

## ***Interactive comment on* “Mitigation of agriculture emissions in the tropics: comparing forest land-sparing options at the national level” by S. Carter et al.**

### **Anonymous Referee #2**

Received and published: 15 July 2015

#### Major Comments:

The authors of the study “Mitigation of agriculture emission in the tropics: comparing forest land-sparing options at the national level” carry out a highly integrative, policy-relevant study on the potential for mitigating greenhouse gas emissions through the prevention of deforestation. The authors provide a very interesting analysis that ultimately identifies and prioritizes the most feasible emission reduction options for different countries based on their land use and governance regimes. The study is very timely from both a research and a policy standpoint (it takes advantage of a number of products and demonstrates the integration of interdisciplinary data sources, and provides information that is useful for policymakers prior to the upcoming COP21 negotiations).

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This high-level study should be of interest to readers of Biogeosciences. The authors have laid out all of the components of their study in a manner that is extremely clear (both in written form and through flowcharts) and easy to follow, and the approach seems generally sound, though one major comment and some specific comments are mentioned below.

A limitation of this study is that the authors seem to assume zero carbon emissions from the conversion of non-forested land, which may overestimate the mitigation potential of converting this land versus forest. For example, on Page 5438, Lines 11-16, I worry that the authors are, somewhat implicitly, presenting a rather black and white view here of the forms of land conversion that are of concern from a mitigation viewpoint. It is important for the authors to discuss this by, for example, considering the results of studies like Searchinger et al., 2015 (“High carbon and biodiversity costs from converting Africa’s wet savannahs to cropland” in Nature Climate Change). In addition, converting land has other costs, e.g. loss of biodiversity that go largely unrecognized in this version of the manuscript.

## Specific Comments:

Abstract, final sentence: Can the authors offer a more specific recommendation or put the issue in context by bringing some information that is in the body of the study up to the abstract? For example, are the forestry and agricultural sectors excluded from national mitigation policies?

I understand that the authors want to provide national-level estimates, but the presentation and use of a national yield gap value seems quite uninformative. I suggest the authors provide some information of the range in this value since sub-national yield and yield gap data are available, and since yield gaps can vary considerably within a country.

Page 5439, Lines 22-24: I found this sentence confusing.

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Page 5440, Lines 3-5: I don't quite understand what you're trying to say here about your use of thresholds.

Pages 5442-5443, Lines 23-6: Please restructure this paragraph a bit, it is hard to follow.

Section 2.2.2 and Table 3: Why did the authors choose 3.5 t/ha as the threshold? I understand that the authors acknowledge this limitation in section 4.4, but it would be more accurate if they changed this value for each country based on the dominant crop, since, for example, the average yield for wheat in a productive area is different than the average yield for corn or rice. Would something like this be feasible for the authors to do/can they do a test to see whether doing this would significantly change their results?

Page 5444, Section 2.4: Please provide more information on the food security assessment and how it relates to mitigation interventions. Otherwise, it is hard to understand how "Food insecurity indicates a risk to livelihoods when implementing mitigation interventions. . ." later on in the paper.

Page 5446, Lines 12-15 and 17-20: It is a bit hard to distinguish the difference in the points you're trying to make with these two sentences. (Similarly, the first sentence of Section 4.1.2 is confusing.) Also, given the issue presented with the Haiti example, perhaps the authors could also present the absolute number of hectares of forest loss in addition to the percentages that are relevant to each respective country?

Section 4.3: To be sure, do the authors truly intend to make predictions, or do they intend to make projections with this study? They should double-check their language here.

In general, the authors should consider breaking up some of the paragraphs in the Discussion section so that they address single concepts. For example, the second paragraph on Page 5455 addresses multiple issues.

Technical comments:

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Abstract, line 22: I believe you meant “. . .there is a potential to mitigate 1.3 Gt. . .”?

Abstract, line 25: delete comma

Page 5440, Line 17: At this location, as well as all locations in your paper, please be sure to define your acronyms before you use them.

Page 5444, Section 2.3: Where did the authors acquire the governance data to calculate the index – from World Bank, 2012? It was difficult to tell whether the index algorithm or the index algorithm and the data were acquired from this source.

Page 5454, Line 6: I think you meant “within the range of those”, and Line 17: I think you’re missing a word in this sentence as it is awkward.

Page 5455: It should read “. . . the soybean industry’s. . .”

Page 5456: “can be mitigated in those countries in which 33% of emissions are produced by agriculture. . .”

Table 4: The authors should add in some additional lines to delineate the rows from one another, otherwise it is difficult to read.

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Interactive comment on Biogeosciences Discuss., 12, 5435, 2015.

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