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Erosion control in the tropics
Foreword

Foreword to second revised edition
This is a revised version of the first edition of this Agrodok. Hopefully it is a useful introduction to the erosion problem and its control. We want to thank Mr. Eppink from the Agricultural University of Wageningen for his remarks and corrections, and Hensen Trenning for the illustrations.

The authors,
Hil Kuypers
Anne Mollema
Egger Topper

Wageningen, 1987

Foreword to the fourth revised edition
We have experienced that this Agrodok on Erosion control is quite popular. Due to this we have to reprint regularly. For this fourth edition we have improved the layout and the pictures, and incorporated improvements in the text.

We are very grateful to Arend Kortenhorst who has taken care of the lay out with great patience and a good eye for details.

Agromisa welcomes readers to send us suggestions which could help us to improve the contents of the publication.

Marg Leijdens
Coordinator Agrodok Publications

Wageningen, 1999
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Further reading

Glossary
1 Introduction

Agromisa’s Question and Answer Service receives many questions about erosion and its control. In reply to the very specific questions, an equally direct answer can usually be given. However, general questions come in as well, such as: “What can be done against erosion in this area?” Obviously, such a question can only be answered if a number of counter-questions are asked, for example:

- What are the erosion characteristics?
- What is the rainfall distribution?
- What sort of crops are grown there?
- Are you situated in a hilly area?
- etc.

Only then would we be able to give the most important facts about soil conservation. This Agrodok may be considered as an extensive reply to such questions. At the same time it is an introduction to erosion control.

With only this booklet at hand, you will not be in a position to lay out a number of terraces straight away; for this, other books are available (see the section ‘Further Reading’). Yet, we have tried to write a book which will be useful for people who are confronted with the practical aspects of erosion.

1.1 Objectives of this Agrodok

In compiling the booklet we have kept the following objectives in mind:

- To emphasize the seriousness of the erosion problem. Erosion is not always recognized in time, and certainly not when it takes place surreptitiously.

- To give an insight into the causes and the course of the erosion process, by stating the factors which influence the mechanism of erosion and how these factors are linked up.
➢ To clarify the relation between erosion and the farming system. The farming system (land-use) largely determines whether erosion will occur; erosion in its turn again imposes limitations on agriculture.

➢ To enumerate the most important soil conservation measures and the principles on which they are based, at the same time indicating how they can be applied. How erosion can be prevented will be discussed at length here too.

For clarity, we have restricted ourselves to erosion caused by water. In doing so, the connection between the causes of erosion and the principles of erosion control measures will always be kept in mind. The so-called mass movements (earthquakes, mud streams etc.) will also be discussed briefly because these phenomena are often related to water erosion and the causes of it. The seriousness of wind erosion cannot be underestimated but this is beyond the scope of this booklet.

To keep this booklet accessible for everybody we have not assumed a previous knowledge. Therefore, you may well read things you already know. Some technical terms will have to be used too, necessary to prevent misunderstandings. The same terms will crop up anyway when reading other literature. The explanation or the definition of the relevant difficult terms can be found in the Glossary in the back.

If you find it difficult to get an overview of all the information, you could refer to Chapter 10 in which the connection between the various chapters is briefly given.

1.2 What is soil erosion

Since there are several different definitions of erosion, we will first clarify what we mean by erosion here. There are really two types of erosion, natural and accelerated erosion, also called man-made erosion.

➢ Natural erosion is going on all the time; the weathering of mountains, hills etc. caused by the influences of nature. New landscapes are formed, but the process is very slow.
• Man-made erosion occurs when people cause the soil to become susceptible to be carried away by rain or wind. Cutting trees and burning vegetation are examples of practices that destroy the natural protection of the soil. This book is about man-made water erosion.

Another important factor is soil degradation, that is the decline of soil quality as a consequence of people using the land. Soil degradation and erosion overlap. Soil degradation is a wider term, erosion being but one form of soil degradation, others are: pollution, salination, etc.

1.3 The seriousness of the erosion problem

Every minute, an estimated 10 hectares of agricultural land is lost to erosion throughout the world. In some areas, very little occurs, in others more than 200 tons of soil disappears every year from 1 hectare...... (i.e. 20 lorry loads!). On average about 50 tons of soil per hectare are lost each year. The soil lost is the top layer, which is the most fertile part of the soil.

The rivers in which these soils are transported change into a brown gushing stream in the rainy season. They occasionally flood the low lying areas. The fish in these rivers are at the mercy of that dirty water. If the water is used for irrigation, then ditches silt up, at best maintenance costs rise alarmingly. Sometimes all the soil ends up in a dam reservoir, as in the Shinen reservoir in Taiwan for example, which was half full of silt within five years, whereas a life duration of 70 years had been estimated.

These problems could be fatal and forces the governments to face up to the seriousness of the erosion problem. A government can oblige farmers to carry out erosion control (soil conservation) measures as reafforestation and terracing. The farmers should then be compensated with loans in these schemes. Many farmers are so badly in need of their plot of land that any restricting regulation would mean starvation.
If the threat of erosion is not yet as fatal as mentioned above, individual farmers or groups of farmers can carry out erosion control measures in order to protect their land and food security.

It seems that the seriousness of the erosion problem can be measured by the amount of soil lost from one hectare. This is not always so simple. Especially in hilly areas the depth of the fertile top soil may vary considerably from one place to another within short distances. There is no cause for alarm if the depth of soil is a few meters, but if there are only a few centimetres before reaching the subsoil or bare rocks, this must be safeguarded at all cost.

It can be concluded that the seriousness of the erosion problem differs not only on a worldwide scale, but locally as well. For two farmers living on the same mountain slope, the situation may be quite different. It is usually the poorest section of the community that is hardest hit by the effects of erosion. In the light of this, it is not surprising that in the U.N. report of 1984, erosion is considered to be the greatest threat to mankind.