Chesapeake Healthy Watersheds Assessment: An investigation of Health and Vulnerability of State-identified healthy watersheds in the Chesapeake Bay Watershed

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Project Objectives

Chesapeake Bay Program (CBP) Maintain Healthy Watersheds Goal Implementation Team (GIT) identified a need for quantitative indicators to support watershed assessment and management. The EPA Preliminary Healthy Watersheds (PHWA) framework was developed nationally to provide watershed health and vulnerability metrics at HUC12 scale. This project employs the PHWA and customizes it for the Chesapeake Bay watershed. This work addresses a major gap identified by the GIT, "routine collection of information about the status of healthy waters and watersheds is often lacking." A better scientific and technical understanding of healthy watershed threats has also been identified as a key factor in meeting the Healthy Watersheds Goal. Customizing the PHWA and its vulnerability index information with additional jurisdiction and regional data presents a way to fill gaps related to understanding existing threats. The Chesapeake Healthy Watershed Assessment (CHWA) developed metrics at NHDPlus catchment scale to enable a finer scale assessment and those metrics were calculated for all 83,623 catchments in the Chesapeake watershed.

Goal and Outcome

The goal of the Healthy Watersheds GIT is to sustain state-identified healthy waters and watersheds recognized for their high quality and/or high ecological value. Healthy watersheds sustain local social, economic, and environmental benefits at optimal levels and contribute to the achievement of Chesapeake Bay Program goals for the tidal Chesapeake Bay and tributaries. The optimal levels at which such benefits are sustainable will depend upon the landscape context of the watershed.

Data Sources

Watershed-wide data was sought that would provide consistent, wall-to-wall coverage at a catchment or finer-scale resolution.

Regional sources of geospatial data include:

- Chesapeake Bay Program high-resolution land use/land cover data
- EPA StreamCat
- National Fish Habitat Partnership
- Chesapeake Bay model for nutrient loads
- North Atlantic Landscape Conservation Cooperative
- Landscape/Nature's Network

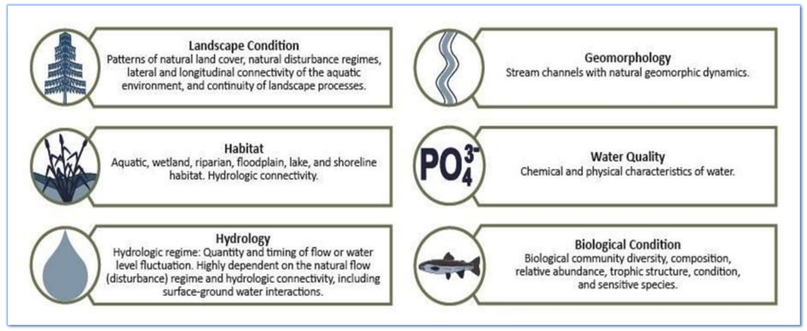
Metric Categories

Vulnerability Indicators

- Future development
- Forest Loss
- Extent of land protection
- Water use
- Wildfire risk
- Climate change

Health Indicators

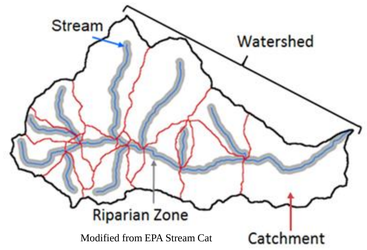
- Landscape condition
- Habitat
- Hydrology
- Geomorphology
- Water quality
- Biological condition



EPA Office of Water, Healthy Watersheds Program, March 2017

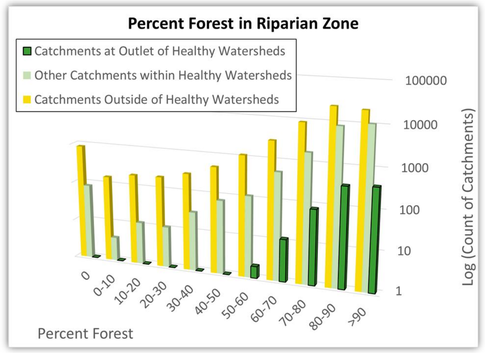
Developing Watershed and Catchment-Scale Metrics

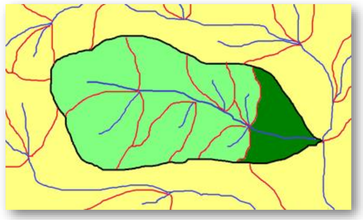
Most Chesapeake Bay candidate metrics were calculated as watershed-scale metrics, reflecting influence of entire upstream watershed, for example % Impervious Cover in Watershed; some metrics were calculated at the catchment scale only, for example aquatic Biological Condition at Outlet. Some describe conditions for riparian zone only: the corridor of land within 100 meters of stream.



Modified from EPA Stream Cat

Metric Example: % Forest in Riparian Zone





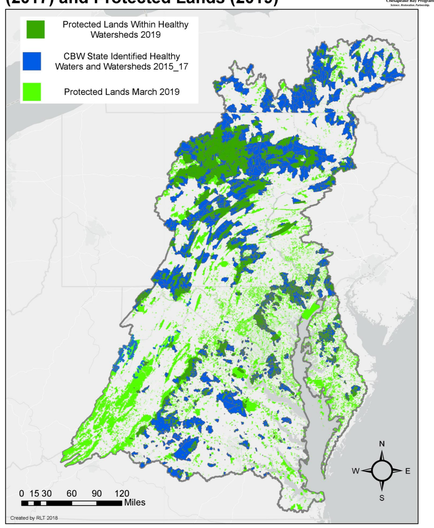
As expected, values for percent riparian forest are high in the Chesapeake Bay Healthy Watersheds, all with >50% forest in the riparian zone, while values outside of these healthy watersheds span a broader range, from 0 to 100%.

Developing an Overall Index of Watershed Health

- Assess the correlation among watershed condition metrics.
- Assess the relationship between watershed condition metrics and healthy watershed designations using stepwise regression.

State Identified Healthy Watersheds

State Identified Healthy Waters and Watersheds (2017) and Protected Lands (2019)



State Identified Healthy Watersheds with 2019 CBW Protected Lands overlay:
Each jurisdiction in the Chesapeake Bay region has its own definition of healthy waters and watersheds, and its own programs to support watershed protection. Maintain Healthy Watersheds Goal will strategically track and support the preservation of state-identified healthy waters and watersheds. These waters and watersheds as identified in 2017 will serve as the baseline from which we assess watershed health and measure progress toward this outcome.https://www.chesapeakeprogress.com/clean-water/healthy-watersheds

Data Visualization and Online Access

Provide suite of Healthy Watershed metrics and indicators for data visualization and analysis

- Geodatabase structured by catchment (COMID)
- Ability to select areas of interest, compare values, visualize data…and more
- Accessible via ArcGIS Online or CBP Chesapeake Open Data portal
- Planned integration and coordination with other efforts including: CBP regional fish habitat assessment and CBP freshwater benthic index ("Chessie BIBI")

Combine Metrics for Tracking Watershed Health

Geodatabase with suite of data, basic approach for analysis and visualization

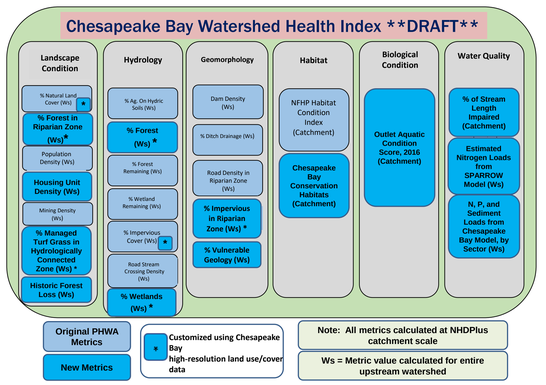
Advanced Tools for Analysis and Visualization

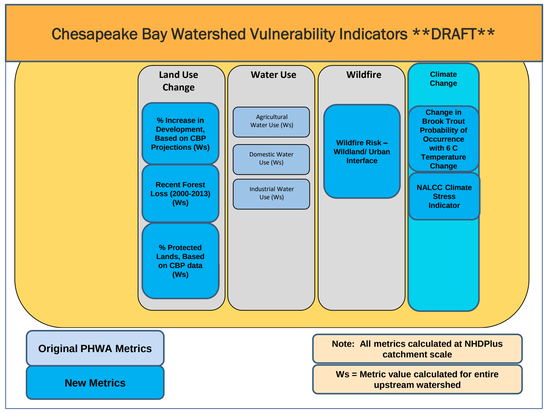
Feedback Appreciated

- How will you be able to use these data?
- How best to provide data for a variety of users?
- What should be added/updated in future?

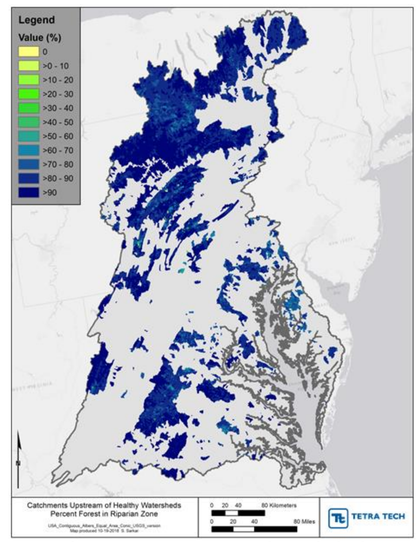
Identify Vulnerabilities

Contact: Renee Thompson, USGS, HWGIT Coordinator
rthompson@chesapeakebay.net



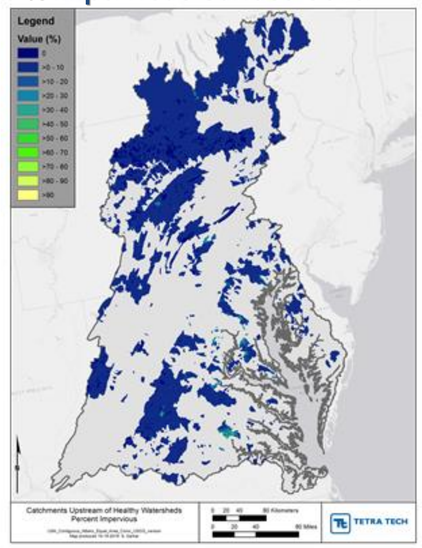


Metric Performance Example: % Forest in Riparian Zone



Percent forest in riparian zone is an indicator for landscape condition. This metric is expected to be high in healthy watersheds.

Metric Performance Example: % Impervious Surface Cover



Percent impervious surface cover in the watershed is an indicator for hydrologic condition. This metric is expected to be low in healthy watersheds. (note: scale is flipped)