Humans have been chopping down and burning trees for a long time, and deforestation is ongoing. Sometimes forest grow back on their own ("natural regeneration"). In the US, most of New England is forested again, after the farms that once replaced trees were abandoned.[1] Humans also plant trees. “Reforestation” is planting trees to restore forests while “afforestation” refers to planting where there were no trees before or not recently. Could we plant trees, a trillion of them, to save ourselves from climate change? What does large-scale tree planting look like?

Franklin D. Roosevelt conceived of the Great Plains Shelterbelt in response to the Dust Bowl. From 1935 to 1942, 220 million trees were planted in 30,233 shelterbelts from Canada to Texas. Besides protecting crops and reducing erosion, FDR's Great Green Wall also provided wood and a home for birds and game, trapped snow which helped to increase soil moisture, and protected structures from harsh winds – houses and schools could have more windows![2] Times change. Farmers today have new techniques and technology.[3] Ranchers fight woody encroachment by trees and shrubs that threatens grasslands.[4]

China’s Three-North Shelterbelt Forest Program is the world’s largest tree planting program, begun in 1978 to counter land degradation (“desertification”) by bringing tree cover to an area over northwestern, northern, and northeastern provinces. More than 30 million hectares (74 million acres) of trees have been planted.[5] But China's Great Green Wall has had difficulties and sometimes negative effects. Poplars not used to arid conditions soaked up groundwater and had low survival. Blocks of single tree species stunted biodiversity and were vulnerable to pests and diseases.[6] Other potential harms include taking land away from farmers, introducing invasive species, or destroying grasslands or other ecosystems.[7]

The Great Green Wall for the Sahara and the Sahel is an African-led initiative to grow an 8,000 km band of vegetation across the width of Africa.[8] It began with tree planting but has become more flexible, with a mosaic of projects restoring about 18 million hectares (44 million acres) of degraded land so far. Examples include planting crops among trees, growing trees from stumps, digging retention basins to store rainwater, and selecting useful native species such as the baobab and tamarind, frankincense and gum acacia, and African grape, for food, income, and medicine.[9,10] Projects succeed when managed by local stakeholders whose livelihoods rest on sustaining crops and trees for the long term.

Trees remove carbon from the atmosphere as they grow and can store carbon for long periods of time. Carbon is released when trees die.[11] How much carbon is sequestered by trees depends on tree species, ages, and durations, where they are planted, on how much land, and other variables.[12] Addressing global warming always comes back to cutting greenhouse gas emissions produced by burning fossil fuels and by deforestation. After that, preserving existing forest is far better than planting trees. It’s cost-effective, supports water balance and biodiversity, and provides immediate carbon storage. Also important is recovering deforested areas, preferably by letting them regrow naturally[13,14] or with limited assistance. What about the monoculture plantations favored for timber production? Fast growing trees absorb carbon, but are soon harvested, often for paper, cardboard and wood chip products that degrade rapidly and release carbon back into the atmosphere. Such plantations can still be useful if they prevent deforestation elsewhere.

Planting trees must be done carefully. Which trees should be planted, and where?[15] If the “right tree, right place” dictum isn’t followed, problems arise, as when the planted trees didn't match water conditions in China’s Great Green Wall. Local peoples should be involved. Africa's Great Green Wall builds on the input, stewardship, and resilience of the inhabitants of the lands. The Great Plains remind us that landscapes are not static, and that forests and humans will have to adapt to climate change. When planting trees, it's better to look to the wellbeing of communities and ecosystems, rather than to focus solely on carbon or the number of trees planted.

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