**Why Is Soil Erosion Such a Big Problem?**

Soil is a natural resource that may look robust and endless, but is in fact the fragile product of thousands of years of formation. Topsoil, which lies closest to the surface of the land, contains essential nutrients for crops. It is this layer of soil that is endangered by wind and water erosion. Soil erosion decreases soil fertility, which can negatively affect crop yields. It also sends soil-laden water downstream, which can create heavy layers of sediment that prevent streams and rivers from flowing smoothly and can eventually lead to flooding. Once soil erosion occurs, it is more likely to happen again.

This is a global problem. Soil is eroding more quickly than it is being formed, causing land to become unsuitable for agriculture – [a particularly serious concern](https://www.wri.org/blog/2018/12/how-sustainably-feed-10-billion-people-2050-21-charts) in a world where the population is expected to top 9 billion by midcentury. Smarter land management is a necessity.

**How Does Soil Erosion Affect Climate Change?**

Erosion degrades land, which means it can support fewer plants that can take in climate-warming carbon dioxide. Soils themselves could potentially sequester enough greenhouse gases in a year to [equal about 5%](https://news.mongabay.com/2018/03/keeping-carbon-in-the-ground-can-cut-emissions-and-boost-food-security/) of all annual human-made GHG emissions. Better land management can help keep soils intact so they can grow more carbon-sucking vegetation. This is already happening in China, where the [Grain-for-Green project](https://forestsnews.cifor.org/52964/grain-for-green-how-china-is-swapping-farmland-for-forest?fnl=en) in the Yellow River basin conserved soil and water and reduced carbon emissions.

On the flip side, unchecked climate change can worsen erosion. A [report](https://www.ipcc.ch/site/assets/uploads/2019/08/4.-SPM_Approved_Microsite_FINAL.pdf) from the Intergovernmental Panel on Climate Change (IPCC) found that when cultivated without conservation practices, soil is currently eroding up to 100 times quicker than it’s forming.  The risk of erosion will become even higher in the future due to emissions-driven temperature changes, with resulting decreases in agricultural production, land value and human health.

**What Are the Impacts of Soil Erosion?**

We’re already seeing the risks of soil erosion play out around the world. Jakarta’s deadly [floods earlier this year](https://www.cnn.com/2020/01/02/asia/jakarta-floods-intl/index.html) are a prime example. Eroded sediments from further upstream [clogged](https://www.nat-hazards-earth-syst-sci.net/16/757/2016/nhess-16-757-2016.pdf) Jakarta’s rivers and canals, causing them to overflow. Similar erosion-related floods have occurred in many other countries, such as [Colombia](http://news.trust.org/item/20130423154348-k239i/), [India](https://thediplomat.com/2019/12/new-strategy-to-tackle-floods-and-erosion-in-indias-disaster-prone-northeast/), [the Philippines](https://www.telegraph.co.uk/news/worldnews/asia/philippines/8969554/Philippines-flash-flooding-death-toll-hits-1000.html) and [Democratic Republic of the Congo](https://wedocs.unep.org/bitstream/handle/20.500.11822/14102/Eco%20DRR_DRC_factsheet.pdf?sequence=1&isAllowed=y).

Soil erosion is not only an environmental issue; it also causes huge losses to the economy. One [study](https://www.sciencedirect.com/science/article/pii/S0264837718319343) estimated global economic losses from soil erosion to be around $8 billion, due to reduced soil fertility, decreased crop yields and increased water usage. In Java, Indonesia, soil erosion is responsible for a [2% loss in total agricultural GDP](https://www.jstor.org/stable/10.20851/j.ctt1sq5w4j.10?seq=1#metadata_info_tab_contents), taking into account the losses farmers face directly and the losses others face downstream. [Another study](https://www.witpress.com/Secure/elibrary/papers/GEO06/GEO06006FU1.pdf) showed that soil erosion in Sleman, a district located in Java, costs 17% of an average farmer’s net income per hectare of agricultural land.

**What Solutions Exist to Prevent Soil Erosion?**

**1. Use Soil-friendly Agricultural Practices**

Terraced farming needs to be implemented to make hillside agriculture manageable. Terraces prevent erosion and allow more water to flow to crops. In addition, hillside farm fields need full crop cover to help keep the soil in place. This can be accomplished by intercropping, which means growing two crops together in the same field, such as planting rows of [maize](https://edepot.wur.nl/411353) or [soybean](http://www.fao.org/3/x3996e/x3996e36.htm) between rows of oil palm trees. For smallholders, [agroforestry systems](https://www.wri.org/blog/2019/10/small-amazonian-community-agroforestry-takes) where a diverse set of crops, including trees, are grown together can be effective. Access to manure improves the organic matter of the soil, which inhibits erosion. Finally, alternating deep-rooted and shallow-rooted crops improves soil structure and reduces erosion at the same time.

**2. Offer Incentives for Land Management**

Although the science of sustainable land management has been gaining support, [the socio-economic context](https://www.unccd.int/sites/default/files/documents/2017-09/UNCCD_Report_SLM.pdf) often makes implementation difficult. Sustainable land practices need to be financially viable for farmers. Anti-erosion measures have a median cost of [$500 per hectare](https://www.unccd.int/sites/default/files/documents/2017-09/UNCCD_Report_SLM.pdf), a considerable investment for a farmer. Governments and banks must help farmers get access to credit and support in implementing erosion prevention. This is not only a good deal for the farmer, but for the whole community. The cost of erosion prevention is far lower than the price of land restoration and rehabilitation, which one source estimated to be around [$1,500–$2,000 per hectare](http://www.fao.org/sustainable-forest-management/toolbox/modules/forest-restoration-and-rehabilitation/basic-knowledge/en/?type=111). Another source found it could reach [$15,221](http://www.cifor.org/publications/pdf_files/Books/BNawir0701.pdf) per hectare.

**3. Prevention AND Rehabilitation**

The key to managing and reducing soil erosion is to [rehabilitate already-damaged land](https://www.wri.org/our-work/project/global-restoration-initiative), stop further degradation and put erosion-preventative measures at the core of land management policy. In this way, we can help prevent hunger and mitigate the climate crisis.