

# Pack #105, Item 10

# Type: Backgrounder

January 2017

# \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Backgrounder on soil erosion**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Why is this subject important to listeners?***

* + Soil erosion reduces crop yields and silts up waterways, resulting in lower crop production, flooding, and pollution.
	+ On average, past soil erosion on agricultural land in Africa has reduced yields by more than 8% since the land was first farmed. This represents billions of dollars in lost yield and income.
	+ Globally, soil erosion costs every human being $70 US per year.
	+ Soil erosion removes valuable soil nutrients and fertilizer, thus costing the farmer extra money.
	+ The soil degradation caused by soil erosion reduces the efficiency of inputs so that more fertilizer is required to produce the same yield.
	+ There are many methods for decreasing soil erosion. Some can be easily applied by individuals, while others require investments and coordinated actions.

***What are some key facts?***

* + Soil erosion is caused mainly by wind and water removing topsoil.
	+ Where topsoil is removed, the yield drops.
	+ Where topsoil is deposited in rivers and lakes, it is often harmful, causing flooding and destroying habitat for aquatic plants and animals.
	+ Soil erosion is a natural process that is greatly accelerated by cultivating the soil or overstocking with animals. Common agricultural practises can result in soil erosion thousands of times faster than natural erosion.
	+ “Acceptable” erosion is erosion that is no greater than the rate of natural soil formation, resulting in no net loss of soil. The rate of soil formation can reach about 1 mm per year in young volcanic areas. But in the old, usually red soils that cover much of Africa, it takes more than 100 years to form 1 mm of soil.
	+ Topsoil contains most of the nutrients in the soil. Because it is the topsoil that is removed by erosion, even low levels of soil erosion can have a big effect on crop yield.
	+ Topsoil can store water better than the sub-soil. Removing the topsoil therefore reduces the ability of crops to survive dry spells.

***What are the big challenges of controlling soil erosion?***

* + The effects of soil erosion are not immediate, but accumulate over the years. Controlling erosion therefore tends to be given a low priority when there are more immediate and urgent needs.
	+ In areas where the use of inputs and improved farming methods are increasing, the effects of soil erosion are hidden and can therefore be easily ignored. Boosting fertilizer application will initially increase yield, but if soil erosion continues, the benefits of fertilizer will decrease year by year.
	+ Effective control of erosion often requires collective action. For example, stabilizing an unstable hillside cannot be accomplished by just a few farmers, but requires coordinated action among many. Reducing overgrazing or cutting of trees on common land also requires collective action.
	+ Some of the most effective erosion control measures like reforestation and terracing require significant investment—but it takes years for the benefits to materialize. In places where farmers have insecure land tenure, there is little incentive for long-term investments.
	+ Once the topsoil is gone, it is rarely feasible to restore it. Reforestation can regenerate the topsoil but it typically requires centuries. It also requires protection and minimal or no removal of products from the land in the meantime.

***Key information about controlling soil erosion***

1. **Make sure that land use is appropriate:**
	* Ensure that land use is appropriate—for example, avoid cultivating on steep slopes and easily-eroded soils. If you must use fragile and erosion-prone areas, consider forestry, pasture, and other uses that stabilize soils and keep soil disturbance to a minimum.

For more information, see documents #1, 2.

1. **Keep soil covered:**
	* When rain hits bare soil, it detaches soil particles, which are then easily washed away. To avoid this, keep the soil covered as much as possible with plants or plant litter. Plant soon after ploughing, and use correct spacing to ensure that crops cover the soil quickly.

For more information, see documents #1, 2.

1. **Reduce soil disturbance.**
	* Planting perennial crops is usually one of the best options since it reduces or completely avoids seasonal land preparation and weeding. But erosion can also be reduced in annual crops by using minimum or zero tillage. You can also plant cover crops to ensure that soil is covered after the main crop is harvested. Cover crops also improve soil fertility and can be used for fodder.

For more information, see documents #1, 2.

1. **Careful on steep slopes:**
	* If it is necessary to cultivate annual crops on steep slopes, build terraces for long-term sustainability. Barriers can reduce erosion on steep slopes, but rarely reduce it to sustainable levels.

For more information, see documents #1, 2.

1. **Stop running water with barriers:**
	* Practice intercropping and relay cropping to ensure that live, vegetative barriers are in place most or all of the year. These barriers slow down water that flows overland, thus reducing loss of topsoil from water erosion.
	* Slow down water running down slopes with barriers. Barriers can be made of soil, sticks, stone lines, trash lines, perennial fodder grasses, or agroforestry species.

For more information, see documents #1, 2.

1. **Ensure good soil structure:**
	* Ensure that your soil has a good structure by regularly adding manure, compost, and plant residues. Organic matter in the soil binds the soil particles together. It also acts as a sponge for nutrients and water, absorbing them when there is too much and releasing them as needed.

For more information, see documents #1, 2.

1. **Plant on the contour:**
	* When digging sloping land, work along the contour, starting from the top of the slope.
	* Plant crops along contour lines so they form barriers to water that runs downhill across the surface.
	* A-frames are simple and cheap to construct and to use for marking contours.

For more information, see documents #1, 2.

1. **Ensure good drainage:**
	* Ensure good drainage structures are in place for safely removing excess water. If there is not too much water and you have good infiltration of water into the soil, ditches and overflow ponds may be sufficient. But where excess water must be drained from steep slopes, stone- or cement-lined ditches, or pipes are usually required to avoid gully erosion.

For more information, see documents #1, 2.

***Other points:***

Be aware that tall trees on bare soil can increase erosion because large drops (falling from the trees) will be concentrated at the edge of the canopy.

Pay attention to animal paths—they are often the starting point for gully erosion. If there are signs of gully formation, take immediate action: divert animals along other paths, and stabilize the gully.

***Where can I find other resources on this topic?***

1. Kuypers, Hil, Anne Mollema, Egger Topper, and P. Verhei, 2005. *Erosion Control in the Tropics*. Wageningen; Agromisa: CTA, 2005. <http://publications.cta.int/media/publications/downloads/69_PDF.pdf>. (1,031 KB)
2. Roose, Eric. *Land Husbandry: Components and Strategy, 1996*. FAO Soils Bulletin 70. Rome: Food and Agriculture Organization of the United Nations, 1996. ftp://ftp.fao.org/agl/agll/prosoil/docs/S518.pdf. (in English only, 29.4 MB)

***Key definitions***

**Desertification:** Desertification is land degradation that occurs in drylands.

**Gully:** Ditch created by water running down a slope with enough force to detach and transport the soil.

**Land degradation:** Reduction in the productive capacity of the land.

**Relay cropping:** The growing of two or more crops on the same field with the planting of the second crop after the first one has completed its development.

**Soil erosion:** Loss of topsoil and nutrients.

## Acknowledgements

Contributed by: Flemming Nielsen, System Agronomist/Farming System Analyst, International Institute of Tropical Agriculture (IITA)

Reviewed by: Leon Nsharwasi Nabahungu, Soil scientist, International Institute of Tropical Agriculture (IITA)

 Project undertaken with the financial support of the Government of Canada through Global Affairs Canada (GAC)