

## NEON Choptank Watershed Study Site

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The Choptank River is an estuary located on the Delmarva Peninsula of the Chesapeake Bay. Its watershed is 1756 km<sup>2</sup>, and a large fraction of this area is dedicated to crop production. Specially, the watershed contains 59% cropland, 33% forest land and 7% wetlands. There are also small to medium animal feeding operations (AFOs) consisting primarily of poultry operations, and poultry litter is frequently used as a fertilizer within the watershed. Parts of the Choptank River Watershed are identified as "impaired waters" for nutrients and sediment under the Federal Clean Water Act. Monitoring of water quality and living resource habitat within the watershed since 1985 reveal increasing nitrate, chlorophyll a, total suspended solids, and decreasing Secchi depth values over time. Seasonally low oxygen levels are also observed in the deeper estuarine portions of the Little Choptank River and Lower Choptank River. Farmers within Maryland are currently required to prepare and implement nutrient management plans in order to minimize off-site

movement of nutrients into surface and ground waters. NRCS has also established voluntary programs for agricultural landowners to install specific conservation practices such as the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancement Program (CREP). However, more detailed information is needed to determine how well these programs are working to protect our natural resources. This project will produce a calibrated, validated watershed model to assess the effectiveness of these resource conservation programs in protecting water quality within the Choptank River Watershed. Fifteen sub-basins within the larger system have been selected. Each basin contains a different percentage of buffer systems installed along the stream edge as part of CRP or CREP. These streams will be monitored for a number of water quality parameters monthly under base flow conditions, and selected streams will be sampled during storm events. Selected samples will also be analyzed for nitrogen and oxygen isotope enrichment as a means of tracing manure-based nitrogen in surface and ground water.

Direct contacts with producer groups within the sub-basins will be used to obtain more detailed information on current conservation practices. This data along with existing datasets will be used in the watershed models SWAT (Soil and Water Assessment Tool) and REMM (Riparian Ecosystem Management Model) to determine the effectiveness of existing conservation programs on reducing loads of nutrients from entering the lower watershed and the Chesapeake Bay. ARS, NRCS, NOAA, University of Maryland, and Smithsonian Environmental Research Center scientists have combined efforts to develop a two-year project to use the Choptank River watershed as benchmark for other coastal plain watersheds in the Mid-Atlantic Region.

### Approach to Data Acquisition

An intensive set of remote sensing observations is being implemented to assess landuse change and health of ecosystems within the watershed. This set includes multi temporal SPOT images (10 m resolution) to assess crop growth patterns, four return LIDAR that can be used to assess canopy structure of riparian buffers, novel use of radar data from satellites to detect and characterize forested wetlands. This watershed is also a candidate validation site for the French/Israeli Venus satellite scheduled for launch in 2009 which will have both high spatial (5 m) and temporal (2 day) resolution. An extensive set of ground observations provide ground truth for interpretation of remotely sensed data.

