The risks of large-scale biosequestration in the context of Carbon Dioxide Removal

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The Paris Agreement and support for bioenergy and monoculture tree plantations

The Paris Agreement has set an ambitious target of limiting global temperature rise to 1.5°C. But the explicit reference to achieving "a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases" has put a strong focus on Carbon Dioxide Removal (CDR) as a mitigation approach. According to the Intergovernmental Panel on Climate Change (IPCC), the primary CDR methods are bioenergy with carbon capture and storage (BECCS) and afforestation, [1] both falling under the category of "large-scale bio-sequestration". The majority of the scenarios modeled by the IPCC that keep global temperature increases to 2°C rely on BECCS to one extent or another.

BECCS is referred to as a "negative emissions" technology, and implementing it at the scale envisaged would require a significant increase in global bioenergy use. There is significant support for BECCS and afforestation. Both are envisaged to play key roles in compensating for carbon budget overshoots, as countries globally struggle to reduce greenhouse gas emissions. However, the IPCC has concluded that these approaches involve a high level of uncertainty and significant risks. [2]

Whilst BECCS implementation is still in a state of infancy and discussions relating to CDR as a climate mitigation strategy are similarly in their initial stages, industrial tree plantations, which would produce the raw materials for BECCS, are growing rapidly, globally. With a growing interest to engage and leverage funds from the private sector, the first plantation projects supported by climate finance are emerging, including through the voluntary forest carbon offset market and the Forest Investment Program (FIP). Any policy support for BECCS and afforestation could therefore translate into a significant gearing-up of new industrial tree plantations, regardless of the likelihood of technologies like BECCS actually being rolled out commercially, or large-scale biosequestration successfully mitigating future greenhouse gas emissions.

Plantations often replace natural forests, such as this palm oil plantation in Peru. Mathias Rittgerott/Rainforest Rescue

This community in Brazil has been completely surrounded by eucalyptus plantations for bioenergy generation. Ivonete Gonçalves de Souza

Plantations in Uganda exclude communities from their traditional grazing lands. Carbon Violence

The negative ecological and social impacts of monoculture tree plantations

If implemented at the scales envisaged, both BECCS and afforestation will require vast areas of land for the establishment of industrial monoculture tree plantations. One estimate suggests that using BECCS to limit the global temperature rise to 2°C would require crops to be planted solely for the purpose of CO_2 removal on up to 580 million hectares of land, equivalent to around one-third of the current total arable land globally. Planting at such scale, at least initially, is predicted to involve more release than uptake of greenhouse gases due to the impacts of land clearance, soil disturbance and use of fertilizers. [3]

Even in the absence of global efforts to curb climate change through biosequestration, plantations already cause significant harm to biodiversity and ecosystems by virtue of their extent alone. Often the largest impact of plantations on biodiversity is felt due to land conversion before planting, with plantations being responsible for significant natural forest loss and ecosystem degradation. The counterfactual or "alternative" scenario for tree plantations tends to be either a natural ecosystem or a form of existing land use, such as agriculture. [4] This therefore means that for every hectare of new tree plantation, a hectare of more biodiverse land is lost, directly or indirectly.

Plantations are responsible for significant impacts on biodiversity, alterations to hydrological cycles, land degradation, nutrient loss and soil erosion, agrochemical contamination, and in many parts of the world result in albedo changes that cause significant localised warming.

Monoculture tree plantations also often involve significant social impacts and result in conflicts with communities. Conflicts involving Indigenous Peoples are common as they often do not have legal rights to their land. [5] The establishment of plantations usually involves transfers of land ownership and shifts in decision-making power, [6] with access rights being restricted, for example for grazing and farming. This can have dramatic impacts on the people that depend on the land and resources it provides.

People are often coerced from their land by plantation companies, through restricting access to land, exposing livestock, crops and people to pesticides, and isolating communities by surrounding them with plantations, or they are removed by force. [6] People are forced, one way or another, to migrate to urban areas, leaving their homes, livelihood and cultural practices behind, and consequently, losing their traditional knowledge. [5]

Governance is key!

In principle, addressing climate change through biosequestration requires multi-scale governance options that succeed in translating a global environmental policy objective into local action. But global actors like transnational corporations, international financial institutions and powerful, hegemonic governments have far more political and economic power than local rightsholder groups like women and Indigenous Peoples. These global actors have an economic interest in relatively cheap or even commercially profitable forms of biosequestration, and large-scale monocultures of trees and other crops tend to qualify well in that respect. These actors will subsequently be inclined to use arguments that align their economic interests with a discourse of global biosphere stewardship, claiming large-scale biosequestration is one of the few remaining options to effectively address climate change.

These interests and arguments are juxtaposed with the rights and livelihoods of local rightsholder groups. Meanwhile, policy options that might be more effective, efficient and equitable in addressing climate change like the rapid phase out of fossil fuels and halting deforestation are often dismissed as they conflict with the interests of powerful players in multi-actor governance. [13]

Positive alternatives and the different governance they require

Large-scale biosequestration schemes, in practice and as envisaged, are seriously problematic and more often than not default to monoculture tree plantations. At the root of this is poor governance, with an emphasis on private-sector involvement and top-down approaches.

There are, however, different ways to sequester carbon in natural terrestrial ecosystems that are beneficial both for the people that live in and depend on them, and for the planet in terms of contributing towards the ecosystems themselves and efforts to meet global warming targets. But to be effective, they require a substantially different form of governance, with a much greater emphasis on rights-holders and avoiding corporate-capture of climate policies.

Rights-based and community-lead biosequestration could, in theory, involve many positive schemes that, put together, would help to mitigate climate change on a large scale. There are vast areas of deforested and degraded lands and that could be restored through bottom up, gender sensitive approaches. In many parts of the world such schemes are already being practiced by people in their every day lives. Natural ecosystem regeneration, agro-ecology, and indeed many forms of peasant agriculture do restore and conserve terrestrial ecosystems, sequestering carbon on many different scales. Supporting these practices should be at the forefront of climate mitigation strategies.

This community mangrove restoration project in Samoa, is helping to restore damaged ecosystems. OLSSIN

Agro-ecology systems can involve livestock and put carbon back into soils and forests. Simone Lovera

Agriculture practiced by small farmers and peasants can help to cool the planet. LVC

Plantations and fire: Portugal's extensive eucalyptus plantations

Portugal has a greater proportion of its territory planted with eucalyptus than anywhere in the world by a significant margin, and has more eucalyptus in absolute terms than anywhere else in Europe. It is planted in vast areas of monoculture plantations, mostly to provide pulp to a large paper products industry. A lack of enforcement of regulations and forestry planning has meant that many plantations are illegal, and years of rural depopulation and abandonment has seen diversely cultivated hillsides be replaced with monoculture eucalyptus.

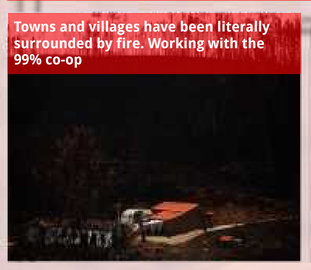
An extreme heatwave in June, coupled with severe drought conditions across the country, sparked the beginning of a long and unprecedented forest fire season. The first major forest fire of the year resulted in 64 deaths and affected nine different municipalities. All throughout the summer out-of-control forest fires raged such that, by September, an area greater than 6 times the average over the past decade had burned, and more land had burned in Portugal than anywhere else in Europe.

Eucalyptus plantations are "green deserts" in terms of biodiversity, and are a serious drain on the countries scarce water resources. Most significantly though, they are highly flammable, spreading fires quickly and over large distances. Despite the southern regions of Portugal being the hottest and driest, it is the central and northern regions that are worst affected by fires, having the highest concentrations of eucalyptus plantations. The combination of monoculture plantations and climate change has been devastating for Portugal this year.

Fires have raged throughout central and northern Portugal, resulting in an unprecedented number of deaths and damage to property. Margus Kurvitis

Ploughing before planting eucalyptus causes serious environmental damage. Ashlesha Khadse

Extensive eucalyptus plantations have replaced many natural forests and agricultural lands in Portugal. Allysse Riordan



Towns and villages have been literally surrounded by fire. Working with the 99% co-op

Native tree species are more fire-resistant and often survive forest fires. Annabelle de la Panouse

Community forest resoration in Nepal

Community forest management in Nepal is a unique example of a rights-based approach to forest conservation and restoration. It has been a cornerstone for forest conservation and restoration in many areas, and is a key ecosystem-based adaptation strategy for the country. Approximately 35% of forest land is under a community-based forest management system. Community forest user groups, including some of the poorest and most vulnerable communities in the mountain ecosystems of Nepal, have played a central role in halting forest loss and promoting forest restoration, and the associated enhanced ecosystem-based climate resilience. The Ministry of Forests and Soil Conservation for example has acknowledged that community conserved forests have contributed significantly to controlling forest encroachment and subsequent ecosystems restoration. [14] The United Nations Development Programme has also highlighted how soil erosion, landslides and floods in the Panchase region have been significantly reduced by community conservation. [15] The customary rights of communities to manage their own forests for the production of timber and non-timber forest products are explicitly recognised in the 1993 Forest Act, although community access rights to forest resources remains one of the most contentious policy issues in Nepal. There is obviously still much room for improvement, especially in areas without community-based forest management systems, and in strengthening the roles and positions of women in these systems. But the success of community-based forest management in Nepal shows that rights-based, bottom up and community-led ecosystem restoration is possible on a large scale, without the need for private-sector involvement and monoculture tree plantations.

Members of community forest user groups are managing their community forest in Nawalparasi district, Nepal. Nawalparsi/FECOFUN

The reality of large-scale biosequestration: Climate finance for large-scale tree plantations

International climate-related funding mechanisms are already directing money, whether in the form of grants or loans, towards projects that include subsidies for monoculture tree plantations. One reason is the growing dependency of climate policies on private investments through public-private partnerships and other forms of blended finance. For private investors, a commercial tree plantation is a more profitable investment than forest conservation or restoration, despite the benefits of the latter for local communities, Indigenous Peoples and women. The underlying drivers are flawed accounting mechanisms that hide the emissions of plantations.

These are examples of tree plantation schemes that have been supported, funded or subsidised by climate finance mechanisms to date:

Ghana: public-private partnerships for the restoration of degraded forest reserve through VCS and FSC certified plantations. Approved by the Forest Investment Program (FIP) and consisting of a USD 10 million loan aimed at catalysing private sector involvement in large-scale commercial teak plantations in supposedly degraded forest reserves in Ghana. The project is aimed at meeting the expected rising global and domestic demand for teak. The composition of this plantation is only 10% indigenous trees species. [7]

Brazil: Commercial Reforestation of Modified Lands in the Cerrado. This project proposal, which was part of Brazil's FIP Investment Plan, was endorsed in 2013 for a total of USD 15 million of non-grant investment. The project subsidised a private company to plant 18,000 ha of teak. [9]

Uganda: Green Resources' plantations. As part of its mandate to combat global climate change, the Swedish Energy Agency entered into an agreement with Green Resources to buying so-called 'carbon credits' from a tree plantation in Kachung, Uganda, where there are documented cases of forced evictions, and pesticide pollution of watercourses. People in the area were deprived of land to graze cattle and grow food on. [9]

Mozambique: Emissions Reductions in the forest sector through planted forests. This project has been recently approved by the FIP for a total of USD 1.85 million of funding, and will facilitate the afforestation of over 200,000 hectares, mainly with eucalyptus. A leading pulp and paper company is one of the private actors involved in this project, and in charge of expanding the plantations area. [10]

Ivory Coast: FIP Investment Plan. USD 24 million in funding has been promised for a plan that aims to establish 100,000 hectares of plantation, planted and operated by public and private investors and in some cases, public-private partnerships. The importance of the private sector for reforestation and long term supply of sustainable fuelwood and lumber is emhpasised in the plan. [11]

Paraguay: PROEZA project (Rejected). This project was submitted to the Green Climate Fund by the Food and Agriculture Organization and would have involved subsidising 32,500 hectares of eucalyptus plantation, to produce bioenergy for the soy sector, one of the main drivers of deforestation and greenhouse gas emissions in the country. The project was rejected at the 18th GCF Board Meeting in October 2018, partly out of concern by Global Forest Coalition activists and others about using public funding to support tree plantations. [12]

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