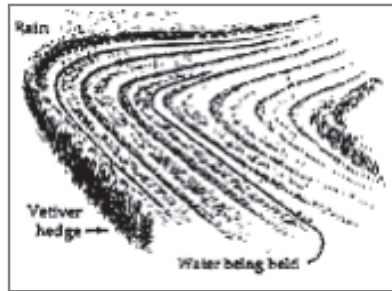
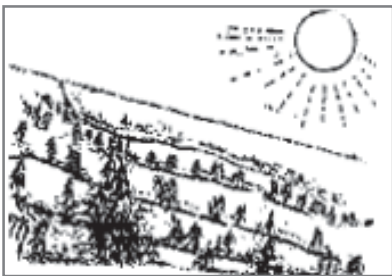


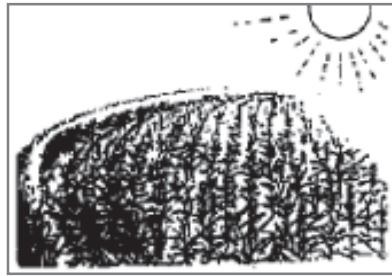
Heavy rains carry away the top soil on Farmer A's land



The contours protect the land against erosion



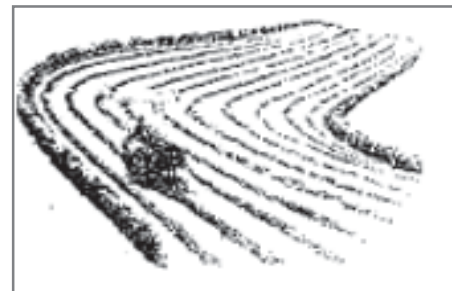
Farmer A has a bad harvest



Farmer B has a good harvest

## SOIL CONSERVATION

What you should know about soils and how to avoid erosion



### Introduction

A natural forest that has never been disturbed by cutting down of trees, ploughing of land, burning or killing of animals and insects, is said to be in balance. However, this natural balance does not apply to most land under cultivation, because many agricultural practices disturb the balance in nature. Too often this results in loss of soil through erosion and also

causes the reduction of soil fertility. However, with good farming practices, much can be done to restore the soil fertility. Soil conservation includes all the agricultural practices that is employed in order to maintain or improve the soil. It is also necessary to learn about some soil and crop management practices that lead to soil infertility, in order to avoid them.



This manual was elaborated by:  
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## Soil Structure

### Top Soil

The first layer of soil is called "top soil".

It is dark, because it contains humus. Humus consists of materials from dead plants and animals that are partly decayed. The more humus in the top soil, the more fertile the soil is. This is because humus gives the soil a good structure for air and water to penetrate. Top soil is an important layer.

The crops that we grow make most of their roots in this layer, so this is where they get their food and water which make them grow.

Top soil contains many nutrients that plants need and is often 20-30 cm deep.

### Sub Soil

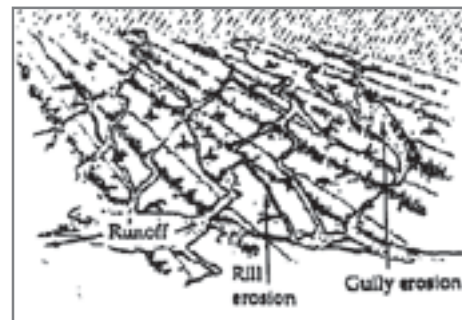
Sub soil may be very shallow or very deep. It is lighter in colour and does not contain as many nutrients as top soil.

## What is soil erosion

Soil erosion is when soil is moved away by either wind or water. Every year thousands of tons of good top soil is washed away from the fields. Washing away of top soil by rain usually happens where the soil is bare and is worse on slopes and hill sides. Wind erosion is mainly a problem in dry and flat areas with little vegetation.

## Types of soil erosion

- ◆ **Gully erosion** is easily seen. It looks like big rivers in the landscape
- ◆ **Rill erosion** is often seen in fields. It looks like a net



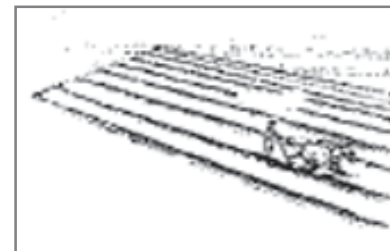
ripping the lines for planting with draft animals or tractor.

### 9. Avoid burning

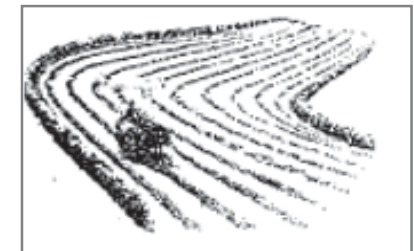
Never burn crop residues. Chop them and spread them all over the field. This will protect the soil against the

destructive action of the rain drops. It will at the same time provide the soil with organic matter, which will improve the soil fertility. Avoid late burning of the bush, because it will leave the soil bare. Early burning or no burning must be practised.

## Good and bad farming methods



Farmer A just plows straight up and down the slope



Farmer B has protected his land by planting vetiver grass along the contours. He then plows along the contours.

### **Peg the contour lines**

Cut a number of small pegs approximately one foot long. Start measuring the contour lines. When the string touches the mark in the middle of the



A-frame, the line is level. Place a peg every time you move the A-frame.

### **Plough or dig along the contour lines**

Either plough several times along the contour lines or dig with a hoe.

### **Vetiver Grass**

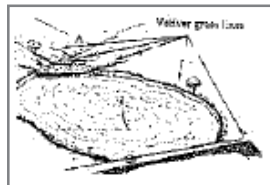
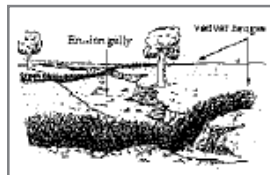
If the plant material is available the farmer can put vetiver grass along the contour lines instead of ploughing or digging. The grass will slow down the flow of water and the soil will remain in front of the vetiver grass hedge. After some time the land will have formed terraces. Vetiver grass is a very

good, easy and safe way to make contours. They should be planted with a distance of 15 cm between them.



### **7. Plant vetiver grass**

Plant vetiver hedges across gullies and around dams in order to protect against erosion



### **8. Practice minimum tillage**

Minimum tillage ensures that the soil is not broken down into very small particles that can easily be blown or washed away by rain.

Minimum tillage can be done using permanent planting holes dug with a hoe or ploughing or

of very small rivers, where soil was removed

- ♦ **Sheet erosion** is more difficult to see, because it means that a small layer of topsoil is lost all over the field. This often happens due to wind erosion. Sheet erosion can be identified by the appearance of stones and roots on the surface.

### **Farming methods that cause soil erosion**

#### **1. Overgrazing**

Overgrazing is a big problem in many parts of Africa. Too many animals, especially cattle and goats, graze on very small pieces of land, thus destroying the vegetation, which in turn causes soil erosion.

#### **2. Lack of soil organic matter**

Soil that contains humus (organic matter from dead plants and animal, which are partly decayed) is more

resistant to erosion. Humus works as a glue that binds soil particles together in clumps. These clumps do not easily wash or blow away. Soil with organic matter behaves like a sponge when absorbing water. Therefore, the soil is less exposed to erosion when it is given organic matter.

#### **3. Tillage**

Tillage increases the risk of soil erosion. This is because tillage crushes the soil producing large amounts of powdery material. After ploughing, the soil lays bare. When the rain drops hit the bare loose soil, it forms mud, which easily washes away.

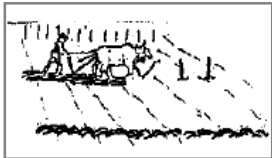
#### **4. Mono cropping**

Planting the same crop on the field year after reduces soil fertility, because the same crop removes the same nutrients from the soil.

Mono cropping also builds up diseases in the soil, which reduce the yield.

### 5. **Ploughing across contours**

If ploughing is done across the contours even on slightly sloping fields, it can lead to severe erosion.



### 6. **Lack of protection of fields on sloping land**

Farming on sloping areas without constructing contour bounds or terraces will lead to severe erosion.

### 7. **Lack of windbreaks around big fields**

This will lead to wind erosion. Especially if the field is tilled and lies bare.

## How to conserve soil and improve fertility

### 1. **Make and use compost**

Compost is a source of organic matter for the soil. Organic matter increases soil's ability to

retain water and provide valuable nutrients.

### 2. **Use animal manure on the field**

Animal manure provides nutrients that help to maintain soil fertility.

### 3. **Plant wind breaks**

Planting wind breaks on the side of the field, where the wind blows from, will prevent the top soil from blowing away.

### 4. **Use crop rotation**

Using crop rotation will make the soil more fertile. Crop rotation means that the farmer does not plant the same crop in the field every year.

An example of good crop rotation:

First year maize, second year cotton, third year groundnuts, fourth year maize. The crop rotation must include legume crops, because they will improve the soil fertility. Crop rotation furthermore secures

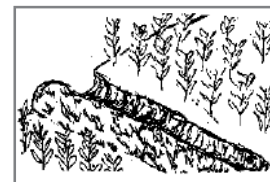
that diseases organisms do not accumulate in the soil and this will help to keep the crops healthy.

### 5. **Contour ploughing**

This is ploughing along the contours. It is very important to prevent rain water from washing the soil away. It is only when the land is totally flat, that it is not necessary to use contour ploughing. In order to find the contours, the farmer can make and use an A - frame. (Described below)

### 6. **Contour bunds**

In sloping areas the farmer ought to construct contour bunds. The contour lines can be measured with an A- frame or



the agricultural extension officers can assist you.

### **Making an A-frame**

The A-frame consists of 3 straight sticks e.g. bamboo.

- ♦ The two legs are exactly the same length.
- ♦ The stick across is placed exactly on the same height from the ground on both legs.
- ♦ The 3 sticks are tied together with fibre or string.
- ♦ A mark is made exactly in the middle of the stick across.
- ♦ A string with a stone at the end is tied to the top of the frame.

