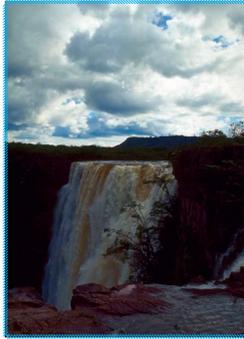


# water as a force in nature

**Running water**, that is water that flows on the Earth's surface in streams and rivers, is the most powerful natural agent operating on the surface, and changes the face of the Earth. Although short term catastrophes, such as tornados and earthquakes, can occur, their effect in the long term is not as great as that of running water.



**Soil erosion** is the process whereby *soil is removed* from an area, and when water is the agent of erosion, it can be in the form of gully erosion, or sheetwash.



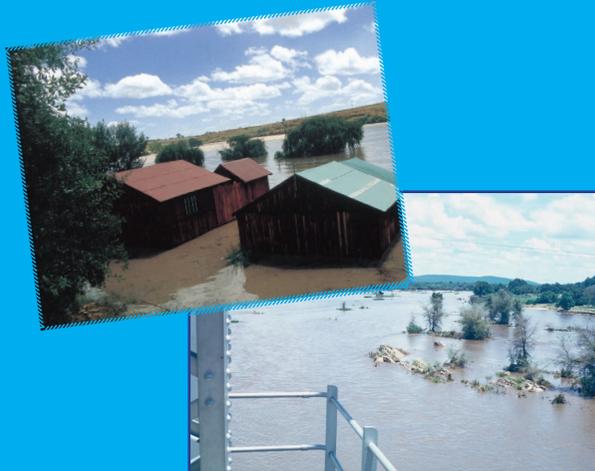
**Gully erosion** is more spectacular, because deep trenches may develop where water is concentrated into streams. The streams may actively deepen and widen the channel in which the water flows, especially where the soil is soft or disturbed in some way, such as where ploughing or tilling was practised. The soil is then removed to form deep dongas. **Sheetwash** however, is the removal of soil over a larger area, before the water canalises into streams. Under such conditions the general surface of the land is lowered by erosion of the soil. This process is not as spectacular as gully erosion because deep trenches are not formed, and unless one can compare it to some other feature it cannot be observed. However, much more material is removed in this way than with gully erosion because it affects a much larger area.

*Soil erosion is a very serious problem in South Africa. Soil loss is measured in terms of tons of material removed on every hectare of land in one year. Remember that one hectare of land is about the size of two rugby or soccer fields next to each other.*

*On a worldwide scale, soil loss of up to 10 tons per hectare of land per year is an acceptable rate. When the soil loss in an area is between 10 tons and 20 tons per hectare per year it is serious, and when it is between 20 and 40 tons or more per hectare per year, it is considered catastrophic. On average, soil loss in South Africa is about 10 tons per hectare per year, but in the wetter parts of the country it is as high as 80 tons per hectare per year. In some places where poor farming practices occur, soil loss is as high as 180 tons per hectare per year, which means that it is far beyond any form of acceptability. The ultimate effect of soil erosion is of course that the fertile topsoil, which is necessary for food production, is removed.*



**Floods** occur when excessive rain falls in the catchment area of a river, and which results in the *river bursting its banks*. Floods are short-term disasters that can cause untold damage to property and lives by swiftly flowing rivers, especially where informal settlement development or farming is practised, on flood plains, next to such rivers. Floods can also cause land-, mud- and rock slides along valley-side slopes, and thereby cause disasters by wiping away or covering anything in its path.



**Tsunamis** are dreadful occurrences of *gigantic waves* in the oceans, caused by either underwater volcanic activity, earthquakes or tropical cyclones. These gigantic waves are



sometimes incorrectly referred to as tidal waves, but that is totally wrong for it has nothing to do with tides in the oceans. These tsunamis cause terrible destruction along coastlines. If it strikes in a position of a coastal city, it can result in the deaths of many thousands of people, and destroy buildings, jetties and harbours, and even ships and boats anchored there. They occur mostly in the western Pacific Ocean.

**Geysers** are *hot water fountains* in which boiling water is forced out of the ground with great force at regular intervals, to form spectacular fountains of water and steam. It forms as a result of overheating of groundwater in contact with hot rock material at great depth. When the water reaches a certain temperature it instantaneously converts into steam, which causes an eruption of hot water and steam at the surface. They are only found in isolated volcanic areas such as Iceland, New Zealand and the north-western USA. Beautiful examples are found in Yellowstone National Park in the USA.

