

Soil Erosion

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What is Soil Erosion

Soil erosion is the phenomenon of disintegration of soil clusters, their transportation by factors such as water and wind, and, as a result, their accumulation in different environments than where they belong.

- ❖ SUSTAINABLE SOIL MANAGEMENT AND SOIL EROSION CONTROL
- ❖ SOIL GOVERNANCE AND THE SOCIO-ECONOMIC DRIVERS OF EROSION
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SUSTAINABLE SOIL MANAGEMENT AND SOIL EROSION CONTROL

Selection of appropriate measures to keep soil erosion within a tolerable range is an important component of sustainable soil management. The basic principle of minimizing erosion is to provide a cover of growing vegetation or organic and/or non-organic debris that protects the surface soil from erosion.

These measures;

- ▶ No-till and erosion control
- ▶ Mulching and other vegetative measures
- ▶ Sediment traps and terraces

The first group of measures aims to minimize land use changes that leave soil vulnerable to erosion. Soil organic carbon (SOC) loss from land use change includes both increased mineralization and increased erosion losses. Recent meta-analyses show that 30 to 40 percent of the original SOC is lost after conversion of forests or grasslands to cropland.

The second and third groups of measures to reduce erosion are closely interrelated and include protecting the soil surface from erosion and minimizing the depth and speed of runoff on slopes. Some measures, such as no-till/reduced tillage, both protect the surface and reduce runoff.

SUSTAINABLE SOIL MANAGEMENT AND SOIL EROSION CONTROL

Measures to reduce flow velocity and depth typically include placing a physical barrier along the slope at concave slope elements where flow converges across the slope. Terraces are the best known of these physical measures, but measures such as strip planting, contour planting, grass strips, cross-slope barriers such as contour bunds and stone lines, grassy waterways and vegetative buffer strips can also be effective.

A fourth and final set of measures is used to minimize the escape of soil particles and other contaminants from the soil. Sediment traps are used both to retain sediment in the field and to reduce sediment input into stream systems. Coastal buffers, check dams, sediment ponds, and wetlands are important measures to reduce the off-site impact of sedimentation.

SOIL GOVERNANCE AND THE SOCIO-ECONOMIC DRIVERS OF EROSION

In the past decade, the literature has moved from a policy focus to a broader discussion about soil governance. Issues related to soil governance are the most significant impediments to the adoption of erosion control measures. Two general problems in soil governance were identified.

- ❖ In the first place, many of the impacts of erosion occur off-site, and there is no direct benefit for the soil user to implement control measures that minimize these off-site impacts.
- ❖ Second, the long time period required for many erosion control measures to have a clear beneficial effect limits their adoption, especially for soil users who do not have secure tenure rights to their land. The successful implementation of erosion control measures shows that these impediments can be overcome.

There are two instruments to address soil and land degradation: the United Nations Convention to Combat Desertification (UNCCD) and the Global Soil Partnership (GSP). The UNCCD is a legally binding convention, but its authority limits it to dry areas. The Global Soil Partnership is a voluntary instrument and, since its inception, has produced a variety of non-binding instruments, such as the Revised World Soil Charter and the Voluntary Guidelines for Sustainable Soil Management.

At the regional scale, the most well established governance instrument is the Soil Thematic Strategy of the European Union, which has coordinated soil related policies across the European Union.

The need for well-designed initiatives to encourage and reward the adoption of erosion control measures is as important as the selection of the correct technical measures for erosion control themselves.

THE WAY FORWARD

Ideally the way forward in erosion studies would be to focus on the remaining big questions and develop programs-of research, extension, policy development, and support-that would make significant progress to answer the questions.

One of the important questions is how serious is erosion and what is the cost? The question of the importance of erosion should be expanded to include impacts on water and air quality. The negative impact of soil erosion on crop productivity has been assessed using both field plots and models and, in many cases, has been shown to be relatively small.

Another question is why does unacceptably high rates of erosion continue to occur and what can we do about it?

Two general problems were identified.

First, most of the effects of erosion occur off-site, and there is no direct benefit to the land user from implementing control measures to minimize these off-site effects.

Second, the long time it takes for many erosion control measures to have a net beneficial effect limits their adoption, especially for land users who do not have secure tenure rights over their land.

THE WAY FORWARD

There are three main tools to increase the adoption of soil control measures:

- ❖ Enhanced extension leading to voluntary adoption;
- ❖ Regulation coupled with effective enforcement;
- ❖ Economic incentives.

The correct balance among the three approaches required to increase adoption rates appears to be difficult to achieve and the question of soil governance at every level is certainly deserving of more attention.