

Reforestation

Reforestation is the natural or intentional restocking of existing forests and woodlands (forestation) that have been depleted, usually through deforestation.^[1] Reforestation can be used to rectify or improve the quality of human life by soaking up pollution and dust from the air, rebuild natural habitats and ecosystems, mitigate global warming since forests facilitate biosequestration of atmospheric carbon dioxide,^[2] and harvest for resources, particularly timber, but also non-timber forest products.

A similar concept, afforestation, another type of forestation, refers to the process of restoring and recreating areas of woodlands or forests that may have existed long ago but were deforested or otherwise removed at some point in the past or lacked it naturally (e.g., natural grasslands). Sometimes the term "re-afforestation" is used to distinguish between the original forest cover and the later re-growth of forest to an area. Special tools, e.g. tree planting bars, are used to make planting of trees easier and faster.



Tropical tree nursery at Planeta Verde Reforestación S.A.'s plantation in Vichada Department, Colombia



A 15-year-old reforested plot of land



A 21-year-old plantation of red pine in Southern Ontario

Contents

Management

For harvesting

For climate change mitigation

Incentives

Examples

- Sub-Saharan Africa
- Canada
- China
- Germany
- India
- Japan
- Lebanon
- Philippines
- United States
- Organizations

Criticisms

See also

References

Further reading

External links

Management

A debated issue in managed reforestation is whether or not the succeeding forest will have the same biodiversity as the original forest. If the forest is replaced with only one species of tree and all other vegetation is prevented from growing back, a monoculture forest similar to agricultural crops would be the result. However, most reforestation involves the planting of different lots of seed of seedlings taken from the area, often of multiple species.^[3] Another important factor is the natural regeneration of a wide variety of plant and animal species that can occur on a clear cut. In some areas the suppression of forest fires for hundreds of years has resulted in large single aged and single species forest stands. The logging of small clear cuts and/or prescribed burning actually increases the biodiversity in these areas by creating a greater variety of tree stand ages and species.

For harvesting

Reforestation need not be only used for recovery of accidentally destroyed forests. In some countries, such as Finland, many of the forests are *managed* by the wood products and pulp and paper industry. In such an arrangement, like other crops, trees are planted to replace those that have been cut. In such circumstances, the industry can cut the trees in a way to allow easier reforestation. The wood products industry systematically replaces many of the trees it cuts, employing large numbers of summer workers for tree planting work. For example, in 2010, Weyerhaeuser reported planting 50 million seedlings.^[4] However replanting an old-growth forest with a plantation is not replacing the old with the same characteristics in the new

In just 20 years, a teak plantation in Costa Rica can produce up to about 400 m³ of wood per hectare. As the natural teak forests of Asia become more scarce or difficult to obtain, the prices commanded by plantation-grown teak grows higher every year. Other species such as mahogany grow more slowly than teak in Tropical America but are also extremely valuable. Faster growers include pine, eucalyptus, and Gmelina.^[5]

Reforestation, if several indigenous species are used, can provide other benefits in addition to financial returns, including restoration of the soil, rejuvenation of local flora and fauna, and the capturing and sequestering of 38 tons of carbon dioxide per hectare per year.^[6]

The reestablishment of forests is not just simple tree planting. Forests are made up of a community of species and they build dead organic matter into soils over time. A major tree-planting program could enhance the local climate and reduce the demands of burning large amounts of fossil fuels for cooling in the summer.^[7]

For climate change mitigation

Forests are an important part of the global carbon cycle because trees and plants absorb carbon dioxide through photosynthesis. By removing this greenhouse gas from the air, forests function as terrestrial carbon sinks, meaning they store large amounts of carbon. At any time, forests account for as much as double the amount of carbon in the atmosphere.^{[8]:1456} Even as more anthropogenic carbon is produced, forests remove around three billion tons of anthropogenic carbon every year. This amounts to about 30% of all carbon dioxide emissions from fossil fuels. Therefore, an increase in the overall forest cover around the world would tend to mitigate global warming.

There are four major strategies available to mitigate carbon emissions through forestry activities: increase the amount of forested land through a reforestation process; increase the carbon density of existing forests at a stand and landscape scale; expand the use of forest products that will sustainably replace fossil-fuel emissions; and reduce carbon emissions that are caused from deforestation and degradation.^{[8]:1456}

Achieving the first strategy would require enormous and wide-ranging efforts. However, there are many organizations around the world that encourage tree-planting as a way to offset carbon emissions for the express purpose of fighting climate change. For example, in China, the Jane Goodall Institute, through their Shanghai Roots & Shoots division, launched the Million Tree Project in Kulun Qi, Inner Mongolia to plant one million trees to stop desertification and help curb climate change.^{[9][10]} China has used 24 billion metres squared of new forest plantation and natural forest regrowth to offset 21% of Chinese fossil fuel emissions in 2000.^{[8]:1456} In Java, Indonesia each newlywed couple is to give whoever is sermonizing their wedding 5 seedlings to combat global warming. Each couple that wishes to have a divorce has to give 25 seedlings to whoever divorces them.^[11]

The second strategy has to do with selecting species for tree-planting. In theory, planting any kind of tree to produce more forest cover would absorb more carbon dioxide from the atmosphere. On the other hand, a genetically modified tree specimen might grow much faster than any other regular tree.^{[12]:93} Some of these trees are already being developed in the lumber and biofuel industries. These fast-growing trees would not only be planted for those industries but they can also be planted to help absorb carbon dioxide faster than slow-growing trees.^{[12]:93}

Extensive forest resources placed anywhere in the world will not always have the same impact. For example, large reforestation programs in boreal or subarctic regions have a limited impact on climate mitigation. This is because it substitutes a bright snow-dominated region that reflects the sunlight with dark forest canopies. A study from the National Center for Atmospheric Research in Boulder, Colorado, USA, found that trees in temperate latitudes have a net warming effect on the atmosphere. The heat that dark leaves release without absorbing outweighs the carbon they sequester.^[13] On the other hand, a positive example would be reforestation projects in tropical regions, which would lead to a positive biophysical change such as the formation of clouds. These clouds would then reflect the sunlight creating a positive impact on climate mitigation.^{[8]:1457}

There is an advantage to planting trees in tropical climates with wet seasons. In such a setting, trees have a quicker growth rate because they can grow year-round. Trees in tropical climates have, on average, larger, brighter, and more abundant leaves than non-tropical climates. A study of the girth of 70,000 trees across Africa has shown that tropical forests are soaking up more carbon dioxide pollution than previously realized. The research suggests almost one fifth of fossil fuel emissions are absorbed by forests across Africa, Amazonia and Asia. Simon Lewis, a climate expert at the University of Leeds who led the study, said: "Tropical forest trees are absorbing about 18% of the carbon dioxide added to the atmosphere each year from burning fossil fuels, substantially buffering the rate of change."^[14]

It is also important to deal with the rate of deforestation. At this point, there are 13 billion metres squared of tropical regions that are deforested every year. There is potential for these regions to reduce rates of deforestation by 50% by 2050, which would be a huge contribution to stabilize the global climate.^{[8]:1456}

Incentives

Some incentives for reforestation can be as simple as a financial compensation. Streck and Scholz (2006) explain how a group of scientists from various institutions have developed a compensated reduction of deforestation approach which would reward developing countries that disrupt any further act of deforestation. Countries that participate and take the option to reduce their emissions from deforestation during a committed period of time would receive financial compensation for the carbon dioxide emissions that they avoided.^{[15]:875} To raise the payments, the host country would issue government bonds or negotiate some kind of loan with a financial institution that would want to take part in the compensation promised to the other country. The funds received by the country could be invested to help find alternatives to the extensive cutdown of forests. This whole process of cutting emissions would be voluntary, but once the country has agreed to lower their emissions they would be obligated to reduce their emissions. However, if a country was not able to meet their obligation, their target would get added to their next commitment period. The authors of these proposals see this as a solely government-to-government agreement; private entities would not participate in the compensation trades.^{[15]:876}

Examples

Sub-Saharan Africa

Plans to plant a nine-mile width of trees on the Southern Border of the Sahara Desert. The Great Green Wall initiative is a pan-African proposal to “green” the continent from west to east in order to battle desertification. It aims at tackling poverty and the degradation of soils in the Sahel-Saharan region, focusing on a strip of land of 15 km (9 mi) wide and 7,500 km (4,750 mi) long from Dakar to Djibouti!^[16]



Forest regrowth in Mount Baker-Snoqualmie National Forest
Washington state, USA

Canada

In Canada, overall forest cover is increasing over the last decades.

China

In China, extensive replanting programs have existed since the 1970s. Programs have had overall success. The forest cover has increased from 12% of China's land area to 16%. However, specific programs have had limited success. The Green Wall of China, an attempt to limit the expansion of the Gobi Desert is planned to be 2,800 miles (4,500 km) long and to be completed in 2050. China plans to plant 26 billion trees in the next decade that is two trees for every Chinese citizen per year.^[17] China requires that students older than 11 years old plant one tree a year until their high school graduation.^[18]

Germany

Reforestation is required as part of the federal forest law. 31% of Germany is forested, according to the second forest inventory of 2001–2003. The size of the forest area in Germany increased between the first and the second forest inventory due to forestation of degenerated bogs and agricultural areas.^[19]

India

Jadav Payeng had received national awards for reforestation efforts, known as the "Molai forest". He planted 1400 hectares of forest on the bank of river brahmaputra alone.

Japan

Mass environmental and human-body pollution along with relating deforestation, water pollution, smoke damage, and loss of soils caused by mining operations in Ashio, Tochigi became the first environmental social issue in Japan, efforts by Shōzō Tanaka had grown to large campaigns against copper operation. This led to the creation of 'Watarase Yusuichi Pond', to settle the pollution which is a Ramsar site today. Reforestation was conducted as a part of afforestation due to inabilities of self-recovering by the natural land itself due to serious soil pollution and loss of woods consequence in loss of soils for plants to grow, thus needing artificial efforts involving introducing of healthy soils from outside. Starting since in 1897, about 50% of once bald mountains backed to green.^[20]

Lebanon

For thousands of years Lebanon was covered by forests, one particular species of interest, Cedrus libani or Lebanon Cedar was exceptionally valuable timber species. Virtually every ancient culture that shared the Mediterranean Sea harvested these trees, the Ancient Egyptians, the Greeks, the Roman Empire, early Christians, the Muslims, Persians, Assyrians and Babylonians. Extensive deforestation has occurred, with only small remnants of the original forests surviving. Deforestation has been particularly severe in Lebanon and on Cyprus. The Lebanon Reforestation Initiative aims to restore Lebanon's native forests. Projects financed locally and by international charity are performing extensive reforestation of cedar being carried out in the Mediterranean region, particularly in Lebanon and Turkey, where over 50 million young cedars are being planted annually

Philippines

The Philippines increased its forest area to 240,000 hectares (593,053 acre) per year from 2010 to 2015. In 2011-2015 period, reforestation through the government's National Greening Program covered 1,258,692 hectares of land, which is 105 percent more than the 1,200,000 hectares planting target for the same period. An estimated eight million hectares of land nationwide need

reforestation and rehabilitation, according to the Forest Management Bureau.^[21]

United States

It is the stated goal of the US Forest Service to manage forest resources sustainably. This includes reforestation after timber harvest, among other programs.^[22]

Organizations

Trees for the Future has assisted more than 170,000 families, in 6,800 villages of Asia, Africa and the Americas, to plant over 35 million trees.^[23]

Wangari Maathai, 2004 Nobel Peace Prize recipient, founded the Green Belt Movement which planted over 47 million trees to restore the Kenyan environment.^[24]

Shanghai Roots & Shoots, a division of the Jane Goodall Institute, launched The Million Tree Project in Kulun Qi, Inner Mongolia to plant one million trees to stop desertification and alleviate global warming.^{[25][26]}

Criticisms

Reforestation competes with other land uses such as food production, livestock grazing and living space for further economic growth. Reforestation often has the tendency to create large fuel loads, resulting in significantly hotter combustion than fires involving low brush or grasses. Reforestation can divert large amounts of water from other activities. Reforesting sometimes results in extensive canopy creation that prevents growth of diverse vegetation in the shadowed areas and generating soil conditions that hamper other types of vegetation. Trees used in some reforesting efforts (e.g., *Eucalyptus globulus*) tend to extract large amounts of moisture from the soil, preventing the growth of other plants.

There is also the risk that through a forest fire or insect outbreak much of the stored carbon in a reforested area could make its way back to the atmosphere.^{[8]:1456} Reduced harvesting rates and fire suppression have caused an increase in the forest biomass in the western United States over the past century. This causes an increase of about a factor of four in the frequency of fires due to longer and hotter dry seasons.^{[8]:1456}

See also

- 10,000 Trees for the Rouge Valley, a reforestation program in Toronto, Canada
- Aerial reforestation
- Forest gardening
- Forest restoration
- Forestry
- Hemp
- Greenland Arboretum
- Hoedads Reforestation Cooperative
- Jewish National Fund
- Land rehabilitation
- Natural landscape
- Plant A Tree Today Foundation
- Pottiputki (tool)
- Restoration ecology
- Revegetation
- Rewilding (conservation biology)
- Richard St. Barbe Baker
- "The Man Who Planted Trees" (French title *L'homme qui plantait des arbres*), a tale by French author Jean Giono, published in 1953, and made into an animated film in 1987
- Tree credits
- Tree planting
- Tubestock
- Deforestation and climate change

References

- "Reforestation - Definitions from Dictionary.com" (<http://dictionary.reference.com/browse/Reforestation>). dictionary.reference.com Retrieved 2008-04-27.
- Gillis, Justin (2016-05-16). "In Latin America, Forests May Rise to Challenge of Carbon Dioxide" (<https://www.nytimes.com/2016/05/17/science/forests-carbon-dioxide.html>) *NYT*. Retrieved 2016-05-17.

3. "Archived copy" (<https://web.archive.org/web/20141111185724/http://kennethmarendefoundation.com/index.php/reforestation-problem>) Archived from the original (<http://kennethmarendefoundation.com/index.php/reforestation-problem>) on 2014-11-11 Retrieved 2013-03-27.
4. "Sustainable Forest Management"(<http://www.weyerhaeuser.com/Sustainability/Planet/SustainableForestManagement>). *Key Timberland Statistics* Weyerhaeuser. 10 June 2011 Retrieved 7 January 2012.
5. "Forest plantation yields in the tropical and subtropical zone" (<http://www.fao.org/docrep/003/x8423e/X8423E08.htm>). *Forestry Department* Retrieved 15 February 2014.
6. "Reforestation and Aforestation" (http://www.greencollar.org/reforestation_aforestation.html). *Green Collar Association*. Retrieved 15 February 2014.
7. Wood well, G.M.; North, WJ (1988-12-16). "CO₂ Reduction and Reforestation". *Science*. ALAS. **242** (4885): 1493–1494. doi:10.1126/science.242.4885.1493-a(<https://doi.org/10.1126%2Fscience.242.4885.1493-a>) PMID 17788407 (<https://www.ncbi.nlm.nih.gov/pubmed/17788407>).
8. Canadell, J.G.; M.R. Raupach (2008-06-13)."Managing Forests for Climate Change"(http://www.globalcarbonproject.org/global/pdf/canadell%26raupach2008_managingforests.science.pdf) PDF). *Science*. AAAS. **320** (5882): 1456–1457. doi:10.1126/science.1155458(<https://doi.org/10.1126%2Fscience.1155458>) PMID 18556550 (<https://www.ncbi.nlm.nih.gov/pubmed/18556550>)
9. "Shanghai Roots & Shoots -"(<http://www.jgi-shanghai.org>) *jgi-shanghai.org*.
10. "Million Tree Project :: Home"(<http://www.mtpchina.org>) *mtpchina.org*.
11. "Five tree fee for a Java wedding"(<http://news.bbc.co.uk/2/hi/asia-pacific/7124680.stm>) *BBC News*. 2007-12-03 Retrieved 2010-08-29.
12. "A changing climate of opinion?"(<http://www.economist.com/help/DisplayHelpcfm?folder=663377>) *The Economist* The Economist Newspaper Limited. **387**: 93–96. 2008 Retrieved 2010-08-29.
13. B.W., Time Magazine, 2007
14. Adam, David (2009-02-18)."Fifth of world carbon emissions soaked up by extra forest growth, scientists find"(<http://www.guardian.co.uk/environment/2009/feb/18/trees-tropics-climate-change>) *The Guardian*. London. Retrieved 2010-05-22
15. Streck, C.; S.M. Scholz (2006). "The role of forests in global climate change: whence we come and where we go". *International Affairs* The Royal Institute of International Affairs. **82** (5): 861–879. doi:10.1111/j.1468-2346.2006.00575.x(<https://doi.org/10.1111%2Fj.1468-2346.2006.00575.x>)
16. "Real happenings and Facts"(<http://nature.blogspot.com/2013/12/the-great-green-wall-of-africa.html>) *nature.blogspot.com*
17. <http://en.people.cn/90882/7675458.html>
18. ?
19. "Grußwort - Bundeswaldinventur"(<http://www.bundeswaldinventur.de>). *bundeswaldinventur.de*.
20. <http://www.ashiomidori.com/%E4%BD%93%E9%A8%93%E6%A4%8D%E6%A8%B9%E3%81%AE%E3%81%94%E>
21. "Philippines 5th out of 234 countries on forest gain"(<http://www.philstar.com/headlines/2016/02/22/1555647/philippines-5th-out-234-countries-forest-gain>) The Philippine Star February 22, 2016 Retrieved February 22, 2016.
22. "Forest Service Chief testifies before Senate appropriations committee on 2013 agency budget"(<http://www.fs.fed.us/news/2012/releases/04/budget.shtml>) US Forest Service. 18 April 2012 Retrieved 29 April 2012.
23. Trees for the Future(<http://www.treesff.org/about/history.htm>) Archived (<https://web.archive.org/web/20100613074936/http://treesff.org/about/history.htm>) 2010-06-13 at the Wayback Machine
24. "The Greenbelt Movement"(<http://www.greenbeltmovement.org>)
25. "Shanghai Roots & Shoots"(<http://www.jgi-shanghai.org>)
26. "The Million Tree Project" (<http://www.mtpchina.org>)

Further reading

- Bonan, G. B. (2008). "Forests and climate change: Forcings, feedbacks, and the climate benefits of forests". *Science*. **320** (5882): 1444–1449. doi:10.1126/science.1155121 PMID 18556546.
- Scheil, D.; Murdiyarso, D. (2009). "How Forests Attract Rain: An Examination of a New Hypothesis". *BioScience*. **59** (4): 341–347. doi:10.1525/bio.2009.59.4.12

External links

- [Tropical Reforestation](#)
- [Plant a Tree and Become Carbon Neutral](#)
- [Brazilian "Mata Atlantica" reforestation initiative](#)
- [Reforestation Carbon Ofsets](#)
- ["Perpetual Timber Supply Through Reforestation as Basis For Industrial Permanency: The Story Of Bogalusa" By Courtenay De Kalb, July 1921](#)
- [Saimiri Wildlife](#); Reforestation for endangered wildlife, side provides many pictures.
- [A tree a day, keeps the carbon away](#)
- [Trees and climate change: a practical guide for woodland owners and managers](#)
- [Floresta, a Christian nonprofit with a reforestation and poverty world mission](#)^[1]
- [Plant with Purpose](#)^[2]
- [Shanghai Roots & Shoots - Million Tree Project](#)
- [Reforestation Information](#)

Retrieved from '<https://en.wikipedia.org/w/index.php?title=Reforestation&oldid=830324960>

This page was last edited on 14 March 2018, at 03:15.

Text is available under the [Creative Commons Attribution-ShareAlike License](#); additional terms may apply. By using this site, you agree to the [Terms of Use](#) and [Privacy Policy](#). Wikipedia® is a registered trademark of the [Wikimedia Foundation, Inc.](#), a non-profit organization.