

Water is a friend and a foe

Water can be a friend or foe depending on the circumstances. It can be a friend when it comes in sufficient supply but a foe when it comes in excess quantities and when it is too little to sustain life.

Most frequently, excess water is defined as the river channels inability to contain the flow of water within its natural channel. The surplus water then spills over the river-banks and flows in to the depressions, voids and storage basins. The strength of the moving water column is given as the mass of the moving water times the speed of the motion. This is the energy required to cause damage and destruction.

The water levels begin to drop when there is insufficient rain falling. This reduces the ability of soil to store water for the plants and the flowing rivers to recharge the underground water reservoirs giving rise to drought and el-nino conditions.

1. Types of flooding in Papua New Guinea

The most common form of flooding is along rivers after heavy rainfall. Overflow of drainage systems in urban areas can also be a major problem, particularly in heavily populated areas. Low lying coastal areas can be inundated by storm surges usually caused by tropical cyclones. Our rivers can be broadly grouped as those around the coast draining more or less directly to the sea, and those draining large areas of the inland.

Inland River – Slow Onset Flooding

Flooding of river in the vast flat areas of Sepik and Western provinces and other parts of Morobe province may last for one or more weeks, or even months on some occasions. Floods in these areas can lead to major losses of livestock and damage to crops, as well as extensive damage to rural towns and road links. This may result in the isolation of the whole communities from the rest of the population.

Mountain/ Coastal Rivers – Quick Onset Flooding

Flooding can occur more quickly in the mountain headwater areas of large rivers, as well as the rivers draining to the coast. In these areas, the rivers are steeper and flow more quickly, with flooding sometimes only lasting for one or two days. These floods can potentially pose a risk to loss of life and property because there is generally much less time to take preventive action, and flow of water is faster and more dangerous. This type of flooding can affect most of our major towns and cities, especially in Markham area of Morobe province and the Gulf province.



Figure 1: Erosion at headwaters caused by flash flooding.

FLASH FLOODING

Flash flooding results from relatively short, intense burst of rainfall, often from severe thunderstorms. It can occur in almost all parts of PNG and poses the greatest threat of loss of life. People are often swept away after entering floodwaters on foot or vehicles. These floods can also result in significant property damage and major social disruption. They are a serious problem in the urban areas where the response time is in one or two hours and the drainage systems are often unable to cope. They can also occur in rural areas where the nature of terrain and steepness of the streams could lead to very rapid development. This is common for Port Moresby and Lae cities.

2. Monitor your water level and flood

The Water Resources Management Branch of Department of Environment and Conservation provides rainfall and stream level data from observation stations in many parts of PNG. National Disaster and Emergencies Services and other agencies can have access to data on request.



Figure 2: Water Level/Flow Monitoring Station, Yonki, Eastern Highlands Province.

3. Floods – Know the hydrological cycle

Floods are part of the natural water cycle or a Hydrological Cycle. In this natural cycle, the energy of the sun causes water to evaporate and form clouds, which move inland and become rain. This rain will then run off either directly through the river system or be absorbed into the soil to later form groundwater flow.

Floods happen when the capacity of the rivers is not enough to carry the water that has entered the river network, and the banks overflow. The areas that can be inundated are called flood plain.

Floods are caused by prolonged or heavy rainfall. Cyclones bringing huge amounts of moisture inland from the ocean are a major cause of floods, particularly in coastal areas. Thunderstorms are relatively small in area but can produce very intense rainfall that can cause floods in smaller streams. Large storm systems that form around moist air masses moving across the country cause floods over large inland areas. Other, less common but significant causes are storm surge and tsunami, which involve rapid rise of the seas.

Several factors determine the size of flooding including; rainfall intensity (rate of rainfall) and duration (how long the rain lasts); how dry or wet the land is; topography; ground cover and many more. Therefore flooding is considered a complex natural phenomenon.

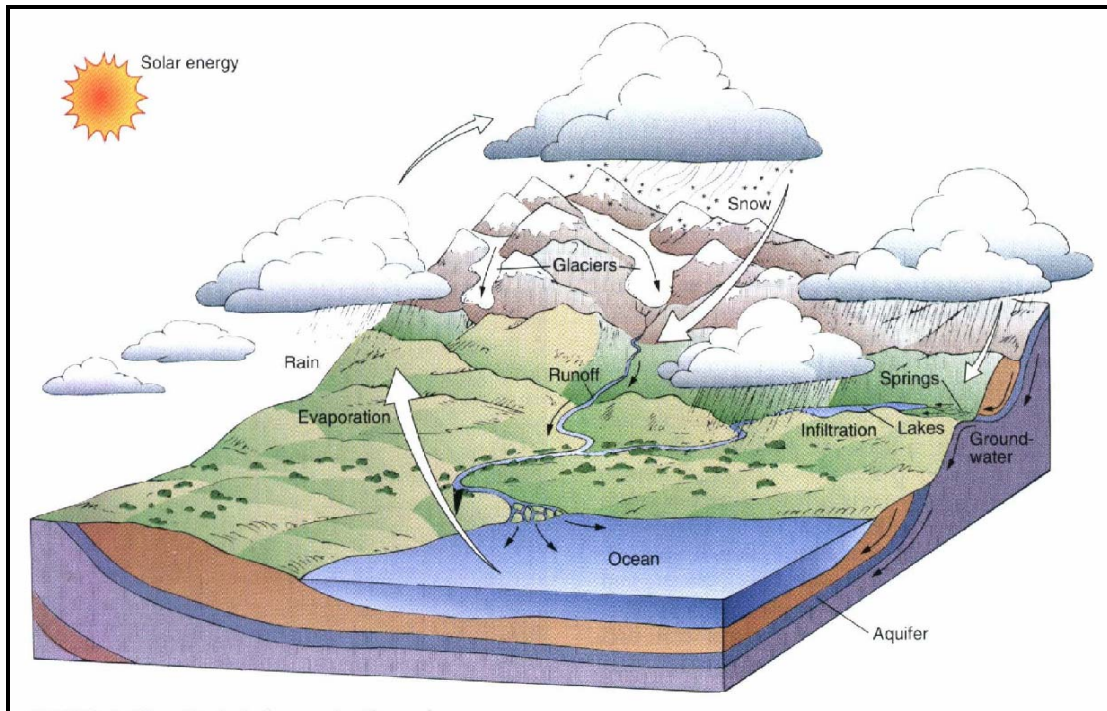


Figure 3: Hydrological Cycle.

4. Humans and floods

FLOOD RISK MANAGEMENT

People who live near river or low-lying costal areas live with the greatest threat of floods.

Townships living with threat of flooding have taken steps to mitigate the impact of the regular floods they endure by constructing levees, dams etc. These mitigation measures are often successful in giving protection against the smaller floods, but are not designed to withstand every flood that may occur. Flood hazard is sometimes called a silent killer because it can build up quietly and may not always seem dangerous. However, it is one hazard against which we can prepare and respond properly. Flood warnings issued by the authorities whenever there is a threat of flood, and except for flash floods, there is usually inadequate or not coordinated warning issued to take any protective action.

FREQUENCY OF FLOODING

Floods area natural phenomenon that occur frequently. The frequency of flooding in an area is commonly described by the average recurrence interval (in years) between occurrences of such flooding. For example, a flood that occurs around 5 times in 25 years

is said to have an average recurrence interval of 5 years (5 year flood). We need to remember that it will not necessary occur regularly every 5 years. There is a one in five chance that such a flood will occur during any one year.

Although a much bigger flood such as a 100-year is expected to happen rarely, there is still a one in a 100 chance that 1 flood of that size will happen in any one year.



Figure 4: Damage to access bridge caused by flooding.

HUMAN INTERVENTION AND FLOODS

While floods are natural phenomena, they are affected by human intervention. Changing land use from farmland to housing developments, for an example, can cause the runoff to increase and lead to an increase in the magnitude and frequency of flooding, and the speed on of onset.

Building dams that store water such as Sirinimumu and Yonki can reduce the magnitude and frequency of flood peaks below the dam. With the ongoing changes in the catchments and floodplains, it is important to keep track of changes in flood behaviour.

5. Flood Preparedness and Safety

(a) Before a flood

- Identify local risks in your area. Your local authority or provincial emergency services can inform you of your local plans, warning systems, evacuation routes and strategies
- Prepare a home emergency plan and identify risks around the home

- Fix faults and remove leaves, debris and items that can cause localised flooding
- Develop an evacuation strategy, which identifies routes and safe locations in which to shelter
- Prepare an emergency kit containing:
 - (i) a first aid kit (including medication)
 - (ii) a torch and portable radio with spare batteries
 - (iii) candles and water proof matches
 - (iv) important papers including emergency contact numbers
 - (v) a copy of your emergency plan
 - (vi) rubber gloves, and water proof bags for clothing and valuables
- Prepare a checklist of important family records, including wills, birth/marriage certificates, banking, financial records, etc
- Keep a list of emergency phone numbers on display
- Store poisons and chemicals on high shelves to reduce contamination of flood water

(b) During a flood

- Monitor current flood warnings
- Avoid entering flood waters unless absolutely necessary, and never underestimate the strength of flood water even if you are in the comfort of a vehicle
- If advised of local evacuation
 - (i) listen/watch for flood reports and instructions
 - (ii) follow all instruction by emergency authorities and react to changing conditions
 - (iii) turn off electricity, water and gas and take your mobile phone
 - (iv) place a strong plastic bag full of sand or earth in the toilet bowl and over shower and bath outlets to prevent backflow of sewage into your home
 - (v) lock your home and take recommended evacuation routes for your area
- If leaving of your own accord, tell police, provincial emergency services or neighbours so that they know of your whereabouts

(c) After the flood

- Wait until authorities have declared the area safe before entering a flood zone
- Before entering your house, wait until water has fallen below floor level
- Wear rubber boots (or at least rubber-soled shoes) and rubber or leather gloves
- If you are going into an isolated area notify the proper authorities
- Check with electricity, gas and water authorities to determine whether supplies to your area have been interrupted and are safe to be turned on by you. If the water supply system has been flooded, you assume it is contaminated.
- Do not use gas or electricity appliances until they have been checked for safety
- Beware of damaged power lines, bridges, buildings, trees and do not enter flood waters. Wait until authorities have declared the area safe before entering a flood zone

6. Where to obtain warning information

RADIO

Listen to the National Broadcasting Corporation and/or your local radio for emergency warning, evacuation advice and weather updates. Flood warning information is provided by the National Weather Service Office.



For more information contact:
The Principal Hydrologist
Department of Environment and Conservation
Environment Division
Water Resources Management Branch
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BOROKO
National Capital District
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