

River Floods

NATURAL HAZARDS IN THE PACIFIC - FACT SHEET 6



Reducing Vulnerability of Pacific ACP States

River flooding is a frequent risk to high volcanic Pacific island countries due to high rainfall, small river catchment areas and low lying coastal areas. Whilst floods cause considerable damage to people and property, some benefits of flooding include an increase in soil fertility due to sediments being deposited on flood plains, pollutants being washed away and groundwater being replenished. However, currently our knowledge of Pacific island river system behavior remains poor.



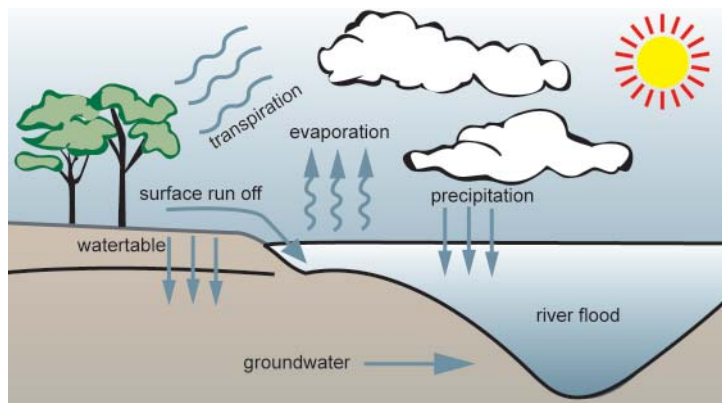
Image source: Faga Finiasi, Fiji PWD
Evacuation at Navua Hospital, Fiji, during Easter floods 2004.

What is a Flood?

Inland flooding results from heavy and prolonged rainfall, when the water level in rivers and streams rises over the banks and inundates the surrounding land. There are three different types:

- **Flash Floods** occur within a few hours of torrential rains with little or no warning and dissipate rapidly. This is the most common form of flooding in Pacific island countries.
- **Rapid-Onset Floods** occur within several hours of heavy rainfall, can last several days and are specific to medium-sized river catchments.
- **Slow-Onset Floods** occur gradually over a fairly long period of time and are only characteristic of large river systems like the Sepik, PNG.

Coastal flooding is a separate hazard which occurs when storm surges, waves and/or extremely high tidal levels inundate low-lying coastal areas.



A simple diagram of the water cycle as it relates to flooding.

What Causes Flooding?

Many factors influence the intensity of a flood:

- Rainfall intensity and duration.
- Steepness of terrain.
- Water levels and moisture conditions preceding the rains.
- Increased runoff due to deforestation.
- Capacity of rivers, streams and drainage networks.
- High tide levels preventing river drainage.

Example: Cyclone Ami in 2003 cost Fiji's agricultural sector alone FJ\$66 million. The floods killed 17 people and there were outbreaks of diarrhoea, dengue fever, leptospirosis and typhoid. Floods in Samoa in 2001 cost SAT 11 million and affected nearly 30,000 people. Papua New Guinea suffers several seriously destructive floods every year, which affect thousands of people.

Flood Hazards

Floods disturb fragile island economies by affecting individuals, businesses, insurance companies and governments. The costs of flooding are high. For example, Fiji's economy suffers annually losses of some FJD 20 million on average due to flooding.

People and property. Floods have tremendous impacts to life and property, with 10 people on average being killed every year in Fiji alone. Buildings, personal belongings and stock get washed away or seriously damaged by muddy water. Businesses and services become disrupted for several days and people need to be evacuated from flooded areas, sometimes for weeks.

Livestock and crops. Animals and crops get drowned and washed away and sometimes soil is saturated for months afterwards, preventing new planting.

Disruption of transport. Floods can seriously affect transport lines with airports closed, roads submerged and bridges washed away.

Health hazards. Spread of epidemics such as cholera is frequently associated with floods due to the flooding of septic tanks and sewage systems contaminating drinking water.



Flooding impacts largely on sparse transport routes in small Pacific islands countries, as shown here on Savai'i, Samoa.



Flooding in February 2005 led to the disruption of the Lae-Madang Highway, a main transport route in PNG.



Floods can transport a huge amount of sediment into oceans and onto reefs. At this bridge in PNG the whole river channel was filled up with sediment over a distance of 20 km. The river channel disappeared altogether within 3 - 5 years. This bridge worth a million kina became redundant and was dismantled.

Flood Risk Reduction

Flood risks can be reduced through a combination of options including engineering solutions, development planning and early warning systems. Structural flood defence measures require ongoing maintenance and unfortunately can result in flood prone areas being used inappropriately for housing or agriculture. Development planning and control is essential and cost-effective but it can be difficult to enforce. Some flood mitigation options are outlined below:

Structural:

- Hydropower dams and water-reservoirs control river flood levels in lowland areas.
- Embankments along river courses contain greater quantities of floodwaters.
- River dredging, deepening and widening of river channels increases its capacity.

Non-structural:

- Controlled development, based on flood hazard zones
- Catchment management practices to decrease runoff.
- Insurance to transfer the costs of flood damage.
- Flood warning systems.

Flood Warning

Effective flood forecasting and warning is difficult in Pacific island countries because catchments are invariably small and steep, high intensity tropical rainstorms are common and flash flood forecasting technology is lacking in the region. However, standard techniques of flood forecasting, such as using data on previous floods, geology, soil, drainage and precipitation in sizeable catchments do help predict flooding.

Currently Fiji operates the only functional flood warning system in the region. As part of the European Union funded Reducing Vulnerability Project implemented by SOPAC, an additional flood warning system will be established in Fiji. It will also strengthen flood monitoring, modelling and warning capacities in Samoa, Vanuatu and PNG. SOPAC provides further assistance in this field through a global initiative called Pacific-HYCOS, funded by the European Union.

EXAMPLE: At the village of Nabouciwa, the Fijian Government devised a project to reduce the risk of flooding by a) dredging the river delta, b) using sludge from dredging to raise the village level, c) raising houses on stilts using local materials, d) implementing a village draining system and e) educating and mobilising the community.

What you can do before, during and after a flood

PREPARE FOR A FLOOD:

- Learn all you can about previous floods in your area and about possible warning signs and systems.
- Keep an eye on the weather conditions, listen to the weather forecast and follow flood warnings.
- Keep to hand materials such as lumber, plywood, nails, rope, wires, plastic sheeting, sandbags, etc.
- Keep to hand a portable radio, spare batteries and an emergency kit.
- Store all chemicals away from the reach of flood waters.
- Store livestock feed and supplies above expected water levels. Ensure safety of pets.

UPON HEARING A FLOOD WARNING:

- Listen for emergency instructions.
- Ensure all your family members are present.
- Watch for rapidly rising water.
- Store drinking water in sealed plastic containers as water supply may be interrupted.
- Move livestock to higher ground.
- Move household items to higher levels. Secure objects that could float and cause damage.
- Evacuate if necessary when it is safe to do so. If crossing flood waters, move slowly to avoid losing your footing.
- Turn off electricity at the main switch before evacuating.

DURING A FLOOD:

- Avoid areas prone to flash flooding.
- Don't attempt to cross rivers or streams where water is above knee level.
- Beware of water-covered roads and bridges.
- Never allow children to play around high water or storm drains.
- Animals can swim well. Do not leave them in confined areas or pens. Open gates so that animals can escape.

AFTER THE FLOOD:

- Re-enter buildings with caution. Use flashlights, NOT lanterns with open flames in case of flammable gas inside.
- Be alert for fire hazards such as broken electrical wires.
- If the building has been under water, do not switch on the main, wait for professional assistance. Never touch electrical switches while wet or standing in water.
- Don't use appliances or equipment until they have been cleaned, dried and thoroughly checked for damage.
- Report damaged utility lines (electricity, water, gas and telephone) to the appropriate authorities.
- Boil all water and don't eat left-over food until it is checked for contamination.
- Keep away from disaster areas as your presence may