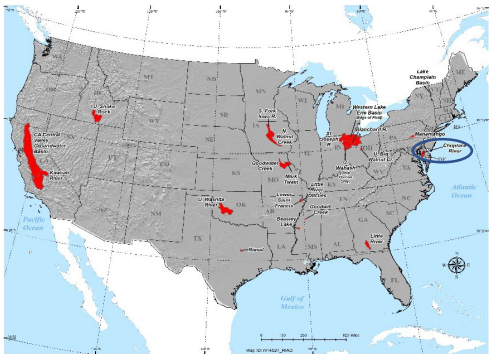
Choptank River Watershed

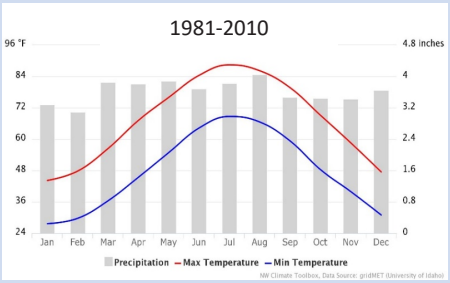


A Conservation Effects Assessment Project (CEAP) Watershed Assessment Study: A collaboration between the Agricultural Research Service and the Natural Resources Conservation Service

Location

The approximately 2,600 km^2 Choptank River Basin is a major tributary of the Chesapeake Bay. Approximately 60% of land area is in cropland and 40% in forest.

Temperature and Precipitation



Major land uses

Cropland: Corn, Soybean, Wheat.
Grassland: Pasture and Hay.
Woodland: Forested wetlands.

Data collection

This site is a testbed for demonstrating new agronomic and conservation practices on-farm and for evaluating crop residue mapping techniques, air and water modeling efforts, and wetland ecosystems, as well as for developing advanced geospatial tools.

This CEAP study started in 2004: Satellite images monitor winter cover crop performance and reduced tillage management. Real time in situ sensors monitor water quality at two USGS gage stations. Extensive time series datasets on wetland hydroperiod have been established.

Concerns

The Choptank River Watershed contains a large estuarian embayment that drains directly into the Chesapeake Bay estuary. Health of both ecosystems are highly impacted by nutrients and sediment.

Nearly 50 percent of wetlands that once dominated the landscape have been drained to make way for crop production during 400 years of ditch drainage history.

An intensive poultry production industry on the Delmarva Peninsula creates a lot of poultry litter typically used for fertilizer, leading to excess phosphorus levels in soils.

Poultry houses are major sources of ammonia and other atmospheric contaminants that can degrade air quality and lead to excess nutrient deposition on sensitive ecosystems.

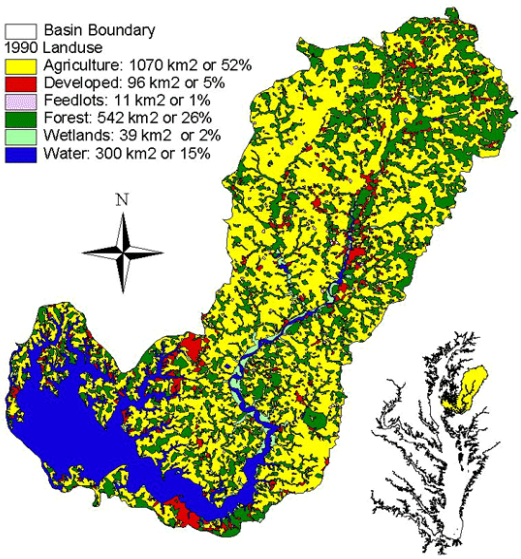
Extensive ditch drains allow rapid movement of agricultural nutrients to sensitive waterways.

A water deficit for summer crop production is common, and farmers rely increasingly on irrigation for production on cropland.

Main conservation practices used

To meet non-point source water quality regulations, Maryland and Delaware depend increasingly on conservation practices of reduced tillage and winter cover crops. Other practices include:

- Improved management of manures.
- Use of buffers for water quality and stream health.
- Increased riparian buffer acreage.
- Improved drainage management.

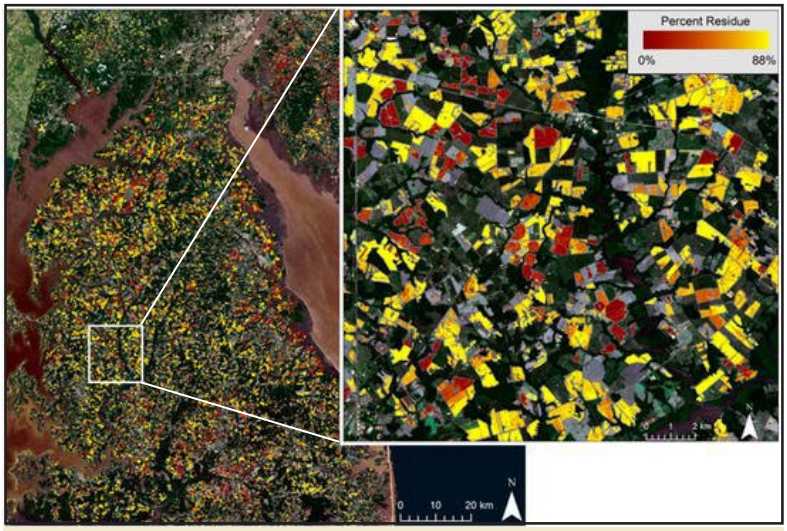


Choptank River Watershed

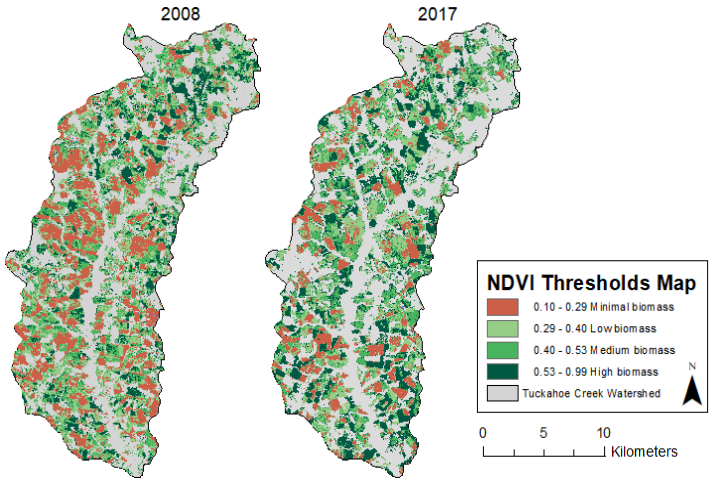
Choptank River Watershed

Outcomes/Findings

- Technology was developed to use satellite data for monitoring winter cover crop performance. The Maryland Department of Agriculture now routinely uses remote sensing to manage their winter crop program and Delaware is following suit.
- Remote sensing approaches for monitoring tillage intensity using World View 3 and Landsat data were successfully demonstrated.
- Watershed research has led to development of a novel transient tracer for measuring watershed lag time, an important parameter in assessing performance of conservation practices.
- In situ water quality sensor data from the watershed provide more accurate and robust estimates of nitrogen fluxes using high frequency measurements compared to estimates often obtained with the LOADEST model.
- Vegetative buffers around poultry houses captured 20 to 70 percent of particulate emissions depending on meteorological conditions and reduced net downwind ammonia dispersion by 51 percent.
- The Choptank River Watershed has been an important testbed for development of advanced geospatial tools using remote sensing inputs for monitoring the performance of conservation practices such as residue management, winter cover crops, riparian buffers, and wetland restorations.
- Tillage intensities can be estimated from a satellite-generated map of percent crop residue cover on non-vegetated agricultural fields, overlaid on a natural-color Landsat 8 imagery.



Increased Use of Reduced Tillage and Winter Cover Crops, comparing 2008 and 2017



- Wintertime vegetation classification for cropland in the Tuckahoe Creek sub-watershed based upon composite satellite Normalized Difference Vegetation Index (NDVI) threshold values for minimal, low, medium, and high levels of green vegetation. Increased adoption of cover crops reduced nitrate leaching by 25% over 10 years.

Collaborators and Stakeholders

NASA, NOAA, USGS science for a changing world, Maryland Department of Agriculture, Save the Bay, The Nature Conservancy, National Wildlife Federation, University of Maryland

More Information

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