

Sources of atmospheric nitrogen to the Upper Susquehanna River/ Chesapeake Bay watershed with special reference to ammonia.

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Control of nitrogen loading to reduce eutrophication in Chesapeake Bay has been an issue for several decades. A major input of nitrogen to the Bay is from the Susquehanna River, and oxidized atmospheric inputs represent 20% to 25% of the estimated net anthropogenic nitrogen input to the watershed, which is strongly correlated to the nitrogen discharge of the Susquehanna to Chesapeake Bay. While many of the atmospheric inputs (NO_3^- and NH_4^+ from wet deposition, particulate NO_3^- and NH_4^+ and gaseous HNO_3 from dry deposition) are reasonably well-understood, other atmospheric nitrogen sources (wet organic nitrogen and dry deposition of NO_x and NH_3) are not empirically well quantified. Gaseous ammonia deposition may be a significant component of total N deposition particularly in and near areas of agricultural activity.

Using passive samplers we have measured concentrations of NH_3 and NO_2 in a number of landscapes representing land use areas found in the upper Susquehanna Watershed such as agricultural farmland, animal production facilities, forests, roadsides and urban areas. Using representative deposition velocities we have estimated the contribution of NO_2 and NH_3 to total deposition. Our results show that for most landscapes NH_3 deposition can account for a significant percentage of the total nitrogen deposition to the the upper Susquehanna watershed. NO_2 deposition is less important, except near roadsides where NO_2 and NH_3 deposition are comparable. We will present data on concentration and deposition of these species and their relative importance compared to other nitrogen deposition species. These deposition results will be compared with estimates of deposition generated by the EPA CMAQ model for this region.

Control of both NO_x (mainly from vehicle and utility emissions) and NH_3 (mainly from agriculture and livestock production) will further reduce nitrogen loading from the upper Susquehanna watershed to the Chesapeake Bay ecosystem.

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