Dear California Air Resources Board,

As a board member of Rainforest Trust (https://www.rainforesttrust.org), a US charity focused on tropic forest conservation, and as a committed conservation philanthropist focused on preserving large areas of tropical forest with a primary motivation of mitigating climate change (see: http://millionacrepledge.org and http://millionacrepledge.org/byers-santos/) and as a published author in Nature regarding this subject (see http://www.halfthesolution.com), I would like to submit the following comments in relation to the March 22, 2016 California Air Resources Board meeting regarding the possibility of introducing tropical forest carbon offset credits to the California CO2 cap and trade market. I much appreciation the work of the California Air Resources Board towards including tropical forest conservation and restoration offsets, giving the tremendous importance of tropical rainforest to mitigation of human-caused climate change. Respectfully submitted, Brett Byers.

TROPICAL FOREST COULD BE HALF OF THE CLIMATE CHANGE SOLUTION

First, and most importantly, I would like to indicate that, as I did at the meeting, while CO2 emissions from rainforest destruction and degradation may only account for 11% to 15% of total worldwide, tropic forest conservation and restoration has the potential to provide about 50% of the net CO2 emissions reductions over the next critical decades that it will take the world to largely stop burning fossil fuels and to reach peak atmospheric CO2 concentrations, with CO2 levels in the atmosphere then dropping.

There are two primary reasons that could permit tropic forest conservation to provide half of the climate change solution. First, with adequate political will and funding (which are needed for all climate change solutions), forest conservation and restoration can be implemented much faster than a transition away from fossil fuel use. The New York Declaration on Forests indicates the length of time dramatically reduce and eliminate forest destruction is measured in years, while estimates (especially when political realities are considered, as well as the still rapidly increase in use of fossil fuels in the developing world) of the time to end fossil fuel use start at 35 years, with more realistic periods extending to 50 or 85 years.

Second, there are hundreds of millions of acres of tropical forest that are degraded, often selectively logged, such that the large trees, which contain the majority of the above-ground-carbon, are absent. If these degraded areas are protected, they would absorb huge quantities of CO2 for 50 to 100 years until the small trees become large. No human intervention is needed, as the seed base and variety of small trees are intact within the degraded forest. An amount of as much as over 10 billion tons of CO2 could be absorbed per year by recovery of degraded forest. This amount thus could be nearly 30% of current worldwide CO2 emissions and could be larger than the current net emissions from continued tropical forest destruction and degradation, which amounts to another 11% to 14% of total CO2 emissions.

As such, tropical forest conservation and restoration could provide a critical bridge to the post-fossil fuel era, and could be a major portion of any climate change solution.

Finally, I note that the amount of carbon stored in tropical forests worldwide (nearly 2,000 billion tons of CO2 sequestered) is equal to over half of the carbon stored in proven fossil fuel

reserves (estimated to be about 3,000 billions tons of CO2 emissions on burning of this fuel). Thus, just as we court very dangerous climate change by burning all (or even a substantial fraction of) proven fossil fuel reserves, we face the same danger by destroying all (or a substantial fraction of) remaining tropical forest.

Here are citations to articles and papers (many peer-reviewed academic papers) providing support to the assertions above:

1. Regarding the 35+ years to convert off of fossil fuels: Mark Z. Jacobson and Mark A. Delucchi, Providing all global power with wind, water and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials, Energy Policy (2011) 39, 1154-1169, http://www.stanford.edu/group/efmh/jacobson/Articles/I/JDEnPolicyPt1.pdf .
2. New York Declaration on Forests: http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-–-Action-Statement-and-Action-Plan.pdf .
3. Peer reviewed articles showing potential of rainforest to offset CO2 emissions, including via absorption of CO2 by recovering degraded forests (the second article also indicates that about 500 billion tons of carbon is stored in tropical forests, equal to nearly 2000 billion tons of CO2 emissions on destruction of such forests):
   a. Richard A. Houghton, The emissions of carbon from deforestation and degradation in the tropics: past trends and future potential, Carbon Management (2013) 4(5), 539–546, http://research.mblwhoilibrary.org/works/39404 and http://www.tandfonline.com/doi/pdf/10.4155/cmt.13.41 .
   b. John Grace, Edward Mitchard and Emanuel Gloor, Perturbations in the carbon budget of the tropics, Global Change Biology (2014) 20, http://onlinelibrary.wiley.com/doi/10.1111/gcb.12600/full .
   c. There is literature that indicates that tropical forest conservation and restoration could offset about 30% current human-caused C02 emissions (see: http://www.cgdev.org/blog/tropical-forests-offer-24%E2%80%9330-percent-potential-climate-mitigation and http://www.halfthesolution.com/other_research.html and citations from within each, including http://www.cgdev.org/sites/default/files/CGD-Climate-Forest-Paper-Series-11-Goodman-Herold-Maintaining-Tropical-Forests.pdf). But note that because it will take decades to eliminate (or at least dramatically reduce) fossil fuel use, whereas tropical forest conservation and restoration can be put in place far more quickly, the cumulative net CO2 emissions from tropical forest conservation and restoration could be roughly equal to that from reduction in fossil fuel during the critical period from now until peak atmospheric CO2 concentration, with tropical rainforest conservation and restoration providing a crucial bridge to the post fossil fuel era.
4. Peer reviewed article in Nature Climate Change showing how tropical forest conservation could account for up to ½ of net CO2 emissions reductions over the crucial next 5 decades: http://www.nature.com/nclimate/journal/v5/n12/full/nclimate2869.html and http://www.halfthesolution.com .

If you would like any of these articles in PDF format or if you would like further explanation, please contact me.

REPORTING REQUIREMENTS – INDEPENDENT THIRD-PARTY VERIFICATION

With regard to reporting and measurement of carbon and biomass content for both reference levels and monitoring of achievement of emission reductions, I would suggest that it is important to have independent, third-party verification of measurements. This measurement must not be left totally to tropical forest nations, but should be verified by independent, third parties with no interest in the issuance of offset credits, and such third parties should be sufficient empowered with technology and access, including LiDAR aircraft over flights, on-the-ground access and access to all raw data forms and analyses used by the tropical forest country and others in their measurements.