Data Submitted (UTC 11): 11/17/2021 11:00:00 AM
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Organization:
Title:
Comments: Dear Staff of the Grand Mesa, Uncompaghre and Gunnison National Forests:

On behalf of Sustainable Development Strategies Group, a nonprofit research institution based in Gunnison, Colorado, I submit the following comments.

There is an immense amount of carbon embodied in trees in the GMUG National Forests.Whether this burns in wildfires, or prescribed burns, or slash piles, far too much of it is going back into the atmosphere.

There is a massive amount of carbon embodied in dead standing wood. For example, each of the estimated 7,146,464 dead Engelmann spruce at Monarch Pass in Colorado contain approximately 23.7 pounds of carbon stock (i-Tree). In the event of a large scale wildfire in this forest, roughly 84,752.3 tons of carbon could enter the atmosphere.

There needs to be a reorientation of forestry practices aimed at keeping as much as possible of this carbon out of the atmosphere.

Please see the attached.

Luke Danielson

SDSG

[ATTACHMENT FOLLOWS]
Keeping Carbon Out of the Atmosphere

Nathan Gore and Luke Danielson

1. There is a great need to find ways better to manage the rapidly increasing amount of beetle killed deadwood in the Gunnison Basin, in Colorado, throughout the West, and in temperate boreal forests around the world.

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o Warming temperatures are fueling the expansion of pine and spruce beetle outbreaks across North America, Europe, and Siberia, ravaging tens of thousands of square miles of woodlands (Katz 2017).

o 1.8 million acres of Colorado forests are either impacted or dead. The spruce beetle was Colorado[rsquo]s most widespread and damaging forest insect pest for the seventh consecutive year in 2018 (Colorado State Forest Service, 2018).

o The number of impacted trees in Colorado had reached around 834 million by 2018, an increase of 30% since an inventory in 2017 (Colorado State Forest Service, 2017, 2018). The number is almost certainly considerably higher today -- perhaps a billion dead trees.

o With their advance fueled by climate change, bark beetles have ravaged 85,000 square miles of forest in the western United States [mdash] an area the size of Utah [mdash] since 2000. Pine beetles also have killed trees across roughly 65,000 square miles of forest in British Columbia (Katz 2017).

2. The need to find a way to manage this problem is acute.

o This amount of standing dead biomass creates an enormous danger of massive wildfires such as the ones that devastated parts of Colorado in the summer of 2020 (National Geographic Area Coordination Centers, 2021).

o From the Mexican border to the forests of Washington State, the West Coast is ablaze. Dozens of fires have roared to life across the western states, burning millions of acres of forest and grassland (Thompson 2020).

o Most importantly, there is a massive amount of carbon embodied in this dead standing wood. For example, each of the estimated 7,146,464 dead Engelmann spruce at Monarch Pass in Colorado contain approximately 23.7 pounds of carbon stock (i-Tree). In the event of a large scale wildfire in this forest, roughly 84,752.3 tons of carbon would enter the atmosphere, rather than be sequestered, adding greatly to the greenhouse gas burden (i-Tree, n.d.; USFS Salida Ranger District, 2017, 2018).

o Human activities release roughly 28 gigatons of carbon dioxide (CO_2) into the atmosphere each year, but much of that is naturally sequestered by vegetation and the world[rsquo]s oceans (Matovic, 2011).

o Recent studies have even concluded that wood burning may create more carbon emission than gas, oil, and even coal (Lagani[egrave]re et al., 2017).

3. There is a pressing need for innovative solutions to manage this important and critical problem in a way that does not produce further greenhouse gas emissions or contributions to climate change.

o Climate change has been found to promote the bark beetles[rsquo] spread and capacity for destroying forests, as increased average temperatures will have expanded the climate limitations and thus the geographic ranges where the beetles can survive. In short, beetle kill often results in large scale wildfires.

o The stands of the dead trees can be useful for lumber, at least for some time after they die, however the quality of the dead wood deteriorates over time. When it is no longer viable for lumber, the biomass can still be turned to biochar. In any case, the amount of dead standing wood far exceeds demand for lumber.

o The dead stands can be managed to some extent by controlled burning methods. This is currently the most common management tool.

o But both wildfire and controlled burning releases CO_2 and other greenhouse gases (GHGs) which contribute to climate change and further exacerbate future potential beetle kill (Carswell, 2012; Cudmore et al., 2012).

o In the event of a forest fire at Monarch Pass, Colorado, one part of our study area, a massive percentage of the Monarch Pass carbon stock would be released into the atmosphere to further drive climate change and ultimately continue the spread of beetle kill. With traditional slash and burn management, about 90% of these 84,752.3 tons of carbon would be emitted into the atmosphere, resulting in a net emission of about 76,277 tons of CO_2 (i-Tree, Libretexts, 2020).

4. One part of the solution could be using the dead trees to produce biochar: a material produced by cooking biomass such as beetle killed trees.

o Refining biomass into biochar is a carbon neutral closed loop process, which vastly reduces the emissions associated with controlled burning.

o Biochar has many properties for restoring degraded soils, of which the world has an unfortunately large supply, while also sequestering carbon (Hawken, 2017; Ronsse et al., 2013). This soil amendment is found to promote nutrient buildup for revegetation, carbon sequestration, and the concentration of heavy metals to catalyze their removal from degraded lands (Ippolito et al, 2019; Lal et al, 2018; Ippolito et al, 2017; Anawar et al, 2015; Lehmann & Joseph, 2009).

o When added to topsoil, biochar can sequester massive amounts of carbon, and its production can be an alternative to controlled burning; thus, furthering emissions offsets. Sequestration and repurposing the beetle kill can serve to mitigate the positive feedback loop of climate change which drives further beetle infestations (Cudmore et al., 2012).

5. Carbon sequestration is the process of plants and soils storing carbon within the plant biomass or soil organic matter. This ecosystem service prevents the carbon from being released into the atmosphere or it captures the greenhouse gases and stores them within the organic material (Paustian et al., 2019).

o Biochar has thus far been used as a novel strategy to increase the carbon stocks of amended soils to increase nutrient flow and offset emissions by a potential of up to 9.5 gigatons annually (Yousaf et al., 2016).

o The carbon based biochar can persist in the soil ten to 100 times longer than the original biomass, thus initiating a massive climate impact mitigating storage of carbon (Lehmann & Joseph, 2009). The global potential of biochar to sequester carbon both above and belowground ranges from 0.5 to 1.1 Petagram of carbon per year, which is roughly equal to the amount of carbon released annually to the atmosphere from land use change, or about 25% of the carbon released from fossil fuel burning (Lal et al. 2018).
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