# TIME FOR ACTION IN SOIL CONSERVATION

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## INTRODUCTION

Every country which hopes to have permanent and stable agricultural production must conserve its soil. The loss of topsoil through erosion makes the land much less fertile, since most nutrients (plant foods) are in this top layer of soil. It can take a very long time for topsoil to form, but many farming systems cause it to erode very quickly. Thus, a vital natural resource - productive agricultural land - is being washed away.

Large scale erosion and destruction of agricultural lands has occurred in many parts of the world. In many cases, it happens like this: A rising population leads to over-use of land for food production. This causes land degradation. When some of the most fertile land is used for cash crops, even more pressure is put on the areas used for annual subsistence crops. When the soil deteriorates (gets worse), so do the level of crop production and the health and general well-being of the country.

It is important that this cycle does not happen in Papua New Guinea.

## UNNATURAL EROSION

The erosion caused by man is not a natural process. It is often the result of agricultural practices unsuited to the type of land.

Soil is eroded in different ways and at different rates. It is greater on steep slopes and is affected by the amount and intensity of rainfall. Different crops will affect the amount of erosion. Those crops that cover the ground or that are deep rooted can help prevent erosion. The depth and quality of the topsoil also affects the rate and type of erosion. Improving fertility is one important way to help prevent erosion.

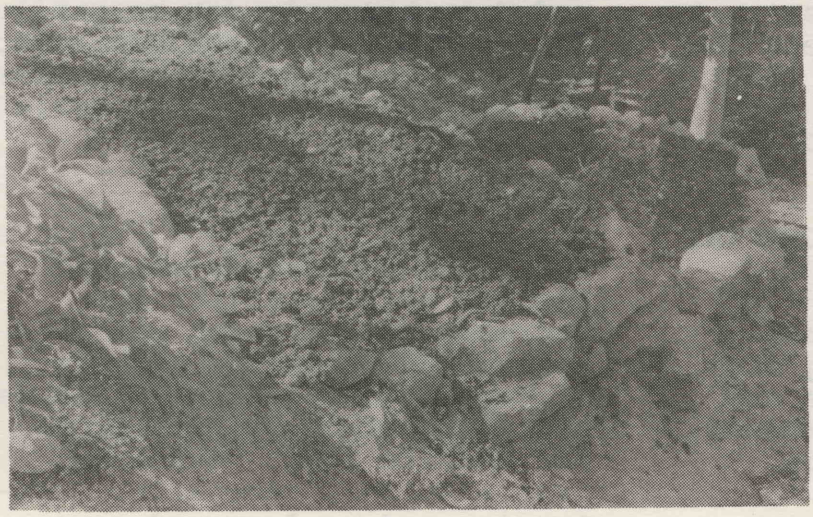
## ORGANIC MATTER - THE KEY TO FERTILITY

The presence of organic matter in soils provides essential nutrients for plant growth,

*Erosion caused by raindrop impact*

*Composted ridges in the Wau Ecology Institute garden*

*The tree nursery at Wau Ecology Institute*



*Newly made terraces*

helps store the nitrogen available from bacterial decomposition (breakdown) and increases the water holding capacity of the soil.

Organic matter also provides phosphorus, nitrogen and sulphur. It improves the soil structure by causing soil particles to clump together. More air can then circulate in the soil. The presence of organic matter in the soil is the key to fertility.

## BURNING

Burning is still an important activity in traditional forest clearing and gardening. In grassland areas, burning is a less useful practice, as the ashes of grass do not provide so many nutrients for plants. Much of the nitrogen, sulphur and other important nutrients are lost in the smoke. The remaining ash is mainly potassium. Thus by burning grasslands, important crop nutrients are wasted.

To get the full benefit of returning organic matter to the soil, it is much wiser to cut the grass and pile it up for later application as a mulch or compost. Repeated burning of the grassland, especially large, uncontrolled fires, kills small trees and keeps the forest from re-growing. The soil underneath trees is more fertile than grassland soils.

## COMPOSTED RIDGES, AGRO-FORESTRY AND TERRACES

The Enga people traditionally understood that by adding organic materials like grass and leaves to their kau kau mounds, they could increase yields. This is just one of the techniques used in the agro-forestry system of the Wau Ecology Institute. Various other methods are used to help maintain the fertility of the soil and prevent soil erosion in this garden.

At Wau, the rainfall is not very high (about 1900 mm per year). The garden is partly on level ground and partly on very steep slopes.

Ridges, composting, nitrogen-fixing shade trees and mulching are used to retain moisture and ensure seed germination. Pathways through the gardens direct any flow of water down to level collecting areas. Soil particles which are washed from one mound are usually caught in the next one down the slope. The roots of trees planted in the gardens stabilize the soil and recycle deep nutrients. Leaves on the trees reduce the impact of heavy rains on the soil.

Mounds 30-50 cm high and about 1 m wide are made along the contours, with a small 'barat' or furrow of 0.6 m between mounds.

Levelled rock-supported terraces are useful on steeper slopes. Smaller stake fences across the slopes, like those used traditionally in the Simbu and Maprik areas, act as partial terraces and collect soil that may be washed down from the slope above.

## WHAT CAN BE DONE

All these techniques which improve soil fertility and decrease soil erosion can balance the negative effects of population and land pressure and competition by cash crops for fertile land. Mulching, tree planting, composting, contouring and good ground cover

have all proved useful at Wau. In other parts of Papua New Guinea they may help. However, each one of these steps may not be beneficial if used alone. Wherever possible, all or most of the techniques should be applied together.

It should be remembered that conditions in different parts of Papua New Guinea vary very much. Advice on what are the best soil conservation practices for a particular area can be obtained from the Land Utilization Section of the Department of Primary Industry.

## CONCLUSION

There is still a need for more technical research to be done to determine the rate of soil formation and the relationship between soil erosion and decline in fertility in Papua New Guinea.

However, it is wise to start now to encourage farmers to carry out soil conservation practices. Also sites for cash crops should be chosen carefully. These sites should not seriously reduce the amount of good fertile land available for food production.

These suggestions could be put into action immediately in villages, schools, women's organisations and other institutions around Papua New Guinea.

## FURTHER READING


Ambai and Sui-Sakail (1979). A plan for erosion control. *Klinki* 1(3).

Appropriate Technology (1978). *Who Needs Inorganic Fertilisers?* London.

Golueke, C. (1979). *Composting.* Rodale Press, Ewarnua, Pa.

King, K.F.S. (1979). *Agro-Forestry and Fragile Ecosystems.* Soils Research in Agro-forestry, International Council for Research in Agroforestry.

Lappe, F.M. and Collins, J. (1977). *People Pressure on the Ecosystem.* Food First.

Meyer, G. and Sims (1979). *Storage and Retention of Water in Compost Treated Soils.* Acres, U.S.A. (January).

Sanchez, P. (1976). *Properties and Management of Soils in the Tropics.* John Wiley and Sons.

Steffen, R. (1979). The value of composted organic matter in building soil fertility. *Compost Science* (October).