

Floods: Flowing Water Driven Natural Hazard Risk-Based Solutions Resources -2005 S. Mwiya-Ph.D, Pr. Eng

Floods are among the most common and widespread of the natural hazards. A flood is generally a temporary condition of partial or complete inundation of normally dry land or area. Floods represent the power of flowing water sometimes mixed with other lethal objects such as uprooted trees, waste and rock fragments up to the size of boulders. Floods occur in different forms and all involve flowing water rising and overflowing its normal pathway. Among the many different types of flood, the Seasonal River flood, Coastal flood, Urban Flood and Flash flood are the most common in Namibia. Examples of their occurrences include the floods that hit Windhoek and indeed other parts of the country during the week ending January 16, 2004 which were the urban and flash flooding types. Similar flooding phenomena also hit the town of Mariental and other parts of the country in 2000. Seasonal River flooding is common occurrence in the north-eastern part of the country and people there have been living and have learned to live with such floods. Coastal Floods are not very common but with increasing coastal developments and fluctuating weather patterns more infrastructure may be exposed in the future. History also tells us that our coastal town such Swakopmund and Walvis Bay have once been exposed to some type of flooding in their existence.

Types of Flood

Seasonal River Floods - Flooding along rivers especially perennial rivers such the Zambezi and Okavango rivers is a natural and expected yearly event. These floods occur seasonally when water from the main catchments areas fills the river channel and basins too quickly. In the process river overflows its banks particularly in topographically lower areas such as plains. Often the land around a river is covered by water but the process is slow gradual and generally develops over a period of days. This is typical of the flooding characteristics in Kavango region as well as the Caprivi Region, east of Katima Mulilo.

Coastal Floods-storms can produce drive ocean water onto land, sweeping away beaches and coastal houses in the process. Our coastal towns in Namibia have effective floods defences. In other parts of the world, sea waves called tsunamis,



giant tidal waves that are created by volcanoes or earthquakes in the ocean can also produce coastal flooding.

Flash Floods - Flash floods are a frightening and destructive geohazard phenomenon. Floods have enough power to change the course of a river channel and bury houses in mud. They are the most dangerous kind of floods, because they combine the destructive power of a flood with incredible speed and unpredictability. Walls of water generally carry a huge amount of debris with them. Flash flood waters move at very fast speeds. They have the power to move boulders, uproot trees, destroy buildings, and obliterate bridges, typical of the floods that hit Windhoek, January 16, 2004 and Mariental in 2000. Flash floods occur when heavy rain falls in an area and surface runoffs within a short time collect in a stream or gully and eventually turns the normally dry river channel into an instant rushing current. The quick change from calm to raging river is what catches people off guard resulting in panic and eventually giving up to the forces of water. Any flood involves water rising and overflowing its normal path. But a flash flood is a specific type of flood that appears and moves quickly across the land, with little warning that it's coming. When forecasters predict storms be alert and stay away from streams, ditches, and gullies. A storm upstream from you could send water rushing down your way.

Urban Flood - As undeveloped land is paved for parking lots, it loses its ability to absorb rainfall. Rain water can not be absorbed into the ground and becomes runoff, filling parking lots, making roads into rivers, and flooding basements and businesses.

An Overview at the Recent Windhoek Floods

There many factors that contributes to flash flood occurrence. Generally they are the result of heavy rainfall concentrated over one area. From a climatic perspective, most flash flooding is caused by slow-moving storms that repeatedly move over the same area.

Water from a dam can create the worst flash flood events. This is typical of the flooding characteristics that occurred along the Klein Windhoek River on Friday evening of January 16, 2004. It happen when When a dam or levee breaks, a gigantic quantity of water is suddenly let loose downstream, destroying anything in its path. As development expands including



Over a very short time, flash floods have enough power to change the course of a river channel and destroy infrastructure originally sort to be safe

undeveloped land is paved, it loses its ability to absorb rainfall. Rain water can not be absorbed into the ground and becomes runoff, filling parking lots, making roads into rivers, and flooding basements and businesses. The following factors determine the overall water budget during a rainfall event:

- i. Depressional storage - water collects in small depressions on the ground surface which is dependent upon the initial soil moisture status
- ii. Evaporation - water that returns to the atmosphere
- iii. Infiltration - water percolates in to the ground, replenishing soil moisture and the water table,
- iv. Interception - water trapped by flora and fauna in the catchment (including man) supplying their water needs, and
- v. Surface runoff - water which has not undergone any of the above processes and flows into the surrounding stream and river channels.

All the above processes are very active in Namibia. The time between rainfall events is often long and unpredictable and when the catchment is partially dry at the start of a rainfall event, it will initially collect water in hollows and depressions. Some of the water falling will infiltrate into the soil, replenishing the groundwater and soil moisture. This is an equilibrium process, and as the water content of the soil increases, the infiltration rate decreases. When the rate at which rain is falling on the catchment is greater than the rate at which all of the processes listed above (i – v) except the last (v), combined are removing it, the excess will flow in the rivers channels as runoff (v). Part of the rain, which flows as runoff into the surrounding river channels, is known as the effective rainfall and the fraction of the total rainfall, which is effective, is different for every storm and varies throughout the duration of the storm. However, the various data sets associated with the processes listed above, (i-v), are often not readily available and precipitation estimates may be used as an indicator depending on the type of project.

A Key to Sustainable Infrastructure Development

The use of sound latest data and the integration of key and relevant specialist as well as stakeholders, particularly local communities in the town planning process, are effective bases for achieving sustainable infrastructure development. The use of sound technical data in the town planning process is the first step that should then be followed by an extensive consultation process. The consultation process should involve the presentation to all the effected and interested parties, the technical data forming the base of the intended development.

Flood Precautions

Floods can be slow, or fast rising but generally develop over a period of days. includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation steps now, such as, engaging in floodplain management activities, constructing barriers, such

as levees, and purchasing flood insurance where necessary will help reduce the amount of structural damage to your home and financial loss from building.

- Don't drive through a flooded area. If you come upon a flooded road, turn around and go another way. More people drown in their cars than anywhere else.
- If your car stalls, abandon it immediately and climb to higher ground. Many deaths have resulted from attempts to move stalled vehicles.
- Don't walk through flooded areas. As little as six inches of moving water can knock you off your feet.
- Stay away from downed power lines and electrical wires. Electrocution is another major source of deaths in floods. Electric current passes easily through water.
- Look out for animals - especially snakes. Animals lose their homes in floods, too. They may seek shelter in yours.
- If the waters start to rise inside your house before you have evacuated, retreat to the second floor, the attic, and if necessary, the roof.
- Take dry clothing, a flashlight and a portable radio with you. Then, wait for help.
- Don't try to swim to safety; wait for rescuers to come to you.
- If outdoors, climb to high ground and stay there.