

## Research Priorities Resulting from 2016 Sustainability Workshop

In order of rank
1. <b>Newer version of GTAP:</b> Publish papers that describe the latest improvements, why they were done and what the impact is.
2. <b>Moving to a trend yield for agricultural yields instead of using the precise yield of the data year</b>
3. <b>Updating trade elasticities by crop and region – currently only one set for all regions</b>
4. <b>Estimate YDEL by crop and region instead of just by region</b>
5. <b>Tune the data base better for 2011 land rents</b>
6. <b>Add cropland pasture for Europe and other regions:</b> The availability of all cropland that is not currently harvested must be captured in the model. The data shows that this is the first land that is cultivated when demand increases, yet other than some cropland pasture in the United States (CRP not included) and Brazil it is not included in GTAP and most of the other models.
7. <b>Idle Land:</b> Establish consensus nomenclature for land use classification as it pertains to idle cropland. Use improved satellite imagery data to validate land use classification and the inventory of available land.
8. <b>Using consequential LCA analysis for direct emissions:</b> CARB uses attributional LCA for direct emission and adds those to consequential emission from ILUC. Consistency would require using consequential LCA instead of attributional LCA for the direct emissions when adding ILUC.
9. <b>Multiple Shocks:</b> Run multiple shocks of the model to get more realistic estimates. Include intensification of livestock.
10. <b>Nitrogen:</b> Assess the potential impact of added nitrogen (are current assumptions correct that if you add more fertilizer you increase crop yield). What are the impacts locally and globally? How is total nitrogen use impacted by simultaneous shocks for corn and soy?
11. <b>Develop/identify expertise. Extend the network of professionals working to improve the accuracy of ILUC quantification.</b>
12. <b>Analyze problems of Globium</b>
13. <b>The revised nesting structure in GTAP,</b> which dealt with the issue that too much forest conversion was happening, may need additional improvements to make it more reliable.
14. <b>Enhance characterization of forest land cover change:</b> Process forestry gains on a fractional basis using the same approach as forestry losses (R&D). Enhance handling of situations where pixels experienced both gains and losses during the time period covered. Enhance handling of gains in pixels where there already existed some canopy coverage according to the 2000 layer. Use methodology described in Hansen et al. to estimate forestry gains on a per-year basis as opposed to a single gain number 2000-2012 (R&D)
15. <b>Should unmanaged land be added to the CET function model structure and if so, how?</b> A. We suggest that it is necessary first to do a detailed investigation about the land cover data in GTAP. B. It is important to think how an increase in the area of forest land can affect GTAP results.
16. <b>Add Soil Carbon Credits</b>
17. <b>Use new satellite data to determine measure LUC instead of predicting it</b>
18. <b>Review of AEZ-Emission Factor Model</b>
19. <b>Dynamic GTAP:</b> Develop expertise using and modifying a dynamic version of GTAP.

<p><b>20. Century Soil Organic Carbon (SOC) Change.</b> The assumed 50% change in carbon resulting from a change to crop may be too high.</p>
<p><b>21. Should food consumption be bounded on constant intake of calories?</b> Perhaps diets should align with real world trends of increased protein consumption or converge toward ideal intake based on proper ratio of calories from protein, carbs, and fat.</p>
<p><b>22. Yield elasticity with respect to price:</b> For sensitivity analysis, the central value should be 0.25. The lower bound on this elasticity should not be zero because of strong theoretical considerations (input use responds to crop price) and the reality of double cropping. The issue of price yield elasticity is misunderstood by biofuel critics. The way that it is used in GTAP, with a medium term outlook is not the classical definition/interpretation. These issues need to be better communicated/understood to improve consensus over numbers that make sense,</p>
<p><b>23. Elasticity with respect to area expansion.</b> For sensitivity analysis, use as the central value the numbers in Tyner et al (2010) from TEM. Elasticity of land transformation Central value: Keep the same as in current GTAP model (-0.2) Alternative values: the same as used before (-0.1 and -0.3)</p>
<p><b>24. New Estimates of the Productivity of New Land vs Old Land in the United States:</b> For the CARB analysis, this input for the GTAP model was selected in the range of 0.5 to 0.75. Sensitivity analysis indicates that a change from 0.5 to 0.75 results in a 38% reduction in LUC intensity.</p>
<p><b>25. Literature Review:</b> We note that CARB staff chose values ranging from 0.5 to 0.75 (except one scenario for sugarcane ethanol in which 0.8 was used for Brazil) to be used in the GTAP model runs though there is no explanation to the basis of such decision.</p>
<p><b>26. Extend earlier CDL-based examination of double cropping:</b> Include 2013 CDL (and the 2014), Extend to 48 states (from previous 28), Aggregate from pixels directly to AEZs, examine and address NASS claims of biases arising from pixel counting, Attempt to utilize LANDSAT to enhance consideration of double cropping, especially prior to 2007(R&amp;D), Closer look at interplay between double cropping and economics. (Charles)</p>
<p><b>27. Biomass additionality and carbon neutrality</b></p>
<p><b>28. Include corn fiber LUC</b></p>
<p><b>29. Better understanding of the causes for deforestation, e.g. mining, other social and political issues</b></p>