

## **Research and Monitoring Needs from an Agricultural Perspective**

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Agricultural production has benefited tremendously in the last 50 years from the application of nitrogen fertilizer to increase crop yields. Over this same timeframe, natural resource impairment has occurred from increases in reactive nitrogen pools in the environment. Research and education have been very instrumental in improving production and growing the agricultural economy. In some sectors, this has led to geographic consolidation and intensification of agricultural production. National and global environmental interests now look to monitoring, research, and education to provide solutions to protect the environment and provide new economically viable directions in the agricultural economy. The National Atmospheric Deposition Program (NADP) has done an excellent job over the last 30 years in identifying spatial and temporal trends in atmospheric wet deposition and potential impacts to agriculture. Over this same time period, agriculture has recognized and better understood its role in contributing to nitrogen loading to these reactive nitrogen pools. Nitrogen loading to soil and water is much better understood than nitrogen loading to the atmosphere from agricultural sources. Over the last five years, emissions of nitrogenous gases from agricultural sources are much better understood. A real need exists to better understand the fate of dry deposition of nitrogen in managed and natural ecosystems, the bi-directional exchange of atmospheric ammonia with soil and plant canopies, and the gas-to-particle conversion of agricultural sources of ammonia. In addition to spatial and temporal trends in monitoring data, biological and chemical signatures may exist that will improve our understanding of sources and atmospheric fate which will lead to better physical and chemical atmospheric models. A continuing challenge for the NADP networks is for a systematic analysis and interpretation of existing monitoring data. One critical need in this regard is for potential source identification so that effective mitigation strategies can be identified. The future success of the NADP networks depends on timely, economic, or environmentally relevant data products useful to research and education communities to develop value-added products for current and future problem solving.