



Soil erosion during the recent monsoon season damaged roads and riverbanks, such as the Jerantut-Temerloh road in Pahang and the rivers near villages in Kulim, Kedah (inset). To alleviate the problem, we need to **reduce the impact of water** on soil as well as increase the **ability of the soil to resist erosion**.

How to save our land, properties

EROSION CONTROL: Besides dealing with land clearing and global warming, there are other ways to rehabilitate the earth

IT is often said that what goes around comes around. If we take care of nature, nature will take care of us. But human beings, because of their greed, tend to disregard nature.

In essence, we are supposed to always be on full alert of what is going on around us and to look after the earth with great care, or else the wrath of nature will come to haunt us sooner rather than later.

This was what happened in recent years. Disaster comes in various forms — change in weather patterns that threatens our lives, properties and agricultural land used for food production, such as super typhoons and floods. It is nature's way of showing enough is enough!

Uncontrolled land clearing for agriculture purposes worldwide that result in unprecedented soil degradation, as well as the felling of natural forests, have reduced the earth's ability to regulate the concentration of greenhouse gases in the atmosphere. This is made worse by the extensive use of fossil fuel to maintain industrial production.

In the end, the concentration of carbon dioxide has increased and resulted in the rise of temperature of about two degrees Celsius around the world — global warming.

Global warming or global cooling, for that matter, is a natural phenomenon, happening many times alternately throughout geological history — formally called interglacial and glacial, respectively.

However, global warming is made worse by human intervention, such as extensive use of fossil fuel and uncontrolled land clearing.

Many agricultural land in the east coast of Peninsular Malaysia were seriously affected by the recent floods, especially in Kelantan.

In the highlands, logging and excessive land clearing for agriculture have exposed the land to the erosive impact of rainwater. Due to heavy rainfall that took place for a long period, the soil had eroded and the sediments were transported to nearby rivers. The muddy water overflowed the river banks and flooded the river basin downstream. As the surge moved like a tsunami, properties along its path were destroyed.

After the floods, some affected areas were completely silted with muddy materials. The yellowish/reddish nature of the mud is indicative of kaolinitic materials, iron (Fe) oxide and aluminium (Al) that lack plant nutrients. The soil affected by the recent floods will become infertile and are not suitable for

growing crops without proper mitigation. The eroded areas in the uplands also need proper mitigation, such as reforestation. This is to make sure that the land is protected again.

Even coastal areas were not spared. The violent winds that came around thereafter produced ocean waves of two to three metres high. Coastal areas in the east coast were hit the hardest by these strong waves that pounded their beaches.

If this phenomenon continues unchecked, the seashores will be seriously eroded. This is bad in the long run for the country as more land areas are lost into the sea, destroying properties and human lives alike. What can we do to save our land and properties from going into the sea?

If a soil is flooded, there is little we can do until the floodwaters have receded. Working on wet soil is also unwise as it can destroy the soil structure, leading to even worse soil conditions.

Once the floodwaters have receded and the soil is no longer excessively wet, we can start mitigation work on the land.

The key principles are:

PREVENT excessive build-up of water in the soil;

REDUCE the disruptive forces of water on the soil; and,

INCREASE the resistance of soil against water forces.

Drainage is one of the best methods to remove or prevent build-up of water. There are two types of drainage systems: surface and subsurface drains.

Surface drains are built in such a way so that water is channelled into ditches, which then bring the water into one or more outlets to be drained away from the field.



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Land topography (such as a slope) can be slightly altered so that water channels or grass waterways can be built to divert water into ditches. Any depression on the surface must be eliminated by ploughing to smoothen the soil surface and prevent water from ponding or disrupting the water flow.

Subsurface drains are water conduits made from clay, concrete or

plastic that are placed underground. These conduits all lead to one or more outlets, which would collect and drain away the water from the field.

The idea is that the excess water would flow into these conduits under the soil and be drained away.

Surface drainage systems are suitable for flat land with slow infiltration and low permeability, and on soils with restrictive layers close to the surface (such as shallow soil).

For deep and poorly-drained soil, subsurface drains are suitable.

To reduce soil erosion, we need to reduce the impact of water (due to intense or heavy rainfall) on the soil as well as increase the ability of the soil to resist erosion.

These mitigation methods can be grouped into three: agronomic, mechanical and soil.

Whatever method we use, they all share the same principle, that is, to protect the soil surface against physical disruptive forces of water and to increase soil resistance against such forces.

Agronomic methods include increasing ground cover by planting trees and shrubs. Open, unprotected ground must be reduced. Typically, 60 to 70 per cent of ground cover is adequate for reducing soil erosion.

Mechanical methods include applying mulches (whether natural or synthetic materials), cutting terraces (that also act to channel water into drains or ditches) and erecting walls to prevent landslides.

Soil methods are those that increase soil fertility as fertile soil can support vegetation, which acts to reduce erosion. These methods include increasing the organic matter in the soil, which would increase infiltration and resistance against water erosion.

Silted areas usually lack organic matter needed to improve soil structure. As such, organic fertilisers are recommended for the mitigation of these soil. When crops are grown, inorganic fertilisers have to be applied adequately.