



Submission in response to the invitation to accredited observer organizations to provide views on “Enhanced action on mitigation, Cooperative sectoral approaches and sector-specific actions, in order to enhance the implementation of Article 4, paragraph 1(c), of the Convention, (SBSTA)Views from Parties and accredited observer organizations on the issues related to agriculture referred to in paragraph 75 of decision [-/CP.17] Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention. (Decision [-/CP.17] Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, paragraph 76)

The Nicholas Institute for Environmental Policy Solutions at Duke University thanks SBSTA for the opportunity to share results of its research that may be relevant to the SBSTA forum discussion about the possible implementation of a work program on agriculture. The Nicholas Institute creates a bridge between academic expertise and decision makers to help decision makers create timely, effective, and economically practical solutions to the world's critical environmental challenges. The Nicholas Institute directs the Technical Working Group on Agricultural Greenhouse Gases, which has convened experts in the United States and across the world to further a shared understanding of the fundamental science behind greenhouse gas mitigation in the agricultural sector. This submission shares some of the conclusions of this work.

Given the global importance of the agricultural sector in greenhouse gas emissions and mitigation, including carbon sequestration, as well as its front-line role in adaptation, the consideration of sectoral approaches and sector-specific actions for agriculture within UNFCCC deliberations is both timely and critical. Agricultural activity generates significant emissions through loss of soil carbon storage and the release of methane and nitrous oxide during production. It is also a primary contributor to land use change, which generates significant emissions through the loss of forests, grasslands, wetlands, and scrublands across the world. However, agricultural activities can also enhance carbon sequestration, reduce carbon loss, and reduce rates of methane and nitrous oxide emissions on actively-managed agricultural lands. By enhancing productivity on agricultural land, improved agricultural management can also ease pressure for land use change and loss of carbon from other ecosystems (including forests, wetlands, and others). In many regions, agriculture can be a relatively cost-effective option for achieving significant greenhouse gas reductions.

Over last few years the Technical Working Group on Agricultural Greenhouse Gases (T-AGG) at Duke University has led an evaluation of the potential for land management practices in the agricultural sector of the United States to contribute to greenhouse gas mitigation. The findings include:

- An evaluation of 42 management practices, which found 28 activities covered in the scientific literature that were likely to sequester carbon or reduce emissions of greenhouse gases.



- A list of high-priority research areas, including (1) the need for a better understanding soil carbon storage at depth and over time; (2) a broader assessment of nitrous oxide management strategies; and (3) additional evaluation of the stability and life cycle implication of biochar applications.
- An assessment of methods that suggests that models may be sufficiently accurate and efficient for assessing the scaled-up performance of well-studied and well-understood management practices. Direct measurement, on the other hand, can be more complex and costly but is necessary for programs targeting innovation.
- A discussion of the leakage potential for agricultural management actions targeting greenhouse gas mitigation, which notes that some management practices with potential to reduce greenhouse gases may also reduce productivity, and can thus lead to negative leakage (or an increase of emissions elsewhere). However, the discussion also finds that a number of practices are likely to enhance productivity, and can lead to positive leakage (a reduction of emissions elsewhere). In developing countries with greater room for increases in productivity, the potential for positive leakage is significant and should be a focus of attention. Increasing productivity can align food security and mitigation objectives
- Although permanence has been a primary concern for carbon sequestration and storage in forest systems, it is a somewhat different issue for agriculture. A number of carbon sequestration activities, such as restoring degraded lands or improving soil quality, can lead to increases in production and appear less likely to be reversed for financial gain. In addition, one-time natural disturbances, such as fire or storms, may remove one year's carbon contribution, but are unlikely to result in significant loss of below-ground carbon. On a management-relevant time scale, reversals are not as likely to be catastrophic and immediate as in forest management. Further work is needed to fully assess the risks. On longer time horizons, forests and agriculture may both be susceptible to shifts in storage driven by changes in climate. These long-term background trends need to be considered when assessing the impact of different activities in the agricultural sector.

Much of the work of T-AGG to date has focused on the United States, but the results have relevance for agriculture in other parts of the world. The current work of T-AGG focuses on the technical foundations of quantifying mitigation in the agricultural sector in developing countries.

Overall, T-AGG found that although there are clearly areas of significant uncertainty in managing agriculture for greenhouse gas mitigation, there are also areas with strong scientific understanding and practical experience that present opportunities for early action. Many of these management practices are relatively low cost to implement and can enhance agricultural production and some provide additional co-benefits to wildlife or water and air quality.

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