Impacts and Management of Extreme Weather Events in the Federated States of Micronesia

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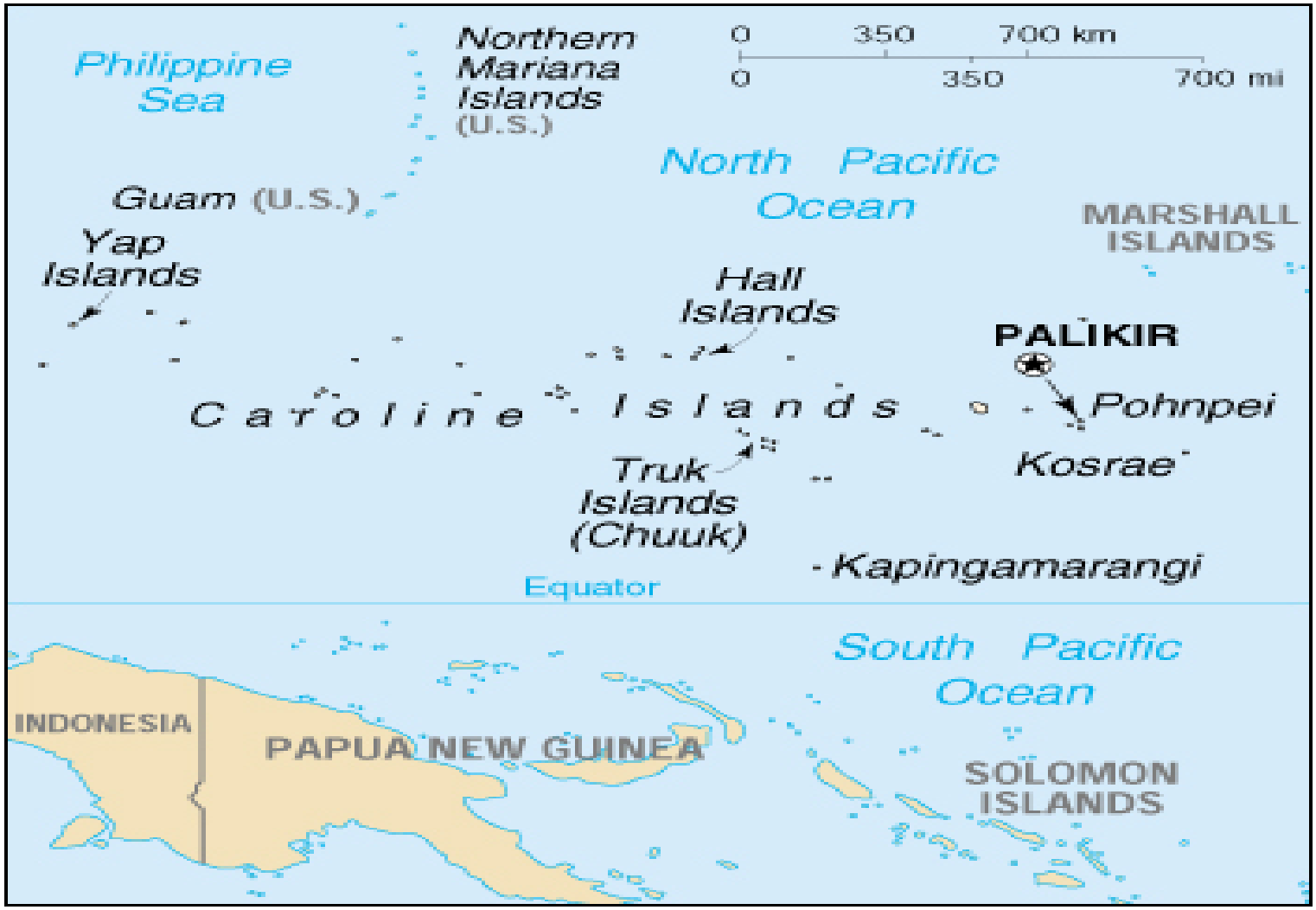
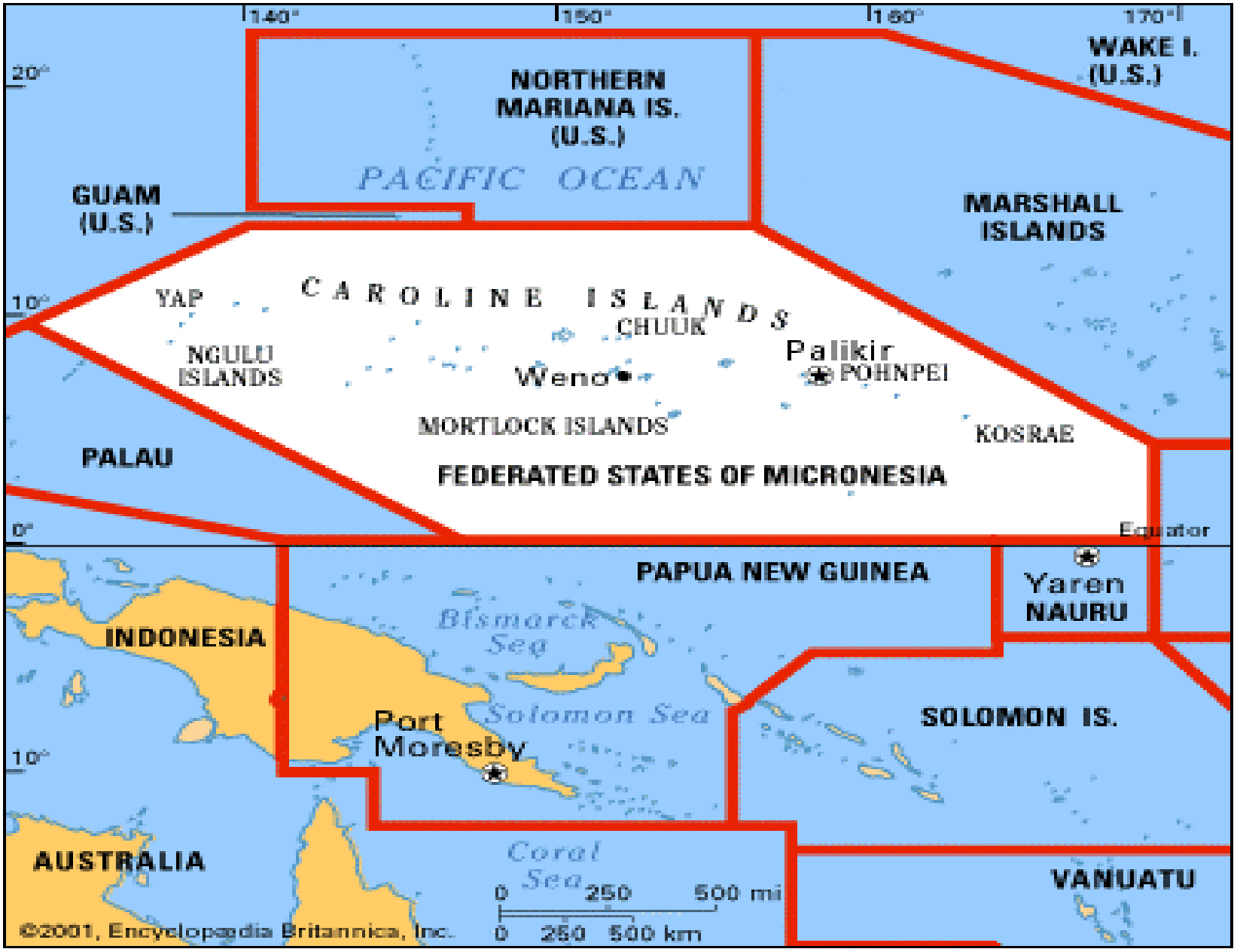
Federated States of Micronesia




140°
150°
160°
170°
20°
10°
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NORTHERN MARIANA IS. (U.S.)
WAKE I. (U.S.)
PACIFIC OCEAN
GUAM (U.S.)
MARSHALL ISLANDS
YAP
CAROLINE ISLANDS
CHUUK
NGULU ISLANDS
Weno
Palikir
POHNPEI
MORTLOCK ISLANDS
KOSRAE
PALAU
FEDERATED STATES OF MICRONESIA
Equator
PAPUA NEW GUINEA
Yaren
NAURU
INDONESIA
Bismarck Sea
Solomon Sea
SOLOMON IS.
Port Moresby
AUSTRALIA
Coral Sea
VANUATU
0 250 500 mi
0 250 500 km
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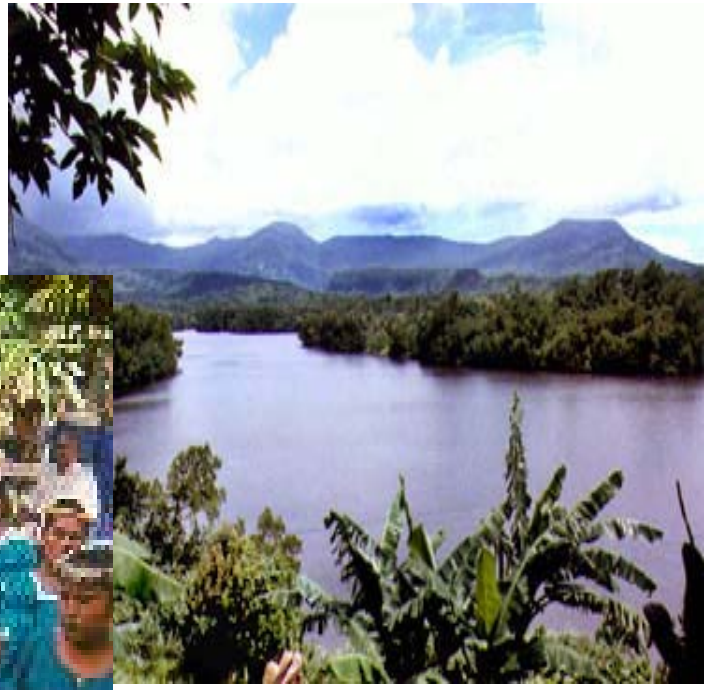
Economic Context

- FSM's GDP - approx. US$ 230 million
- Per capita GDP - approx. $1,977 per year
- Main sources of income:
  - **US payments under the Compact of Free Association**
  - **Fisheries**
  - **Government services**
  - **Tourism**

- ***Population*** –120,000 roughly
- ***Population density*** –168 sq. kilometer
- ***Migration***
  - Outward migration of 11.65 per thousand people in the country.
  - Internal migration – many outer islanders have moved to urban centers to flee drought-stricken or typhoon damaged islands and atolls
- ***Traditional political structures*** including traditional chiefs, govern behavior in rural areas



Subsistence Activities

In rural areas, people rely heavily on fishing and gardening for food

local economies are centered around subsistence activities, and production for non-monetary trade.

- Yap – 27% of the vegetation is agroforest.
- Cultivation of wetland taro plays a significant role in the lives and livelihoods of islanders, and is a staple crop.
- Sensitive to changes in precipitation and salt water intrusion.

Projected Impacts of Climate Change

- Droughts and associated fires
- Typhoon (wind wave and flooding hazards)
- Floods and heavy rains, with associated mud and landslide hazards
- High surf conditions
- Sea level variation
- Long term sea level rise

Drought: 1997-98 El Niño

Preparations:

- Warnings came in June 1997 from PEAC – a partnership among NOAA, the University of Guam, the University of Hawai'i and the Pacific Basin Development Council
- Local vendors sold imported water catchments
- FSM Government delivered water to outer islands in Chuuk and Yap.
- FSM Congress appropriated $5 million to address the potential impacts of anticipated drought conditions
- Water management agencies implemented water conservation plans.
- Public information campaigns about boiling water to prevent outbreaks of disease, reducing wildfires.

Drought Effects

- Serious losses of both food and cash crops.
  - Loss of **taro** and **breadfruit** exceeded 50%, these are staple subsistence crops
  - Over half the **banana** trees evaluated had died or were seriously stressed.
  - **Sakau** (kava) was the most serious economic loss, because it had become a cash crop.
  - **Betel nut** prices went up more than 500%, though only a reduction of 15-20% of trees lost.

Drought Effects

- In the region, changes in ***migratory patterns of fish stocks***
- ***Coral reefs*** -- associated with increased temperatures – coral bleaching
- ***Streams dried up***, reducing freshwater eels, shrimp, fish
- ***Wildfires*** and deliberate burn off
- ***Water rationing*** became necessary
  - Pohnpei, municipal water available 2 hours per day at the height of the drought
  - Outer islands, water was supplied by ship
  - tanker trucks delivered water to schools in rural areas

Typhoon Activity

- ***Western Caroline islands*** (Yap vicinity) have been said to spawn more tropical typhoons than any area on earth, with an average of 19 per year. These typhoons move northwest toward Asia.
- Historically, typhoons rarely occurred in the ***Eastern Carolines*** (Chuuk, Pohnpei Kosrae), Nevertheless,
  - 1987: **SuperTyphoon Nina** hit Chuuk, before hitting the Philippines
  - July 2002: **Tropical Storm Chata'an** hit Chuuk, taking many lives, before hitting Guam, where it caused massive economic losses, but few lost lives.
  - December 2002: **Typhoon Pongsona** affected the outer islands of Chuuk.

Typhoon Effects

- Tropical Storm CHATA'AN, hit Chuuk State of FSM on 1 and 2 July 2002
- Chuuk is the most heavily populated state of the FSM with about 65,000 people (half the FSM's population)
- The worst affected islands were Weno, the state capital, Tonoas, Fefan, Udot, Uman and Siis.

Chata'an hits Chuuk

Worst typhoon in a century
Wind speeds of over 65 mph/ 112 km per hour
Torrential rains
More than 200 landslides
Designated shelters flooded
Landslides continued for days

Aerial view of landslides

Human Losses

- **43 people killed**
- **109 people injured**
- **39 people hospitalised**

Between 120 and 170 families
(900-1,300 people) are estimated to have been directly affected, **through the loss or injury of a family member, and/or the partial or total destruction of their homes**

Additional homes were abandoned due to fear of further landslides in the same or adjacent areas.

Infrastructure Damage

Lifelines, where previously available, were cut:

- **water supply systems damaged**
- **sewage systems - breakdown, overflow**
- **telephone**
- **radio communications**
- **aviation links**
- **power supply**

Damage not limited to Chuuk

- **Low-lying atolls of Nukuoro and Sepwuafik**
  - **In Pohnpei State**
  - **hit with ocean swells of over 3.5 meters (10 feet)**
  - **Swells destroyed sea walls and coastline structures**
  - **Caused massive intrusion of seawater, and**
  - **extensive crop damage**

House flattened by Chata’an

Relief Efforts post-Chata'an

- Local/Community Response
- State Response
- National Response
- International Response

Local Response

- Micronesian Red Cross National Office released relief items in the disaster preparedness container on Pohnpei to Chuuk – but had to be transported there – takes time.
- Other RC national societies
- Organisations and individuals in Pohnpei, including women's groups, local businesses, government offices

State Response

- State Government established the *Chuuk State Task Force (TF) on Tropical Storm Chata'an*
  - public awareness campaign on health and safety threats
  - appealed to unharmed local communities for donations
  - provided parcels of medical supplies to each island dispensary
  - provided limited locally-generated food, chlorine, and clothing
  - provided the state's one freighter to conduct an assessment and deliver relief in the Mortlocks.
- Initial response hampered by the lack of ***financial and material resources*** for transportation of people and goods, and lack of equipment such as bulldozers to clear landslide debris.

National Government Response

- President of FSM responded to Chuuk State's disaster declaration, and declared Chuuk to be in a state of emergency. This released federal funding (approx. $200,000) to the state, despite a serious budgetary crisis, to assist the immediate response.
- FSM National Government sought international assistance from U.S. Federal Emergency Management Agency (FEMA) and others.

International Response

- US Government provided over $10 million in federal disaster assistance:
  - Sent 8 member Disaster Response Team from U.S. Federal Emergency Management Agency (FEMA) arrived 13 July for a 7-10 day mission. 35 more FEMA personnel arrived on 15 July. Team evaluated short and longer-term needs as well as providing immediate relief.
  - Provided relief materials including chainsaws, shovels, tents, camp beds, blankets, wash kits, foods, water.
  - Provided vouchers for materials and supplies, grants, low-interest loans.
- Australian Government agreed to restock the FSM Red Cross disaster preparedness container in the capital in Pohnpei (value approx. $10,000).
- Japanese Government delivered tents, blankets, jerry cans and generators (approx. value $87,000).
- Japanese Embassy pledged $10,000 for MRCS to purchase medicine, medical supplies
- Israeli Government sent shipment of medication worth $5,000.

- ***International Federation of Red Cross and Red Crescent Societies*** (IFRC) - $30,000 (20,000 for a health delegate to perform a preliminary assessment, 10,000 food and non-food items).
- ***United Nations Disaster Assessment and Coordination*** (UNDAC) team conducted a mission to the disaster sites to compile an assessment report.
- ***UN Office for the Coordination of Humanitarian Affairs*** (OCHA) provided cash grant of $20,000 to purchase water tanks
- ***UNICEF*** Suva supplied 20 kg of medicines and medical supplies (value approx. $1,000), delivered by UNDAC directly to the Chuuk Health Department.

- ***New Zealand Red Cross*** - pledged NZD 20,000 for reimbursement of DREF
- ***Australian Red Cross*** - pledged AusD 10,000 for reimbursement of DREF
- ***International FRC*** - sent a health delegate to assist MRCS with a needs assessment.
- ***Palau Red Cross*** – food and clothing
- ***CNMI Red Cross*** – food, water, cleaning items
- ***Micronesian Red Cross,*** Chuuk Chapter, worked with a government assessment team
- ***Medical supplies*** - donated by Guam doctors, pharmacies and Guam Naval Hospital
- ***Medical services*** - team came from Guam

Vulnerabilities

- **Subsistence Agriculture**
  - Greatest percentage of the most productive agricultural land is located in low-lying coastal areas at risk from climate-related changes in sea level.
- **Salt-water intrusion**
  - caused by sea level rise
  - A challenge unless salt-tolerant species can be utilized.
- **Dependence on coral reefs**
  - provide marine life for food
  - serve as a protective barrier against wave and wind damage.
  - Sensitive to temperature changes: significant coral bleaching occurred during the 1997-98 El Nino.
  - Sensitive to damaging effects of tropical cyclones.

Risk Management

- Tendency toward reactive decision-making instead of forward planning, largely due to resource constraints.
- FSM's capability to deal with climate-related hazards and natural disasters is limited
- Geographic constraints on capacity to deal with disasters: islands are far apart; communications and transport difficult
- Great dependence on outside assistance during disasters, which increases with the size of the event
- Recovery from disasters is slow
- If the frequency and/or intensity of individual extreme events increases, more difficult to absorb and recover from these events.

Challenges and Accomplishments

Challenges in addressing disasters:

- providing access to fresh water
- protecting public health
- ensuring public safety
- sustaining agriculture
- protecting infrastructure
- sustaining tourism

Accomplishments

- FSM established a National Disaster Management Office
- Micronesian Red Cross Chapters relatively newly created.
- early warning systems improving
- public education efforts are underway
- New water systems developed in Yap, PNI
- Greater public access to water catchments

Private Insurance Sector

- 4 private insurance companies in the FSM
- No FSM-based insurance companies
- Insurance companies that are present act as agents for companies with headquarters in Guam, Hawaii and the mainland United States.
- Reinsurance companies for these policies are based in the US territories and mainland.

- Policy premiums often go up after a big storm.
- Only a few government buildings are insured (in Pohnpei (national covered, state are not)
- The FSM Development Bank requires commercial and property insurance for construction projects.
- While policies cover damage from storm events, some do not cover flooding.
- Loans associated with the U.S. Farmer's Home Loans require insurance.

Insurance Considerations

- Information:
  - National statistics on insurance coverage not readily available within the FSM
  - Information on regional insurance coverage not readily available
- Affordability – reasonable premiums
- Insurability – many structures not suited for standard insurance cover
- Issues to think about:
  - Crop insurance?
  - Flood damage?
  - Land use planning?

New Developments

- Future of US Emergency Assistance Under the New Compact of Free Association
- ACP/EU Partnership Emergency Assistance

Super Typhoon Paka

The Worry: After gathering strength near the FSM, in December 1997, Typhoon Paka veered north to sweep across Guam, with peak gust wind speeds of 240 mph, the highest wind speeds ever recorded over land.

Damage was estimated at $400 million.

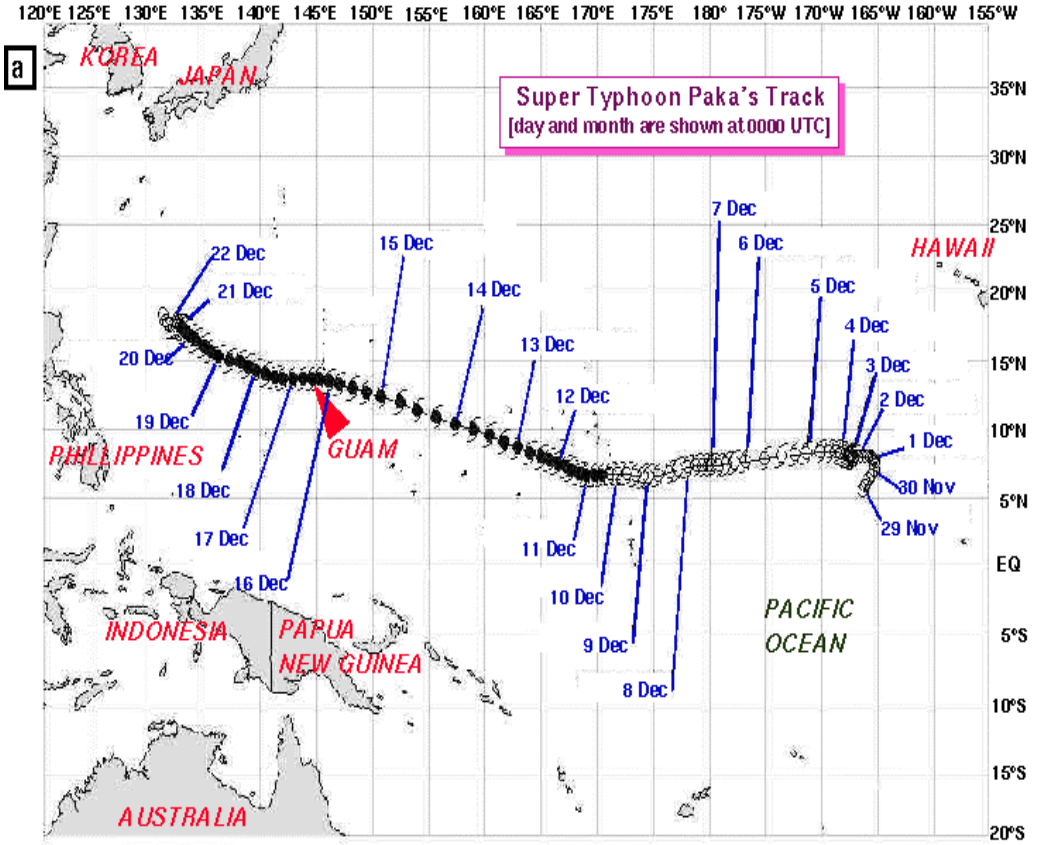


Figure 1: Super Typhoon Paka's track is shown: a) during 29 November - 22 December 1997 where the open circles indicate tropical depression strength, the open tropical cyclone symbol is tropical storm strength, and the filled tropical cyclone symbol is typhoon strength (JTWC 1998).

Selected sources:

Pacific Island Assessment: Preparing for a Changing Climate: the Potential Consequences of Climate Variability and Change for Pacific Islands
Disaster Recovery News, FEMA-State Joint Information Center
FSM National Biodiversity Strategy and Action Plan
International Federation of the Red Cross Information Bulletin12 July 2002

For additional sources used and information, contact FSM Department of Foreign Affairs, FSM Department of Economic Affairs (Sustainable Development Unit) and FSM Disasters Office under the Office of the President.