

Trees to Solve the World's Problems?

From Genetically Engineered Trees for Forests and the Bioeconomy to the Trillion Tree Proposal and Business for Nature

Corporate-Driven Plans to Use Trees to Prolong Business as Usual and Avoid Necessary Action

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Overview

This report examines events and research publicized between 23 June and 4 July 2019 that discuss the mass-use of trees to enable the unsustainable lifestyles of the world's top 1% in the face of looming ecological catastrophe: from trees genetically engineered to feed the "green" manufacture of energy, plastics and chemicals; the planting of trillions of trees to reduce global atmospheric carbon levels; and "reforms" to the economic system to allow future profit-making under the guise of biodiversity protection.

The three events where these proposals were brought out were the International Union of Forest Research Organization's 2019 Tree Biotechnology Conference 23-29 June at North Carolina State University in Raleigh, The Global Tree Restoration Potential, a new study published on 4 July in Science, and the launch of Business for Nature initiatives in China and Norway on 2 July.

Global Justice Ecology Project (globaljusticeecology.org), coordinating body of the international Campaign to STOP Genetically Engineered Trees, (stopgetrees.org) issued this report to expose these ecologically and socially destructive false solutions that enable business as usual.

IUFRO Tree Biotechnology Conference

The International Union of Forest Research Organizations (IUFRO) held its biennial 2019 Tree Biotechnology Conference over 23-29 June at North Carolina State University in Raleigh. This was the first Tree Biotechnology Conference held by IUFRO since June 2017 when their conference in Concepción, Chile was met with days of protests and disruptions by Mapuche activists, students and others. The 2019 Tree Biotech conference was originally announced to take place in Curitiba, Brazil. It appears that the conference was suddenly moved to Raleigh, North Carolina because of the protests at the last Tree Biotech conference in Chile and the fact that Brazil's Landless Workers Movement, *Movimento dos Trabalhadores Rurais Sem Terra (MST)*, has a long history of being militantly anti-GE tree. [1] NC State was likely chosen as it is the hub for many different efforts pursuing and promoting GE trees, including use of gene-editing on trees, and researching new ways to sell GE trees to a resistant public--a major theme of this year's Tree Biotechnology Conference.

The effects of the 2017 protests could be felt at this year's Tree Biotechnology Conference, which included constant police presence both inside and outside of the venue, pleas to attendees to consider taking over the top three leadership roles in the event, and confusion as to when or where the next conference might take place, and even whether to continue to use the controversial term "biotechnology." The lack of public presence by some of the most outspoken leaders in the tree biotechnology field and leading GE tree company ArborGen, further underscored the anxiety of the event.

While the future of the Tree Biotech Conferences is uncertain, what was not at question was the desire by industry to use specially designed GE trees as a feedstock for the future "bioeconomy", which was addressed in a closing series of

presentations. Unlocking the sugars in trees, necessary to transform them into fuels, plastics, chemicals and other products, however, has proven a major challenge. This was reflected in the rising emphasis at the 2019 conference on the genetic engineering technique known as CRISPR. The ecological and social implications of the massive increase in demand for wood to fuel this “bioeconomy” or the risks associated with the GE trees involved, were not addressed.

Rodolphe Barrangou, NC State professor and editor of *The CRISPR Journal* gave the opening keynote for the IUFRO Tree Biotechnology Conference, highlighting his personal efforts to bring CRISPR and other gene editing techniques into the forestry sector. He referred to human history as “BC” – Before CRISPR” vs “AD – after the death of the other recombinant technologies.” He also pointed out that “the [CRISPR commercialization] bottleneck [is] acceptance by regulators and society.”

To solve this problem, he envisioned a CRISPR gene editing process that would achieve a “non-transgenic...non-GMO [regulatory] approval.” Barrangou feared that if people understood that CRISPR is still genetic engineering, it would be the downfall of CRISPR’s commercial success—and make it harder for his new CRISPR startup focusing on developing CRISPR for forest trees to become profitable.

CRISPR would use artificial intelligence and machine learning in forest trees, he explained, to predict what genomes, sequences and pathways to “knock out, turn on, turn off,” in order to find the relevant traits of interest to industry. He did, however, admit that CRISPR scientists are “nowhere near understanding tree genomics as well as we understand human genomics due to the fact that tree genomes are so much bigger and more complex.”

But the excitement around CRISPR as a new tool to genetically engineer trees was evident at the conference, which included several other presentations on CRISPR in trees, including use of CRISPR to modify tree branching in order to grow trees much more densely in plantations. If implemented, this would have serious repercussions for communities and biodiversity near the plantations, as the existing problems with forced displacements, fresh water loss and inundation with agrotoxins like fertilizers and pesticides would be greatly exacerbated.

This lack of concern about the larger implications and risks of GE trees by researchers has led to decades of global opposition, a fact which was discussed during a lengthy panel session on “Societal Acceptance of Forest Biotechnology.” The session was focused on ways to encourage the public to accept GE trees. It opened with a presentation by Jared Westbrook, Director of Science of the American Chestnut Foundation, on using GE to restore the American chestnut—documented as being a “test case” to make GE trees more palatable to the public. The second presentation in the session discussed the findings of a survey by Mark Needham conducted to see how to convince the public of the benefits of using GE trees in forest restoration schemes, especially the GE American chestnut. The panel discussion that followed included participation by Westbrook, Needham, GE tree pioneer Ron Sederoff and a representative from GE tree company FuturaGene. The conversation among the panelists and the audience was very candid about the worries around public opinion, the potential for increased regulations on CRISPR, and the ban on GE trees by the Forest Stewardship Council.

The general malaise of the conference continued at its closing dinner, normally a gala celebration, which was without enthusiasm and repeated the pleas for willing volunteers to take over the organizing of future activities.

Trillion Tree Planting Proposal

Less than one week after the close of the IUFRO Tree Biotech Conference, a study was published in *Science* titled *The Global Tree Restoration Potential*, projecting the ability to mitigate climate change by the mass-planting of trillions of trees across the globe. [2]

The study, developed by Crowther Labs and ETH Zürich, with the help of the UN Food and Agriculture Organization, was hailed as a miracle cure for climate change—the surefire solution to allow dominant culture to continue uninterrupted by ecological collapse. The study, however, is fraught with unanswered questions and serious red flags. One major flag is the

study's reliance on the UN FAO's definition of forests, which is any area 10% covered by trees, and does not exclude monoculture tree plantations—despite repeated calls by forest protection groups to do so. According to the World Rainforest Movement, the FAO definition “discards other life-forms as well as the biological and cultural diversity that define a forest while ignoring the social and environmental impacts of plantations.” [3]

What this means is that the trillion trees being promoted could easily include vast monocultures of non-native trees, or even GE trees, due to the FAO's intentionally overbroad definition of forests. [4] This fact is confirmed by a decision made at the 2003 UN Climate Conference in Milan that GE trees could be used in forest carbon plantations.

Another serious flag is the involvement in this study of researchers linked to the UN's program to Reduce Emissions from Deforestation and Forest Degradation (REDD). [5] The REDD program has been actively opposed by Indigenous Peoples and forest dependent communities since its inception. REDD schemes take over forested lands to “protect” (and sell) the carbon they store—and have resulted in the forced displacement of communities that live in those forests. [6]

Because the trillion tree study repeatedly refers to generating tree cover “in the absence of”, or “with minimal” human activity on 1.7 billion hectares, it could easily result in mass-displacements of rural, poor and Indigenous communities from those lands.

An additional problem with the study comes from its math. The authors admit that the 300 gigatons of carbon projected to be stored by these trillion trees will not be realized until the trees are mature, which could take decades. [7] Meanwhile 10Gt of CO₂ are being emitted annually. [8] Particularly in boreal forest zones, a major emphasis of the study, trees grow very, very slowly. Add to this the study's lack of interest in the increasing rate of destruction of existing critical forests that is occurring—such as the 88% rise in deforestation rates in Brazil's Amazon over the past year [9] —and it reads more like a fairy tale than a serious recommendation for mitigating climate change.

Trees as the Engine for a Green Future of Consumption

While seemingly at odds, both the Crowther Lab study on vastly expanding global tree cover to store carbon, and the proposal by GE tree researchers to vastly increase demand for trees by genetically engineering them to replace fossil fuels for the industrial production of everything from electricity to plastics, fall in the same false worldview where the mass-use of trees becomes the path to a “clean, green future”. Both are, at their essence, cynical and opportunistic schemes to avoid real, fundamental social, economic and political change in order to enable overconsumption as usual in the face of overwhelming evidence that rapid and fundamental changes at all levels of society must be undertaken—a call that has been taken up by the National Academies of Sciences [10] and the UN Intergovernmental Panel on Climate Change. [11]

Business for Nature?

Along with these false solutions to climate change emerged another subterfuge to use forests and the natural world to accelerate profit-making under a “clean, green” veneer. On 2 July, a *Business for Nature* scheme was announced simultaneously at a World Economic Forum meeting in China and Norway's Trondheim Conference on Biodiversity.

The idea is not new. In 2008 in Bonn, Germany, the UN Convention on Biological Diversity (CBD) launched its own Business and Biodiversity Initiative that included models for marketing environmental services, the Business and Biodiversity Offsets Programme (BBOP), The Economics of Ecosystems and Biodiversity (TEEB), and a new Green Development Mechanism. [12]

The *Business for Nature* initiative, however, is renewing the scheme using the urgency of ecological crises, as evidenced by its website headline *Nature Loss is Threatening Our Economies—Urgent Actions and Collaborations are Needed*. [13]

The opening of the site lists statistics on the “massive loss of nature” while studiously avoiding any indication as to the causes, which have been driven by the very belief underpinning the initiative, that humans are somehow separate from

“nature.” The site highlights the *Global Risk Report* which “identified environmental risks as among the greatest systemic risks to our global economy,” adding that “only nuclear war would be more destructive.”

In the twisted logic of the Business for Nature scheme (now also promoted as Natural Climate Solutions), “nature protection” is unironically promoted as “essential for prosperous business,” including the activities that have led us to this ecological crisis—i.e. ongoing natural resource extraction.

The grand finale of their proposal highlights the “significant opportunities” (massive profits) to be made from protecting the “ecosystem services” of nature:

*“\$2 trillion in opportunities in food and land system transformation alone
\$22.6 trillion opportunity for water infrastructure by 2050
THE OCEAN ECONOMY ESTIMATED TO BE WORTH \$2.5 TRILLION PER ANNUM”*

In its pledge to forests, it touts a massive ‘reforestation’ campaign, along with a commitment to REDD, and the “elimination of deforestation by 2030” which would magically be achieved with no plan to reduce demand for wood products.

In fact, the future of “green business,” fueled by a bioeconomy, requires a huge *increase* in wood consumption.

CRISPR to Manufacture the Perfect (Unregulated) GE Tree?

And this is where the Tree Biotechnology Conference, *The Global Tree Restoration Potential* and Business for Nature may overlap is through the genetic engineering technology known as CRISPR. [14]

The overall impression from the IUFRO Tree Biotechnology Conference was that scientists and industry are banking on emerging technologies like CRISPR and a rising demand for wood products and designer GE trees to meet the future market for forest health, climate mitigation and the bioeconomy.

Would CRISPR be used as part of the trillion tree effort? Will it be used to genetically engineer trees to be specially adapted to particular biomes? Or to withstand climate change, insect attacks, or other stresses?

There are uncomfortable connections between the work to create genetically engineered CRISPR trees and the Trillion Tree study. ETH Zürich in Switzerland, home of the Crowther Lab that led the study, for example, is considered one of the best biotechnology schools in Europe. In March it awarded the Richard R. Ernst Gold Medal to Emmanuelle Charpentier, one of the scientists who discovered the CRISPR gene editing tool, and sits on the Editorial Board of *The CRISPR Journal* with Barrangou. And Crowther likes to boast that his lab includes experts in geospatial mapping, remote sensing and genetic techniques. It is easy to see where genetically engineered CRISPR trees could fit into the scheme to cover the planet in carbon sucking GE trees that could be then cut down and pulped, chipped or digested into sugars to feed the insatiable and unsustainable demand for building materials, energies, plastics, etc. The demand which has fed the global economy and has helped lead us to the brink of disaster.

Except for the European Regulation on Gene Editing

During the IUFRO Tree Biotechnology Conference panel on societal acceptance of GE trees, researcher Wout Boerjan, of the Ghent Institute in Belgium, a long-time campaigner for the deregulation of GE trees, discussed his fears about the EU decision to treat gene edited trees and other organisms the same as other GMOs. “If gene editing falls under the GM regulation, many new companies will not start. There are many new ideas based on CRISPR/CAS and they can only develop into a company if it’s not going to be so expensive to bring these products on the market. So, if you have a new edited plant and you need to go through the regulatory system, which is extremely expensive, these small companies cannot afford it and the product will not come to the market, so the whole innovation in Europe will just fall flat.” [15].

Miron Abramson, of GE tree company FuturaGene, responded that he was less concerned about gene editing perceived as GMO, "So we will treat it as GE and I don't see any disadvantage or advantage in this case, but just another tool."

A Voice of Experience Offers a Word of Caution

But the Tree Biotechnology conference was not without its cautionary voices. On the societal acceptance panel, Professor Ron Sederoff, considered the father of tree biotechnology, remarked that, "There are people who are kept up at night worrying about this technology and I might be one of them. One opponent of GE technology, David Suzuki, makes an argument that is widely considered that science shouldn't be trusted with new technology. That science does things that are inherently dangerous and we don't know what to expect, and I think that's the core of his argument. But I agree that that's right. There are people who simply have a fear of new technology, and I think they have a good reason. Looking back on human history, there has been misuse of every major technology that has been invented...We haven't even thought about the potential for the misuse of the technology that we're talking about. But I think it's there...I think that there are worries, and I think that CRISPR, for example, poses a threat because it makes things [that exist outside of the law] and if you could do anything you want to and you were malevolently inclined, you might be able to take pathogens that affect people or ecology or forests and [use CRISPR to combine their traits] and make new things. I think there are things to worry about." [16]

Biotechnology for Conservation: Moving in the Wrong Direction

We can clearly see the result of the dominant political and economic system in the form of climate and other crises, including loss of fresh water and arable land, ocean collapse, mass-extinction and extreme weather, as well as escalating human rights abuses including systemic racism, forced displacements, migrations and genocide.

Yet, at the same time that the need for a fundamental reboot of the dominant economic and political systems that have driven life on Earth to the brink of catastrophe has never been more obvious. Elites are searching for anything that will postpone or prevent this critical transformation. In this context, dangerous techno-centric models that use biotechnology for conservation are being pushed as the newest way to save the planet. Numerous plans exist for supposedly bringing back threatened species or addressing other crises using genetic engineering. But the manufacture of genetically engineered facsimiles of a species is not restoration, it is replacement. It is an experiment that once released into the environment, can never be recalled.

On the cutting edge of this scheme is the development of "Darling 58," a genetically engineered (GE or genetically modified) version of an American chestnut tree, funded and supported by the biotechnology industry. Designed for "blight resistance" to allegedly restore the population of American chestnuts, if approved these GE trees would be planted throughout eastern North American forests to spread wildly with no regulation or control, and eventually replace the wild American chestnuts. Not only is this genetic alteration unproven, it also cannot protect the species from other pests and pathogens, nor can it protect the tree from the unknown pressures of climate change. If approved by regulators, however, it will achieve one crucial thing.

The unprecedented approval of this GE tree would open the door to approval of other GE trees designed for industrial plantations, the development of which has been elusive due to the widespread public outcry against them. And that, as the record shows, is the true purpose of this GE tree. Industry representatives call it a "test tree" designed to win over the public using carefully crafted and meticulously delivered rhetoric about "forest restoration."

Conclusion: We Need Transformation Not Reformation

To truly restore forests and defend the rights of communities, we must both expose and *actively oppose* unjust market-based and profit-oriented false solutions, such as those described above. If what is proposed as a solution jeopardizes other people or ecosystems it cannot claim to be just or sustainable.

These destructive dominant systems cannot be reformed. We must organize to fundamentally *confront and transform* them. Even the generally conservative National Academy of Sciences agrees. A paper they published on 6 August 2018 concludes, “[A] Stabilized Earth trajectory requires deliberate management of humanity’s relationship with the rest of the Earth System if the world is to avoid crossing a planetary threshold. We suggest that a deep transformation based on a fundamental reorientation of human values, equity, behavior, institutions, economies, and technologies is required.” [10]

This deep transformation will require the transition to small-scale, local and traditional systems.

It will require creating and bridging movements around the world that can fundamentally transform political, social and economic systems in order to address the climate and other ecological and social crises threatening the future survival of life on earth

Join the Campaign to Keep Forests Wild

Global Justice Ecology Project and the Campaign to STOP GE Trees are focused on keeping forests wild and ensuring GE trees are kept out of our forests, and out of rural communities and Indigenous Peoples’ lands. To join the effort, go to stopgetrees.org or email Theresa2@globaljusticeecology.org.

Find the original 2019 version of this report online in English, Spanish and Portuguese at <https://globaljusticeecology.org/new-gjep-report-addresses-proposals-to-prolong-capitalism-using-trees-green-profit-schemes/>

NOTES

[1] *CTNBio Meeting to Approve GE Trees Cancelled – FuturaGene Taken Over* (2015) <https://stopgetrees.org/victory-ctnbio-occupied-meeting-cancelled-no-approval-ge-trees/> and see *Interview with a Militant of the MST* (2017) <https://www.youtube.com/watch?v=4GeqRRM7A5s&list=PLJIqsEBkCVM2edxllRUUp2a0zTwPI0CMjq&index=4&t=561s>

[2] *The Global Tree Restoration Potential* (2019) <https://science.sciencemag.org/content/365/6448/76>

[3] For decades, World Rainforest Movement and others have demanded that the FAO change its forest definition, which “reduces a forest to any area covered by trees. In doing so, the FAO definition discards other life-forms as well as the biological, cyclical and cultural diversity that define a forest in its continuous interconnection with forest-dependent communities. FAO’s reductionist definition also allows the companies behind tens of millions of industrial fast-growing plantations to claim their monocultures are ‘planted forests’. Countries’ forest statistics thus count these fast-growing industrial monocultures as ‘forests’, in spite of the well-documented social and environmental impacts such plantations have caused around the world.” In 2009, WRM explained, “the definition of forests is not an academic or linguistic discussion: it is a political issue having serious social and environmental consequences at the ground level. Defining plantations as forests empowers the corporate sector - particularly plantation companies - and disempowers local communities opposing them to protect their livelihoods. The FAO continues playing this role by refusing to change its definition.” <https://wrm.org.uy/wp-content/uploads/2018/03/Compilaci%C3%B3n-21-de-Marzo-2018-EN.pdf>

[4] Use of the FAO definition means that “reforestation” efforts could easily become tree monocultures, or even GE tree plantations, since there is no official difference between them. While the Crowther Lab distances itself from the question of monocultures in its online follow up [<https://www.crowtherlab.com/tree-restoration-potential-qa/>] use of the FAO definition of forests means monocultures cannot be avoided. And at the FAO’s World Forestry Conference in 2009 in Buenos Aires, sessions addressing reforestation, afforestation, forest restoration, sustainable forest management, and net zero deforestation all advocated the planting of tree monocultures. [<http://climate-connections.org/2009/10/23/world-forestry-congress-or-how-i-learned-to-stop-worrying-and-love-plantations/>]

[5] National Forest Monitoring and Information Systems for a transparent and truthful REDD+ process (FAO) <https://www.researchgate.net/project/National-Forest-Monitoring-and-Information-Systems-for-a-transparent-and-truthful-REDD-process-FAO>

[6] *Sky Protector Briefing Paper* <https://skyprotector.org/2018/08/19/sky-protector-briefing-paper-8-2/> also see the film *A Darker Shade of Green, REDD Alert and the Future of Forests* <https://www.youtube.com/watch?v=FPFPUhsWMaQ> and *REDD-Monitor's Offsetting fossil fuel emissions with tree planting and 'natural climate solutions': science, magical thinking, or pure PR?* <https://redd-monitor.org/2019/07/04/offsetting-fossil-fuel-emissions-with-tree-planting-and-natural-climate-solutions-science-magical-thinking-or-pure-pr/>

[7] "Of course, the carbon capture associated with global restoration could not be instantaneous because it would take several decades for forests to reach maturity. Nevertheless, under the assumption that most of this additional carbon was sourced from the atmosphere, reaching this maximum restoration potential would reduce a considerable proportion of the global anthropogenic carbon burden (~300 GtC) to date." (1). *The global tree restoration potential* <https://science.sciencemag.org/content/365/6448/76>

[8] According to the Global Carbon Project: <https://www.co2.earth/global-co2-emissions>

[9] Brazil: huge rise in Amazon destruction under Bolsonaro, figures show, *The Guardian*, 3 July 2019 <https://www.theguardian.com/world/2019/jul/03/brazil-amazon-rainforest-deforestation-environment>

[10] *Proceedings of the National Academy of Sciences*, August 2018: *Trajectories of the Earth System in the Anthropocene* <https://www.pnas.org/content/115/33/8252>

[11] "Limiting global warming to 1.5°C would require rapid, far-reaching and unprecedented changes in all aspects of society. With clear benefits to people and natural ecosystems, limiting global warming to 1.5°C compared to 2°C could go hand in hand with ensuring a more sustainable and equitable society," *Intergovernmental Panel on Climate Change Summary for Policymakers* <https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/>

[12] *The Green Shock Doctrine*, p. 4 <https://globaljusticeecology.org/green-shock-doctrine/>

[13] Business for Nature website: <https://businessfornature.org/>

[14] CRISPR is a gene editing technique in which CRISPR and the RNA segments and enzymes it produces are used to identify and modify specific DNA sequences in the genome of other organisms <https://www.merriam-webster.com/dictionary/CRISPR>

[15] 2019 IUFRO Tree Biotechnology Conference session on "Societal Acceptance of Tree Biotechnology" (Quote found at 49:47) <https://mediasite.wolfware.ncsu.edu/online/Play/f9f72a14f48f4b4bb5a58222979e4afd1d?catalog=b9038d70a4ff49dbaab35ddc1a25705821>

[16] 2019 IUFRO Tree Biotechnology Conference session on "Societal Acceptance of Tree Biotechnology" (Quote found at 1:28:04) <https://mediasite.wolfware.ncsu.edu/online/Play/f9f72a14f48f4b4bb5a58222979e4afd1d?catalog=b9038d70a4ff49dbaab35ddc1a25705821>