China has contributed to 25% of the increase (of 5.5 mn sqkm), and India 6.6%, according to a global study between 2000 and 2017.

The rehabilitation of forest land in China can largely be attributed to a series of six national forestry programmes which have been implemented since the late 1990s, through which China has planted more than 4 million hectares of forest every year. Between 1998 and 2014, investment across the six programmes is estimated to have reached USD 100 billion and involved the participation of 20% of China’s rural population.

The rapid rehabilitation of forest and landscapes at a massive scale in China proves that ecological restoration of large-scale, complex ecosystems is possible, and can be achieved by human hands. Three-North Afforestation Program (TNAP) was behind this large scale afforestation. The TNAP, which has been ongoing for 40 years, is said to be the world's largest tree-planting project covering more than 95 percent of China's wind-sand damaged areas and 40 percent of areas hit by soil erosion.

According to the assessment, the forest area of TNAP has increased by 21.56 million hectares since 1978. The completed afforestation areas have been up to 46.14 million hectares, amounting to 118 percent of the planned afforestation tasks in the same period. Since 2000, desertification has overall been under control and key areas have been significantly improved, the report said.

In addition, the areas of soil erosion by water in the TNAP regions have been reduced by 67 percent in total. The total value of forest ecosystem services in the TNAP regions increased from 4.8 billion yuan (around 695 million U.S. dollars) in 1978 to 234.47 billion yuan (about 34 billion U.S. dollars) in 2017.

Apart from this, the local economy and social development have been promoted by the forest fruit industry and forest tourism in TNAP regions. At present, the annual output value of forest fruit and forest tourism has reached 120 billion yuan (around 17 billion U.S. dollars), absorbing 313 million rural laborers and achieving stable poverty alleviation for about 15 million people.

Notable checkpoints of China’s reforestation program are:

* China increased forest cover from 16.74% of its territory in 1990 to 22.5% in 2015, an increase of 511,807 square kilometres.
* Since the late 1990s, China has planted more than 4 million hectares of forest every year.
* Between 1998 and 2014, investment across the six forestry programmes is estimated to have reached USD 100 billion and involved participation of 20% of China’s rural population.

In 2018, China set a target to achieve forest cover over 30% of its land by 2050. China’s rapid transition to reforest vast swathes of depleted and deserted territory represents the largest ecological restoration project the world has ever seen.

Though the project has achieved much success, challenges remain. Since most of TNAP regions are arid and semi-arid areas, lack of systematic consideration of the local water resource can lead to forest decline. The average afforestation rate of TNAP is 47 percent, but about 25 percent of the forests are in an unhealthy state.

Besides, TNAP plays a limited role in reducing severe desertification; the effect of TNAP is far from counteracting the disturbance of human activities.

Some scientists worry that the planting could worsen water scarcity. Many of the trees are not native to the regions where they have been planted, and they use a lot of water — despite being placed in areas that are experiencing less rainfall due to global warming.

A closer look at the data reveals that all this new tree cover isn’t actually forest, according to a recent study. It finds most reforestation efforts simply planted one tree species, making a plot of reforested land equivalent to a monoculture plantation. These interviews revealed that these households paid attention to government policies and tended to plant species that were promoted. This decision was largely based on how much money they stood to make through government incentives aimed at encouraging the planting of certain types of trees – at times even cutting down actual forest to do so. The researchers say the fault lies in the failure of these policies to differentiate monoculture tree cover from real forest.

Additionally, the new satellite-based dataset Global Forest Change (GFC) finds decreased forest coverage. In this study, four satellite datasets are used to investigate this discrepancy in forest cover change estimates in China between 2000 and 2013.

Results show varying estimates of forest cover change in China from 2000 to 2013 from multiple satellite and forest inventory datasets, suggesting large uncertainty in the direction and magnitude of the net forest change during this period. The forest area increase claimed by the National Forest Inventory (NFI) data cannot be directly verified by satellite data because of the mixed results caused by different definitions and methodologies, although it is in agreement with certain MODIS dataset. The inconsistent estimates of forest cover change from satellite data could be caused by factors such as algorithm parameters, spatial resolutions of monitoring, and forest definition, all of which can strongly influence the estimates with a magnitude comparable to the real change signal. Considering the increase in forest cover indicated by the majority of datasets, combined with independent evidence from other studies, and the implementation of forest conservation policies, a large decrease in China’s forest cover during the study period is less probable. However, we cannot rule out the possibility that forest cover for this period was relatively stable with comparable magnitudes of forest loss and gain.

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[Deforestation](https://en.wikipedia.org/wiki/Deforestation) is an ongoing [environmental issue](https://en.wikipedia.org/wiki/Environmental_issue) in [Kenya](https://en.wikipedia.org/wiki/Kenya). In 1963, when Kenya became an independent nation, its forest cover was approximately 10%. By 2012, the forest cover had dropped to 6% and it was estimated that the country was losing 12,000 hectares of forest annually despite the Kenyan government's efforts to alleviate the problem.

Four causes of deforestation in Kenya are:

* **Demand for farming land**: At local level, farmers face the ever-rising demand for cash crops to meet their unlimited needs, owing to the ballooning population. Over the years, the local administration has been on the forefront in allocating parcels of land to individuals without a conservation mind, leading to immense deforestation.
* **‘Polluted’ Politics**: The unthinkable levels of deforestation we witness today largely stem from backward politics and poor leadership. For decades, politicians have used forestland to gain political mileage at the expense of a suffering environment. Politicians allocate land directly or indirectly to become popular.
* **Nonfunctional Government Agencies:** Human activities like logging, charcoal burning and encroachment of forestland continue to happen in the eyes of Kenya Forest Services, and other government agencies, which seem not to appreciate the need for a green economy.
* **Globalization:** There is high demand for raw materials by industrialized nations for processing. This pressure makes third world countries like Kenya shelve their environmental conservation agenda and focus on exploiting natural resources for business. In the end, the negative effects of deforestation supersede the economic gain. For instance, China has been buying timber from Kenya for years, leading to the escalation of legal and illegal deforestation countrywide.
* **Population:** Kenya's growing population is exerting considerable pressure on natural resources. As forest resources dwindle with the expansion of agriculture onto forest land, forests will no longer be able to meet the rising demand for wood and non-wood products.

Yet between 2000 and 2010, deforestation in the water towers amounted to an estimated 50,000 hectares, leading to reduced water availability of approximately 62 million cubic metres per year. Kenya's economy is highly vulnerable to water availability. Inflation spiked above 10 per cent on three occasions between 2000 and 2010, each time driven by drought combined with increasing crude oil prices and weaker exchange rates.

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Clearly from the data, there is a growing trend in Kenya towards expansion of tree cover and species diversification in intensive farming systems which include trees. As natural formations shrink, are destroyed, or become less accessible, social forestry becomes increasingly important.

Forest plantations, in decline because the rate of replanting has failed to offset the rate of felling, are giving way to grassland. At the same time, farms and settlements are encroaching upon remnants of indigenous forests at an annual rate of 5 000 ha and upon woodlands at a rate of 55 000 ha/yr, with bushland dwindling as well. As timber resources from forest estates decline, wood supply will increasingly come from farmlands and remnant natural woodlands.

Early in the 1930-1940s, the high-potential zones still had a fair amount of plant cover and natural forest, but much of the area was then cleared in the process of agricultural expansion. To offset this loss, farmers were offered incentives during the 1970-1980s for extensive tree-planting on farms, with secure land tenure as a pre-condition. The social and economic benefits of this are felt today in the form of income and product diversification which acts as a safety-net to buffer the risk of hardship and destitution. In the low-potential zones where land tenure is less secure, there are two major trends. Tree resources are being depleted in areas of rapid agricultural expansion, but degradation is less severe where traditional land-use systems are still firmly entrenched.

The Kenya Forestry Master Plan (KFMP) stressed the on-farm contribution of trees, which provide wood and poles for construction, fence posts, fuelwood and charcoal, not to mention fruit, fodder, medicines, gums and resin, all for home consumption and/or sale. A study demonstrated that on-farm income from tree crops amounted to 51 percent in the high-potential zones, 40 percent in the medium-potential zones and 18 percent in the low-potential zones (Njenga, *et al*, 1999). Honey from the Transmara forest region can bring in some US$ 715/yr, in a place where the mean per capita annual income is estimated at US$ 370 (World Bank, 1992).

In any case, the value of all these products would be greatly enhanced if marketing and distribution circuits were designed for profit-sharing. A long chain of middlemen in the wood and charcoal sector, for example, works to the detriment of the grower. By the time a bag of charcoal or wood reaches the final consumer the mark-up can be as high as 150 percent. The same is true for apiculture, where it is often hard for the farmer to market his product for lack of access to outlets. These disfunctional aspects burden the market for off-forest tree resources, hampering official recognition of their contribution to the national economy and allocation of budgetary allocations.

These resources are found mainly in medium-potential woodlands, low-potential bushlands or savanna, and on farms. The mean annual productivity of woody biomass in woodlands is 16m3. In 1995, farms produced 7.4 million m3 of woody biomass, representing 65 percent of the wood production in the high- and medium-potential zones. Assuming a steady growth rate for tree-planting, the figures would rise to 17.8 million m2 and 80 percent by the year 2020 (see Annex 3). The percentage distribution of woody biomass from Trees outside forests is as follows: 20 percent for wood, 7 percent for poles and 73 percent for fuelwood (Holmgren, *et al*, 1994). In low-potential zones the resource provides forage for livestock.

The most significant role of on-farm trees is environmental. Trees stabilize soil and check erosion in highland areas. A rainforest microclimate has been created by agroforestry areas on Mount Kenya and in western Kenya. Tree/agriculture mixed cropping on farmland offers a habitat for the conservation of increasingly endangered indigenous tree species such as *Prunus africanus.* Another increasingly popular practice is the domestication of natural forest species and their introduction on farms and in urban areas. In the Masai and Turkana communities, the bond between people and their environment has produced a conservation ethic for this resource, underpinned by a social and cultural value system.

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Kenya, hence has taken strong measures for forest recovery. Families that practice farming in Kenya have diversified their farmland production and increased their income through sustainable farming practices and an agroforestry technique known as the  Forest Garden Approach.  Since 2001, some 800 [biogas units](https://www.dw.com/en/a-caribbean-nightmare-an-onslaught-of-slimy-brown-seaweed/a-46168371) have been built in Kenya's Kiambu County. That number is expected to reach 2000 by the end of 2022

Over 80 percent of Kenyans use firewood or charcoal to cook. But that's a problem in a country with [high rates of deforestation](https://www.dw.com/en/forest-sos-earths-green-lungs-disappear/a-44908586). Small biogas units could help save Kenya's trees — gas from cow manure even cooks food more quickly than firewood. As the units also cut down on  [hazardous smoke](https://www.dw.com/en/top-5-greener-alternatives-to-charcoal/a-43268826), they are better for people's health, too. They also mean farmers no longer have to collect or buy wood or fell trees, which is helping to halt deforestation. The biogas units produce sludge as a byproduct. Since this is a better fertilizer than cow manure, local farmers are now hoping for a good harvest.

Cabinet Secretary for Environment and Forestry Keriako Tobiko said the country is embracing research, education and training in the forest sector to increase forest cover from 6.9 percent to 10 percent by 2030.

Kenya and the United Nations Environment Programme (UNEP) on Thursday signed a memorandum of understanding (MoU) to help increase forest cover as part of efforts to protect the country against the vagaries of environmental destruction.

The program dubbed "Greening Kenya" campaign will ensure that about 50 million tree seedlings are planted from May.



Seed-balling, seed bombing or in some cases aerial reforestation, is a technique of introducing vegetation to land by throwing or dropping seedballs. This tree-planting technique is helping fight deforestation in Kenya was first introduced to the country two years ago by Teddy Kinyanjui.

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