



Title: Developing Cropland Nutrient Budgets in the Mid-Atlantic Region

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Region: Mid-Atlantic

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Theme: Nutrient and Pesticide Management

Situation: Cropland budgets spanning the period of rapid agricultural transformation in the 20th century can be an element of an informed process for innovation in the 21st. These budgets also can be developed at multiple spatial scales to form the basis for integrating agronomic, hydrologic, ecosystem, and economic aspects of nutrient accumulation, application, and potential distribution. The budgets can be used to shape landscape/facilities management and design as well as policy creation and implementation. To be effectively used in technological and policy innovation, the budgets must resonate with the disciplinary specialists who are developing technologies, policy practitioners who are coping with increasing and at times conflicting demands, and stakeholders who feel threatened by the changes in performance or expectations.

Objectives: Our objectives were to develop cropland P budgets from the 1930s to the current time for Pennsylvania (at approximately decadal time-steps) as a preliminary effort for the Mid-Atlantic region and to promote learning among technical specialists, policy practitioners, and stakeholders by making the budgets readily available via a query-based interface through the Internet.

Methods: These budgets rely on readily available census and industry data and were applied to “cropland” features of nutrient flow in the state.

Partnerships: The basic partnerships are among the technical specialists in the College of Agricultural Sciences at Penn State and with the members of the nutrient budgets topic team of the regional water quality coordination project from Delaware, Maryland, Virginia, and West Virginia.

Research: This approach relies on research to determine meaningful nutrient flows and to compile relevant data from multiple sources. The query-based website will provide a setting in which individual users can learn about nutrient budgets in ways that are most meaningful to their need to understand nutrient flows. As the budgets are expanded in scale to other states within the Mid-Atlantic region and focused in spatial resolution to counties and watersheds, the website and supporting educational materials will become the basis for outreach programs to specialists, practitioners, and stakeholders. These users will be encouraged to consider the implications of their water quality protection efforts for the nutrient budgets.

Resources: We have consolidated the regional coordination funds available in Pennsylvania to focus on the development of the nutrient budgets so that additional efforts in landscape/facility management and design, and policy creation will have this temporal and spatial foundation. Because of the short time available for the project activities, additional funds have not been secured.

Results: The trends suggest that even as crop P utilization increased during the period and fertilizer use decreased, manure P generated offset these trends, contributing to greater cropland P balances in Pennsylvania at the end of the period than at the beginning. The budget information will be made available to specialists, practitioners, and stakeholders through a query-based website. The information has been assembled in several formats for exploration of historical conditions and trends for the period from the 1930s to the present. Users will be prompted to select permutations of the information that are best suited to their interests. We anticipate that not all users will have an interest in or value the information in exactly the same ways, so we are developing a flexible protocol to accommodate their diverse interests/needs. In addition to the historical review, a futuring feature will also be available. This feature will be query-based so that specialists, practitioners, and stakeholders can elect to modify nutrient flow parameters from the budgets of particular interest to them. Their specifications will be applied to the current conditions in order to project the impact of the interventions they envision while setting specifications for the future. We will be monitoring the user access of the website to determine the extent and the patterns of use. We will focus on the frequency of particular kinds of inquiries including those that investigate the compiled data and those that attempt some futuring exercises. We anticipate that enhanced understanding of the nutrient budget dimension of water quality challenges will lead to landscape/facility management and design that will have significant implications for ex ante modification of nutrient flows to prevent pollution from animal agriculture in the Mid-Atlantic region. We anticipate that new policies will incorporate budget performance in agricultural activities rather than continue to induce ex post practice implementation. Our expectations are that stakeholder



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