

Estimating N₂O Reductions from Nutrient Management in the Chesapeake Watershed
Chesapeake Bay Foundation
July, 2011

The Chesapeake Bay Foundation (CBF) received a NRCS Conservation Innovation Grant (CIG) for a project entitled “Estimating Nitrous Oxide Reductions from Nutrient Management in the Chesapeake Watershed” through a special round of CIGs focused on greenhouse gas (GHG) reduction.

The goal of the proposed project is to develop and implement a greenhouse gas tool for estimating nitrous oxide reductions from nutrient management in the Chesapeake Bay watershed. The tool is known as the Denitrification-DeComposition (DNDC) model. The DNDC is a peer-reviewed and tested simulation model of carbon and nitrogen biochemistry in agro-ecosystems and is an accepted method for estimating nitrous oxide emissions by the American Carbon Registry. This project will result in a region-specific, user-friendly version with the goal of reducing some of the technological and financial barriers to certifying carbon offset credits generated by nutrient management projects.

We will use the tool to estimate the nitrous oxide emissions benefits of three different nutrient management approaches, tested in three locations: soil testing/adaptive management on corn farms in the Upper Chester River Watershed, manure injection in western and central Maryland, and variable rate technology (i.e., GreenSeeker) on grain farms in Virginia’s Onancock Creek watershed. This approach will allow us to compare and contrast these approaches in terms of greenhouse gas benefits, fertilizer savings, and obstacles to greater implementation. Eventually the resulting carbon offset credits will be certified and registered in the American Carbon Registry.

Despite the potential for cost-savings to agricultural producers (due to lower fertilizer costs), of implementing enhanced nutrient management, these approaches are, by no means, “business as usual.” The technologies require new capital investments by farmers, use of complex technology, and many farmers fear that the new practices will result in crop yield reductions. Ultimately, we hope to encourage adoption of enhanced nutrient management techniques by Chesapeake Bay region farmers by facilitating the process by which they can participate in, and financially gain from, carbon offsets markets.

CBF will work with a number of project partners including: Environmental Defense Fund; Maryland Department of Agriculture; USDA NRCS; Virginia Tech Extension; DNDC Applications, Research & Training LLC (consultant in model development); and EcoFor LLC (consultant in GHG offset verification).

The project is leveraging dollars from a partnership CBF has with Washington Gas Energy Services (WGES) and Sterling Planet (SP) whereby WGES and SP are donating some of the proceeds from the sale of carbon offsets to WGES customers into a Carbon Reduction Fund (CRF) that CBF is managing. The purpose of this Fund is to implement projects, primarily with agricultural producers, which generate certified carbon offset credits while also reducing water pollution to the Chesapeake Bay. This innovative fund presents a tremendous opportunity for the Chesapeake Bay region’s agricultural producers to participate in the nascent carbon markets. It has also highlighted some of the challenges of certifying credits generated via agricultural projects, some of which the CIG project hopes to overcome.

Background Materials Preparation for the C-AGG Chicago Meeting July 20-21, 2011

Project: Estimating N₂O Reductions from Nutrient Management in the Chesapeake Watershed

1. What are the major goals of the project?

The goal of the proposed project is to develop and implement a greenhouse gas tool for estimating N₂O reductions from nutrient management in the Chesapeake Bay watershed. This tool is intended to help reduce some of the technological and financial barriers to certifying carbon offset credits generated by nutrient management projects. The project will estimate the N₂O emissions benefits of three different nutrient management approaches: soil testing/adaptive management, manure injection, and variable rate technology, providing the ability to compare and contrast these approaches in terms of greenhouse gas benefits, fertilizer savings and obstacles to greater implementation.

2. What is the project timeline?

Final report is expected summer 2014.

3. Which GHG are targeted by the project, and/or which activities?

Nitrous oxide emission reductions via better nutrient management.

4. Can you provide an estimate of tons of CO₂equivalents (per year, and/or over the course of the project) that the project might mitigate/abate?

Roughly 500 metric tons CO₂ equivalents assuming a 1% emissions factor of N₂O production, but we expect the estimated benefits will be greater using the DNDC model.

5. What methods or protocols will the project use to measure or estimate GHG emissions and emissions reductions (e.g. direct measurement, sampling, models, etc).

Paperwork and documentation of reduced nitrogen application, yield information, etc. but we will use the DNDC model to estimate emission reductions from baseline.

6. Do you anticipate or envision any obstacles or barriers to achieving your project goals and outcomes as currently set out, or activities that you believe will be challenging?

Perhaps difficulty in finding farmer participants with the necessary documentation of NMP.

7. Have you identified any data or knowledge gaps associated with the project?

The N emission reductions benefits of different nutrient management approaches.

8. Please list the project partners affiliated with the project.

Chesapeake Bay Foundation, Environmental Defense Fund, EcoFor LLC, Natural Resources Conservation Service, DNDC Applications, Maryland Department of Agriculture, Virginia Tech, Sterling Planet, Washington Gas Energy Services.