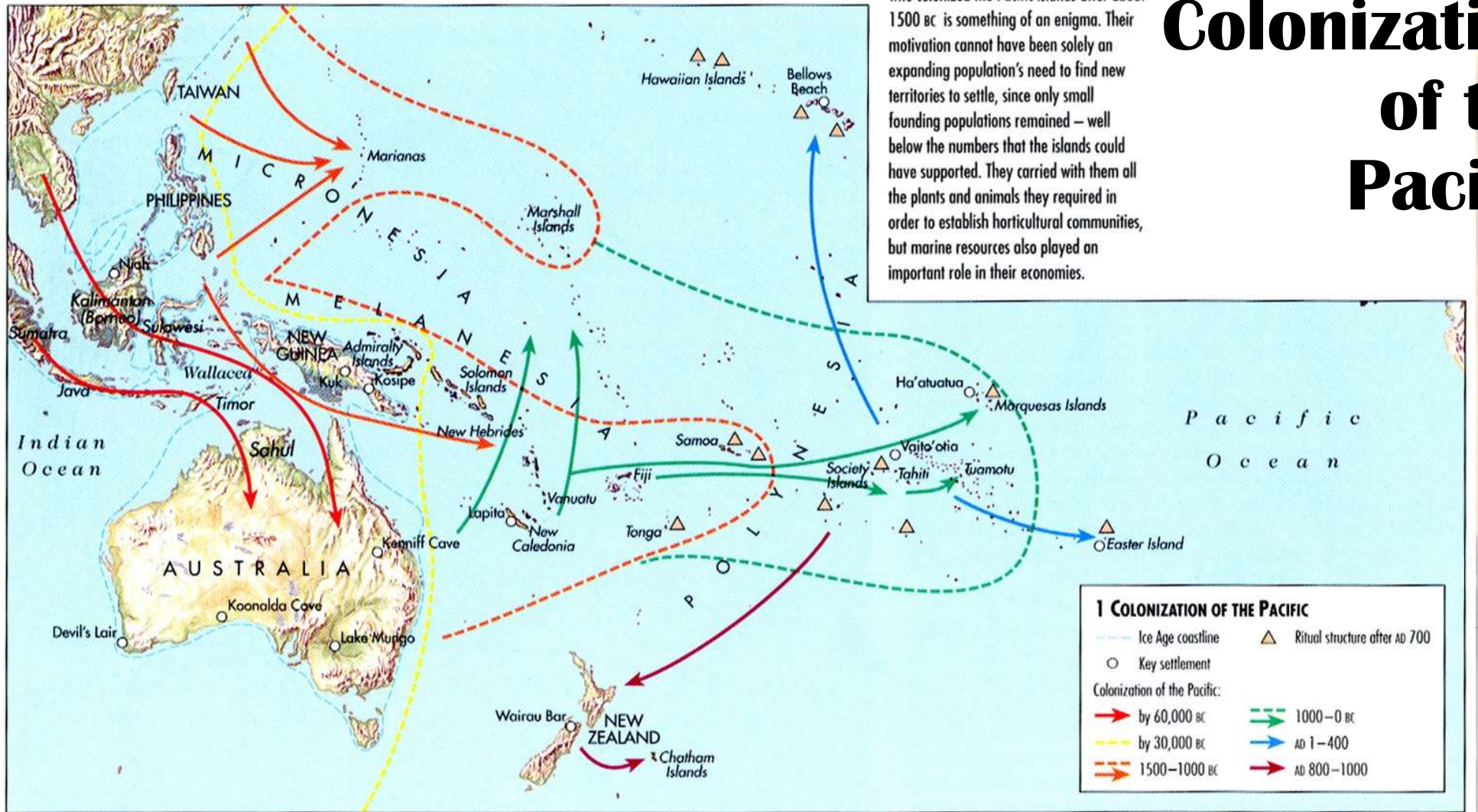


Age of the Hawaiian Islands



- How do these dates compare to when Polynesian Settlers arrived on the Islands?

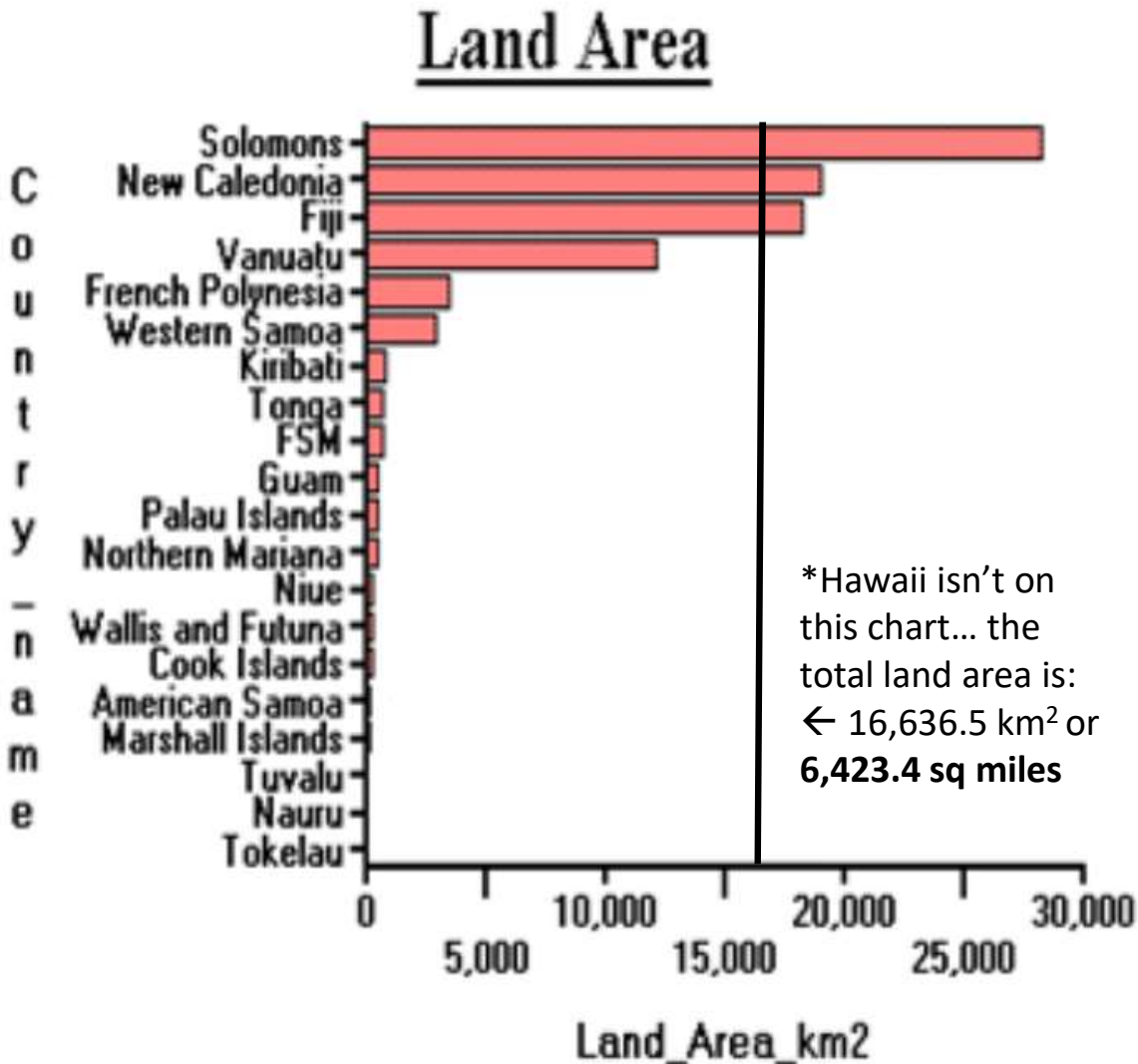




▼ The rapid spread of the Asian peoples who colonized the Pacific islands after about 1500 BC is something of an enigma. Their motivation cannot have been solely an expanding population's need to find new territories to settle, since only small founding populations remained – well below the numbers that the islands could have supported. They carried with them all the plants and animals they required in order to establish horticultural communities, but marine resources also played an important role in their economies.

Colonization of the Pacific

Physical Properties



- Pacific Ocean = over 1/3 of the planet's surface
- Not counting Hawaii and Papua New Guinea, the region comprises 21 island states, 200 high islands, and 2500 low islands and atolls
- Four largest states (Solomon Islands, New Caledonia, Fiji, and Vanuatu) account for most of the last mass
- Except for the Pitcairn group and the southern part of French Polynesia, all lie in the tropical zone.

Cultural Sub-Regions

- Ethnically, Culturally, and Linguistically there are three sub regions:

- **Melanesia:** Solomon Islands, Vanuatu, Fiji, and New Caledonia

- **Micronesia:** Palu, FSM, Guam, Northern Mariana Islands, Marshall Islands, and Kiribati

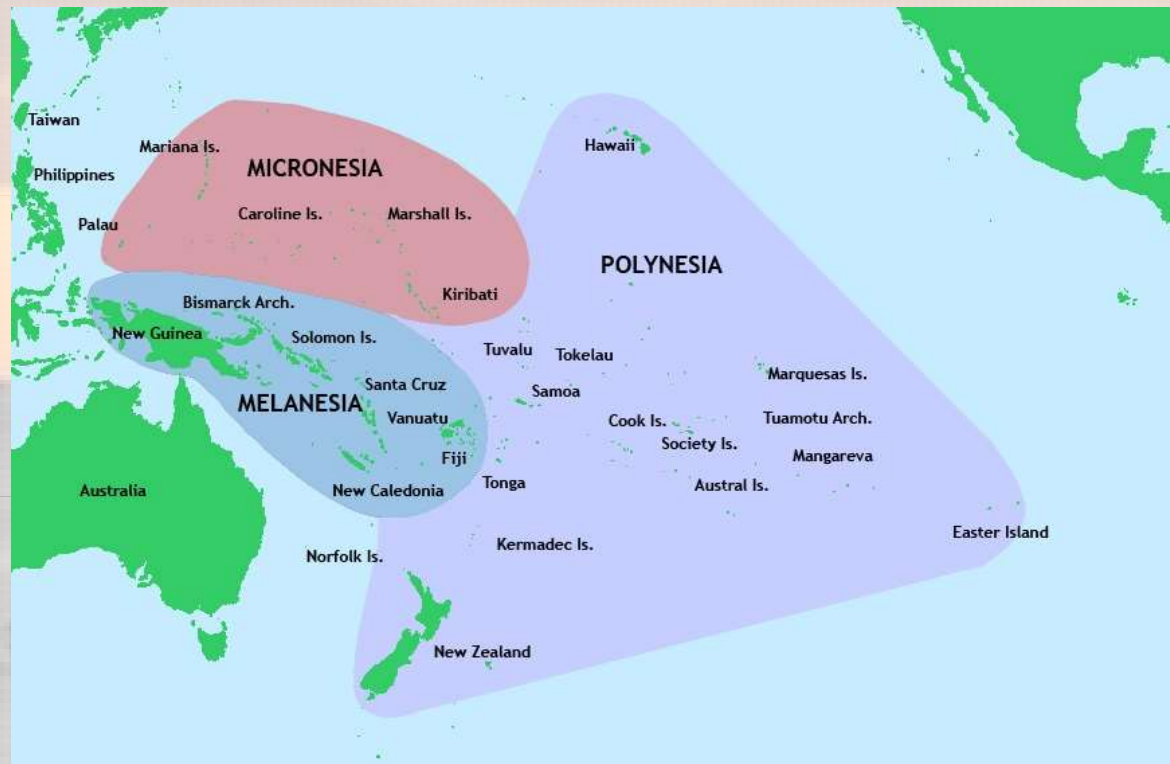
- **Polynesian:** Hawaii, Tuvalu, Tokelau, Samoa, Niue, Cook Islands and French Polynesia



Tonga College students performing a traditional Kailao dance.



Men and Women Singing and Chanting in Fiji



Mid-sized islands of Polynesia and Micronesia

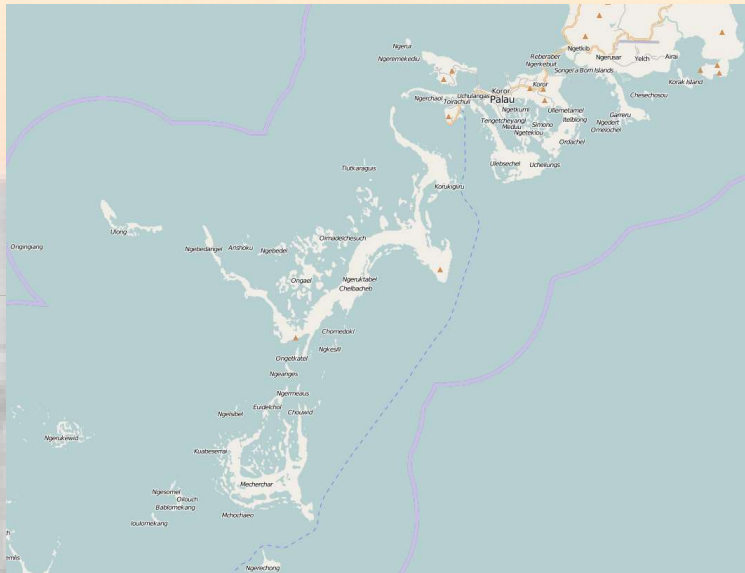


Small rock islands in Palau
<https://www.flickr.com/photos/luxtonnerr/e/2347771522>



Koror largest city in Palau (70% of population), though not the capital.
<https://en.wikipedia.org/wiki/Koror>

- Mid-sized islands of Polynesia (Tonga, Samoas, French Polynesia) and Micronesia (Palau, FSM, Guam, Northern Mariana Islands) have **limited land resources**, little or no commercial forests, and no commercial mineral deposits



- **Few tradable natural resources** and virtually no manufacturing industry
- Currently – many of these islands enjoy a high standard of living from **foreign assistance** and remittances from expatriate island communities

Small, Low, Island States

- Small coral islands and atolls spread over **vast areas of the ocean**
- Cook Islands, Kiribati, Tuvalu, FSM, Marshall islands, Niue, and Nauru
 - e.g. 60,000 Marshall Islanders live on 181 sq km of land, giving each person only 0.3 hectares of land
- **Overall:**
 - Land and Soil are poor
 - Natural resources are mostly limited to the ocean
 - High urban area growth rate
- Considered the most vulnerable places on Earth to the **adverse impacts of climate change and sea level rise** due to the average elevation of only **1-2 meters**:
 - Kiribati, Marshalls, Tokelau, and Tuvalu
- **Key Problems:**
 - Shore erosion
 - Vulnerability to storms and droughts
 - Fresh water scarcity
 - Ground water pollution
 - Solid waste disposal



Aerial image of Marakei Atoll Kiribati
https://en.wikipedia.org/wiki/Kiribati#/media/File:Marakei_Atoll.jpg



Aerial image of Tarawa
https://en.wikipedia.org/wiki/Kiribati#/media/File:South_Tarawa_from_the_air.jpg

Colonization?

- All but one of the countries of the region (Tonga) were **colonized by European nations during the 18th century** 😞

- Most Pacific countries became **sovereign states** in the last 40 years 😊

• American Samoa	US territory	• Northern Marianas	Commonwealth of the US
• Cook Islands	New Zealand-affiliated developing country	• Palau	US-affiliated developing country
• Fiji	Independent developing country	• Pitcairn Islands	Dependency of UK
• French Polynesia	French territory	• Samoa	Independent developing country
• Guam	US territory	• Solomon Islands	Independent developing country
• Kiribati	Independent developing country	• Tokelau	Dependency of New Zealand
• Marshall Islands	US-affiliated developing country	• Tonga	Independent developing country
• Micronesia	US-affiliated developing country	• Tuvalu	Independent developing country
• Nauru	Independent developing country	• Vanuatu	Independent developing country
• New Caledonia	French territory	• Wallis and Futuna	French territory
• Niue	New Zealand-affiliated developing country		

Physical Characteristics

- **Low arable land per person**
 - In modern times limited area for housing (high housing costs in Hawaii)
- **Poor soil** on the smaller islands results in limited agricultural production and a greater dependence on marine products for food and income.
- **Coral reefs** typically surround the islands either close to the shore (fringing reef) or further offshore (barrier reef)
- **Mangrove forests often border the inshore waters**, especially those of the larger islands, and provide habitat for the juveniles of many important food fish
- **Marine and terrestrial biodiversity** is greatest in the equatorial region in the western part of the Pacific Islands area.



French Polynesia, Moorea Island
<https://www.flickr.com/photos/dany13/8044046451>



Mangroves

Coastal Resources

- Heavy reliance on **living marine resources** for subsistence and economic, social, and cultural well-being
- The economies of most atoll and small island are based on marine resources.
 - Coral reef ecosystems, mangroves, and lagoons provide habitat for commercial fish and shellfish species and protect the coastline from erosion, the force of waves and storms (hurricanes and typhoons)
- **Fish and other marine resources** provide a high percent **(40%) of the total animal protein in the diet** of Pacific Islanders (>2x the worldwide average)
- **Tourism**, which is highly dependent on the quality of the coastal environment, currently provides the island with an estimate \$1 billion (or more) in revenues annually



https://commons.wikimedia.org/wiki/File:%27Hawaiian_Fisherman%27,_watercolor_on_paper_by_Charles_W._Bartlett.jpg



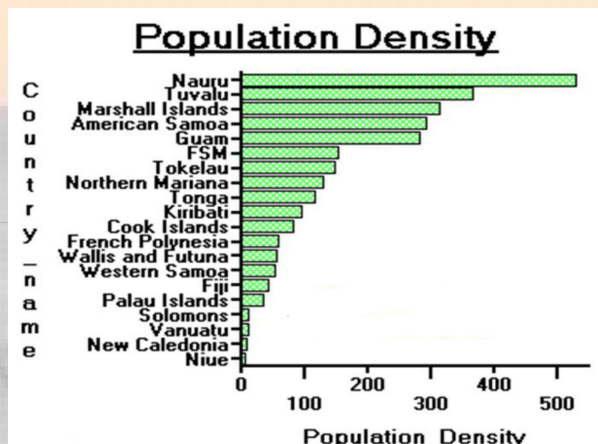
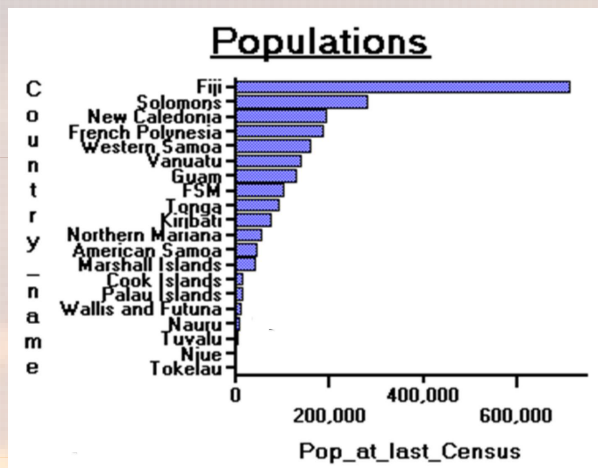
https://en.wikipedia.org/wiki/Hanauma_Bay



Turtle! - Tourism is a huge part of Hawaii's economy and beautiful places like Hanauma Bay inspire people to visit.

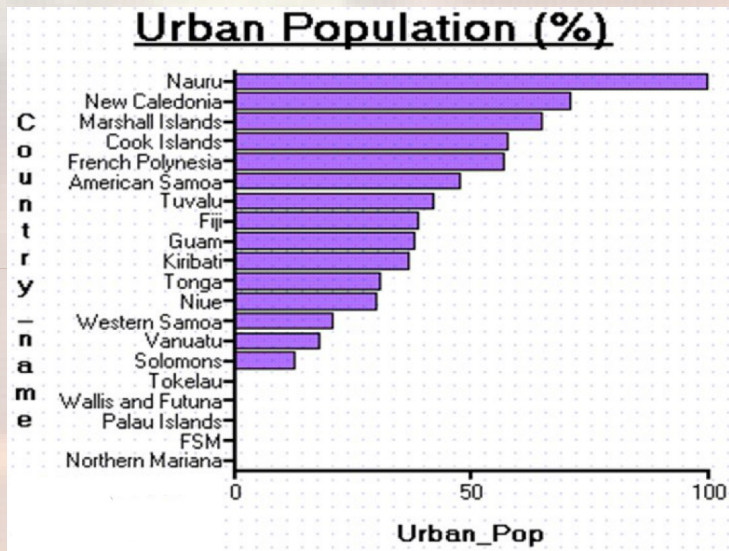
Hanauma Bay is a Marine Sanctuary

Economic & Population Characteristics



- People living in “territories” have **better access to goods** and services than people of the independent states
- Typically a big difference between **urban and remote area** lifestyle and standard of living
- **Outer island communities** are generally small, isolated and resource poor
- In terms of relative development, **Solomons and Vanuatu are the poorest**
- **Economic growth rate is low** in lasts 2 decades; population and urbanization growth rate are high
- High level of development assistance per capita and remittance income tend to mitigate the appearance of poverty

Population Pressures



Ebeye Island, [Marshall Islands](#)

Population: 15,000; People per square kilometer: 41,667

Size: .36 square kilometers

<http://gadling.com/2011/07/07/top-ten-most-crowded-islands-in-the-world/>

- **Population growth**, combined with low economic growth rate and weak prices for agricultural commodities such as copra and taro, has intensified the commercial harvesting of coastal resources
- As more people **migrate from island interior and distant atolls to population centers**, coastal pollution worsens
- Increasing **urban population density** results in the spread of shantytowns and slums, and environmental degradation
- **For example:**
 - 75% of all Tahitians live in the capital city of Papeete
 - 95% of the population of American Samoa live and work on the main island of Tutuila, most in the capital of Pago Pago
- Small islands, with **limited space and resources** can least afford the damaging effects of crowded coasts

Productive Activities

- **Agriculture and fishing are the main activities**
- **Agriculture employs more than 40%** of the labor force: Melanesian states, FSM, Tonga, Samoa, and Kiribati
- **Tourism** is the fastest growing industry. Guam, Fiji, New Caledonia and French Polynesia are the major tourist destinations. Tourism is important in the economies of Palau and the Cook Islands
- Virtually all countries produce and export **copra and other coconut products**.
 - Decline in copra markets has seriously affected the economies of most outer islands and rural areas
- **Timber is an important resource** in large forested countries of Melanesia.
 - Aggressive harvesting by mainly foreign companies has caused controversy in recent years



Poseidon Undersea Resort, Fiji
<http://www.poseidonresorts.com/>



Coconuts drying before being processed into copra in the Solomon Islands.
<https://en.wikipedia.org/wiki/Coconut>

Environmental Problems – Coastal and Marine

- Coastal and Marine Resources
 - The physical environment of the Pacific nations is fragile
 - In 1999, when a survey was conducted, coastal resources were found to be declining, particularly as the result of overharvesting and pollution (sewage, fertilizers, silt and toxins)
 - Other reasons include destructive fishing practices and use of poisons

Level of Threats to Coral Reefs

Country	Reef Area (sq km)	Low	Medium	High
Fiji	10,000	33%	48%	19%
French Polynesia	6,000	82%	18%	0%
Maldives	9,000	88%	12%	0%
Marshall Islands	6,000	97%	3%	0%
New Caledonia	6,000	83%	13%	3%
Papua New Guinea	12,000	50%	38%	13%
Solomon Islands	6,000	50%	42%	8%
Hawaii	1,200	54%	38%	8%

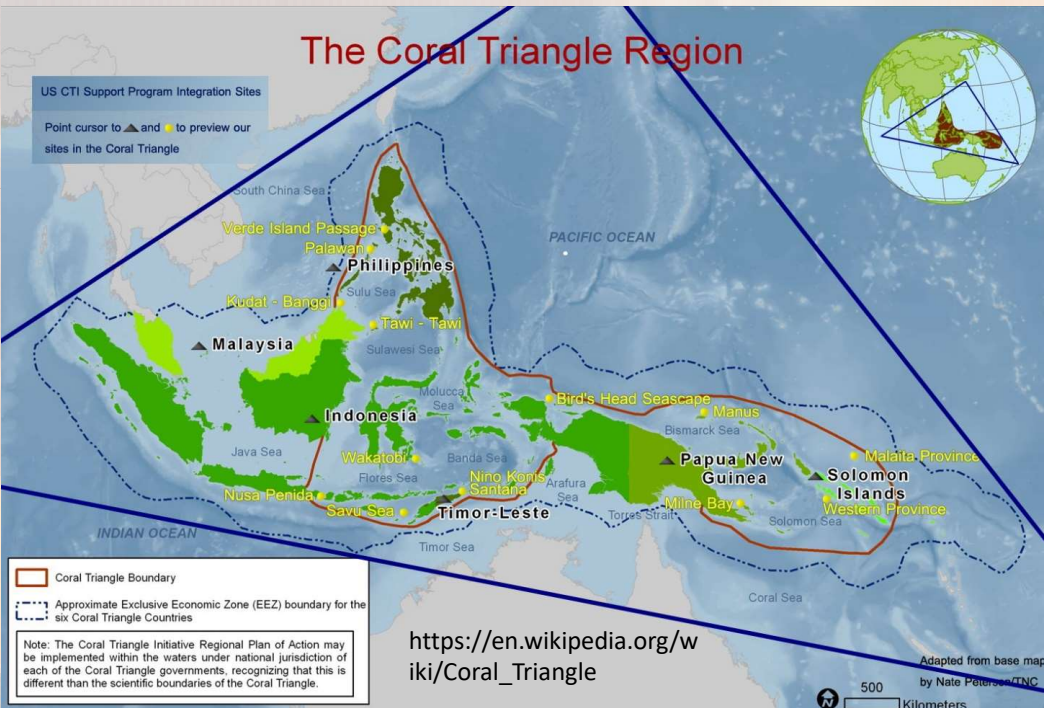


Below: Healthy Coral
https://en.wikipedia.org/wiki/Coral_bleaching#/media/File:Leaf_plate_montipora.gk.jpg



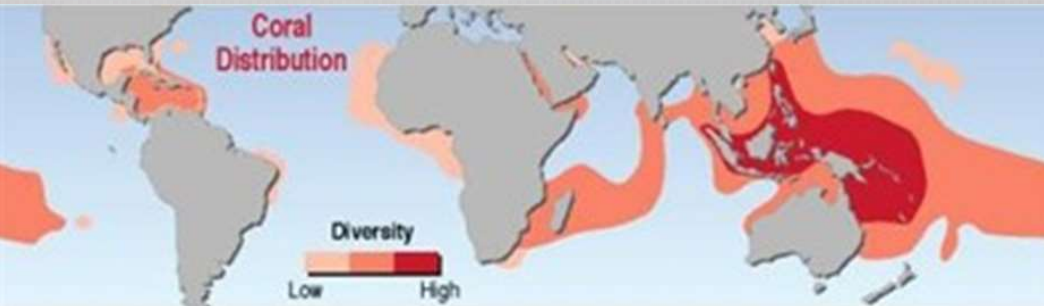
Left: Coral Bleaching
https://en.wikipedia.org/wiki/Coral_bleaching

Environmental Problems – Coastal and Marine

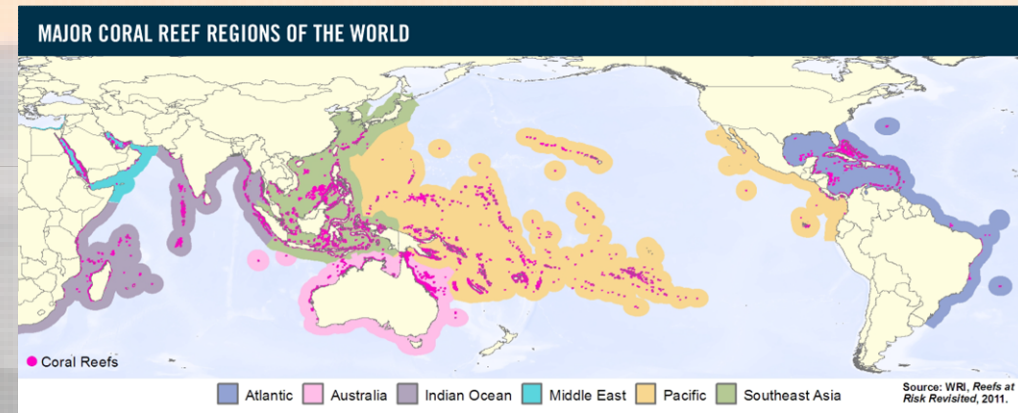


• Corals are at RISK!

- Coral bleaching occurs when the corals are subjected to stress, and their tolerances are exceeded.
- When this occurs, the symbiotic algae are ejected and the corals lose their color, and are white.
- One well documented cause of bleaching is increase of sea surface temperatures (SSTs).



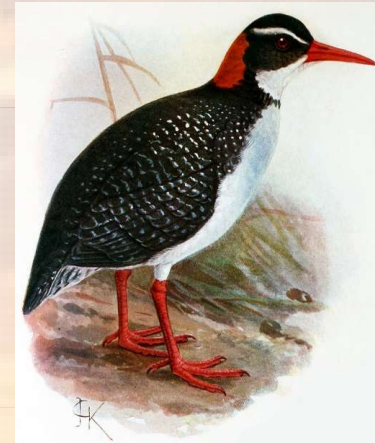
<http://www.grida.no/publications/rr/our-precious-coasts/page/1288.aspx>



http://sites.duke.edu/biology217_01_s2011_pv24/files/2011/04/regional-map.png

Environmental Problems – Biodiversity

- The plants and animals of the Pacific Islands are often found nowhere else in the world
- **New Caledonia** has been isolated from other lands for 80 million years.
 - 76% of the flora and fauna evolved on the island
- **Many species found on the Pacific Islands have gone extinct**
- The decline of biodiversity of the Pacific Islands began with the arrival of the first humans.... But, the arrival of European settlers greatly accelerated the loss of biodiversity
- **Agriculture**, logging, hunting, population growth, habitat change and introduction of exotic species are the main causes of loss
- **Marine biodiversity** is threatened by pollution, overexploitation, global warming and destructive fishing practices



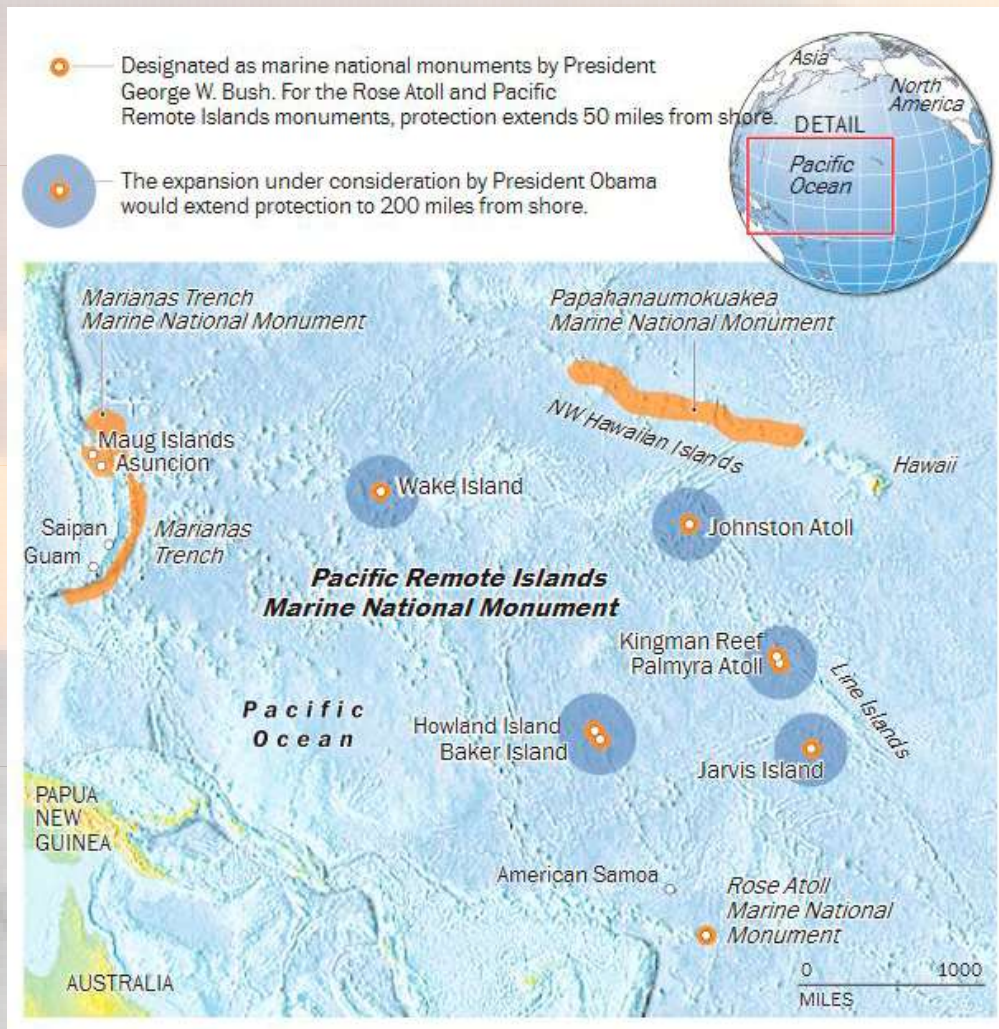
Extinct Tahitian Red-Billed Rail (left)
https://en.wikipedia.org/wiki/List_of_recently_extinct_birds
Protected Hawaiian Nene (right)
https://en.wikipedia.org/wiki/Nene_%28bird%29



Amborella, the world's oldest living lineage of flowering plant found on New Caledonia

https://en.wikipedia.org/wiki/New_Caledonia

Management of Environmental Issues



- Conservation areas (e.g. Hanauma Bay in Hawaii)
 - Planned and managed by local communities with government agencies and NGOs
- Endangered species protection strategies (e.g. sea turtles)
- Community-based resource management
- Education and public awareness

<http://resiliencesystem.org/obama-proposes-vast-expansion-pacific-ocean-sanctuaries-marine-life>

Environmental Problems – Other



Kanapou Bay, Kaho'olawe, Hawaii
<https://www.flickr.com/photos/7437991@N08/galleries/72157622644737508/>

- Other environmental problems that plague the Pacific Island nations include

- **Limited Freshwater resources**

- Water shortages
- Contamination
- Overpopulation and Usage
- Contamination of Groundwater Supplies

- **Pollution**

- Few working sewage treatment plants
- Few Landfills
- Hazardous chemicals
- Nutrient pollution

- **Unsustainable Agricultural and Forestry Practices**

- Deforestation

Discussion – Environmental Issues & Weather

- Which of the environmental issues we talked about today are directly related to weather events?
- Which of the environmental issues are related to climate?
- How does the weather and the climate of the islands we discussed relate to the economics of the islands?