Farming and grazing have taken a toll on the health of soils in many developing countries. Yields in many areas are diminishing due to declining soil fertility and soil erosion. Agroforestry helps farmers to reclaim degraded land, especially if integrated with other soil fertility improvement practices. It improves the health of soils by improving water filtration, replenishing nutrients and soil microbes, retaining soil moisture, and reducing soil and wind erosion. Agroforestry protects forests by offering alternatives for people who exploit forests to eke out a living. In desert-prone areas agroforestry can help stabilize soils and ecosystems in addition to restoring degraded cropland. Nitrogen is one of the main nutrients that plants need. Fertilizers are often used to add nitrogen to the soil. Integrating leguminous trees into cropping systems can reduce the need for nitrogen fertilizer, which is usually too expensive for the rural poor.

Across the world, agroforestry is helping restore the fertility of millions of hectares of degraded land, increasing yields, relieving hunger and improving livelihoods (Photo: World Agroforestry Centre).

**Restoring barren land with agroforestry**

Growing trees on farms as part of a soil fertility management plan can help improve soil quality

Reclaiming Asia’s degraded land

In Asia, large areas of forest margins, grasslands and hilly farmland suffer from land degradation and are unproductive. One agroforestry scheme in rural India helped restore 85,000 hectares of degraded land. In North Korea, agroforests are repairing thousands of hectares of hilly land that was once almost useless.

Rural revival in Tanzania

In 1984, the Shinyanga region in northern Tanzania, was famously described by the then president, Mwalimu Julius Nyerere, as the ‘desert of Tanzania’. Since then, an agroforestry project has revived a traditional system of land management that increases the supply of livestock fodder in the dry season. Today, tens of thousands of smallholders have converted an estimated 500,000 hectares into fodder reserves, woodlots and orchards under this system.

Cows grazing in Shinyanga woodlots in Tanzania (Photo: ICRAF/Charlie Pye-Smith)
The ‘Great Green Wall’ of Africa

Spanning the continent of Africa, including 11 nations fringing the Sahara Desert, the Great Green Wall is an ambitious plan for a re-vegetated corridor. Initially envisaged as a 15km-wide wall of trees extending for over 7000km from Senegal in the west to Djibouti in the east, today it is more about planting a range of vegetation, including agroforestry systems that can help sustain the lives of those living along it. So far, almost 12 million trees have been planted in Senegal alone, most of which are indigenous Acacias that can survive in the harsh conditions and provide income to local communities through the sale of gum arabic.

Fertilizer trees to increase yields

Nitrogen is in short supply in the soil and abundant in the atmosphere. Fast-growing ‘fertilizer trees’ capture nitrogen from the air and make it available to crops via fallen, decomposing leaves and nodules on their roots, known as ‘green manure’. Research in Africa has shown that under the right conditions, fertilizer trees can increase yields significantly. Fertilizer trees can suppress weed growth and reduce soil compaction. This greatly reduces the burden of land preparation, which in many countries is the traditional responsibility of women members of the household.

Studies show that the lack of fertilizer is linked to food shortages that affect up to 90 per cent of the 13 million families in southern and eastern Africa that produce maize for subsistence. Fertilizer trees can complement use of chemical fertilizers, and in some cases increase yields in the absence of fertilizers.

Reviving Malawi’s exhausted soils

In many parts of Malawi the soil is so exhausted that it is impossible for smallholder farmers to produce enough food to feed their families. Their small farm sizes also mean they can’t afford to leave land fallow and allow it to recover from cropping. The result is low soil fertility, continually declining yields and hunger.

Research by the World Agroforestry Centre and its partners has established that the use of fertilizer trees can, under some circumstances, significantly boost crop yields and improve soil quality. Using fertilizer trees such as *Gliricidia sepium* – known in Africa as the tree of life – throughout their fields, farmers can, with the right conditions, increase their maize yields by one or two tonnes per hectare.

Repairing soils in Cameroon

In the mid-1990s, soils in the Western Highlands of Cameroon in Africa were so degraded that farmers were abandoning their land. This began to change when fertilizer trees were introduced. The trees boosted soil fertility and greatly improved harvests of wheat, potatoes and beans. Farmers then planted local varieties of fruit trees. Today, land that was barren 10 years ago now has patches of forest, dense hedges, tree nurseries and fertile fields of crops dotted with fruit and medicine trees.

Benefits of fertilizer trees

Under the right circumstances fertilizer trees can:

- Boost soil fertility
- Reduce the need for chemical fertilizers
- Reduce weed growth
- Enhance soil carbon accumulation
- Improve water infiltration
- Help retain soil moisture
- Reduce soil compaction
- Provide fuel wood and an alternative source of stakes
- Sequester carbon dioxide.

For more information visit www.worldagroforestry.org, and search the keywords ‘land rehabilitation or fertilizer trees’.