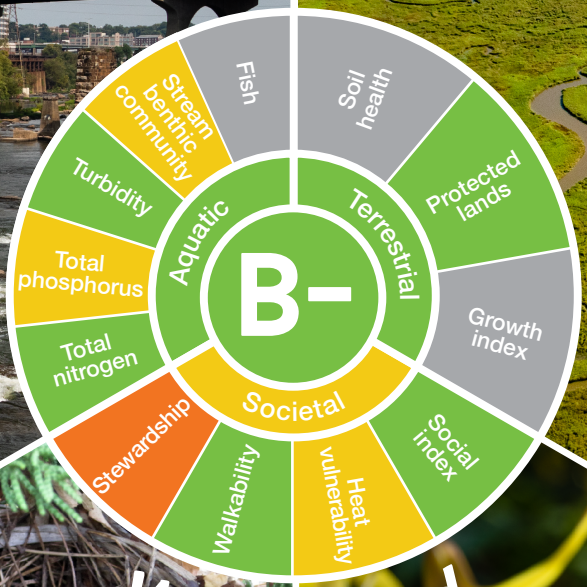
Chesapeake Bay & Watershed Report Card 2020



Watershed



Bay

University of Maryland Center for Environmental Science

Bay indicators

Total phosphorus measures the amount of phosphorus in bay waters. Too much phosphorus can lead to algae blooms, which cause poor dissolved oxygen conditions and stress bay organisms.

Total nitrogen is a measure of the amount of nitrogen in bay waters. Too much nitrogen can lead to algae blooms, which cause poor dissolved oxygen conditions and stress bay organisms.

Dissolved oxygen is critical to the survival of Chesapeake Bay's aquatic life. The amount of dissolved oxygen needed before aquatic organisms are stressed, or even die, varies from species to species.

Water clarity is a measure of how much light penetrates through the water column. Water clarity plays an important role in determining aquatic grasses and phytoplankton distribution and abundance.

Chlorophyll *a* is used as a measure of phytoplankton (microalgae) biomass. High phytoplankton levels lead to reduced water clarity, and decomposing phytoplankton result in reduced dissolved oxygen levels.

Benthic community, or the Benthic Index of Biotic Integrity, measures the condition of the organisms living in or on the bottom areas of the bay. These organisms are a key food source for fish species.

Aquatic grasses, or submerged aquatic vegetation, are one of the most important habitats in the bay. They provide habitat to key species like blue crab and striped bass and can improve water clarity.

Striped bass, **bay anchovy**, and **blue crab** make up the Fisheries Index, which is not included in the Bay Health score. Bay anchovy are a schooling fish, providing an important food source for predators. Striped bass is a key top predator and uses the bay as a spawning and nursery area. Blue crabs are predator and prey in the food web and use aquatic grasses as habitat. There is no score in the report card for 2020 as the striped bass data were not available.

Watershed indicators

Total phosphorus measures the amount of phosphorus in rivers and streams. Nutrients are important for the growth of organisms, but as nutrient levels increase in rivers and streams, they negatively impact the environment. Data are from 2013–2018.

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Stream benthic community measures the condition of the benthic community living in streams. Benthic macroinvertebrates are freshwater organisms like snails, mussels, worms, and insects that live in and on the stream and river bottom. Data are from 2012–2017.

Protected lands measures the amount of valuable lands protected in the watershed. Conserving land maintains water quality and habitat; sustains forests, farms, and communities; and protects lands with cultural value. Data are from 2018.

The Heat Vulnerability Index is an indicator of climate-safe neighborhoods that includes metrics for tree canopy, impervious surface, land surface temperature, and households in poverty. Data are from 2018.

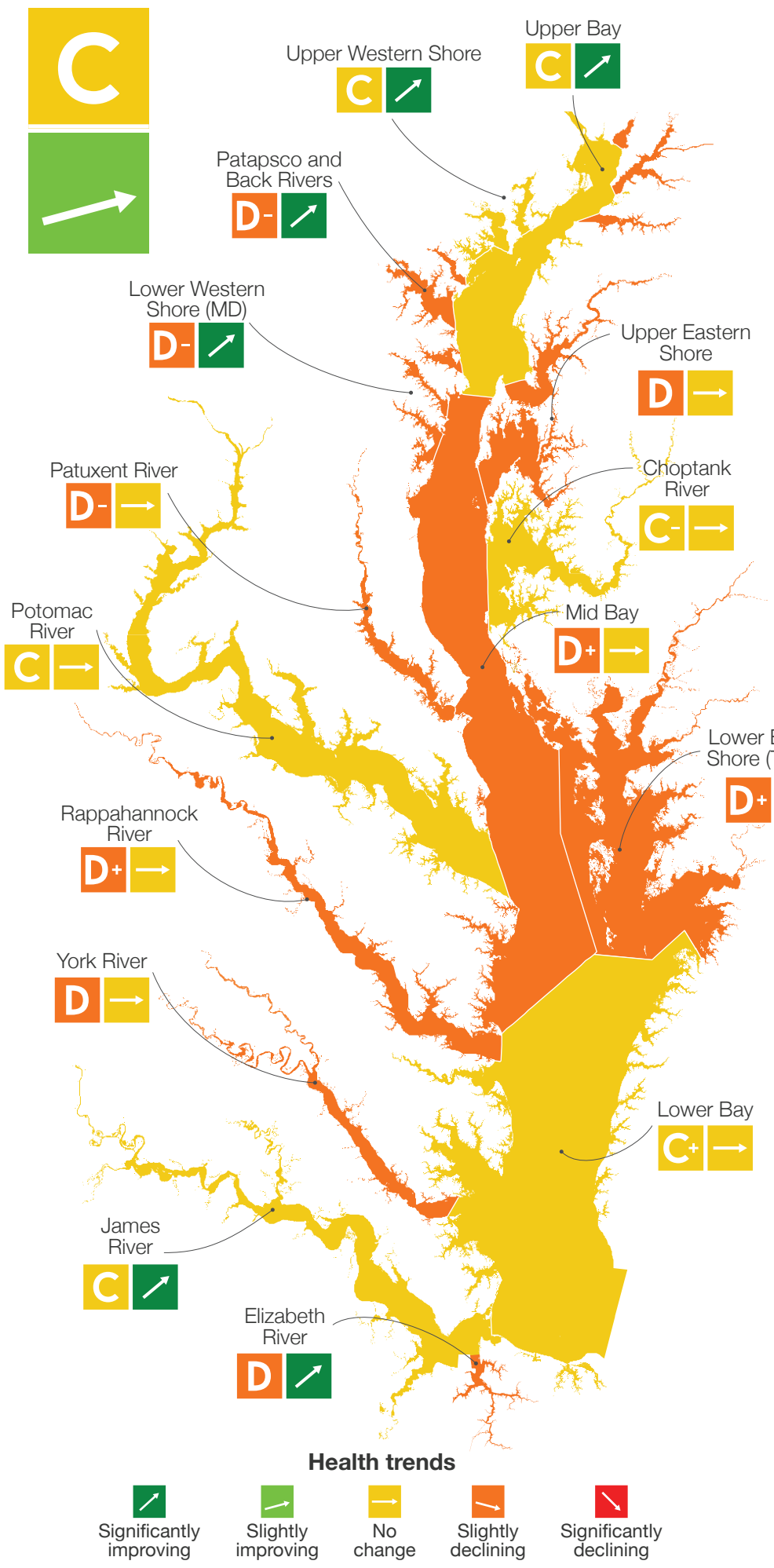
Turbidity is a measure of water clarity that expresses how much light passes through the water column. It is dependent upon the amount of suspended particles and colored organic matter present. Data are from 2013–2018.

The Social Index uses data about social vulnerability from the U.S. Census. Social vulnerability measures how a community can respond to hazardous events. Some of the metrics include socioeconomic status, diversity, minority status, and language. Data are from 2018.

The Stewardship Index examines citizen stewardship in the watershed in categories of behavior, volunteerism, and civic engagement. Data are from 2017.

Walkability measures how many people can walk to a park in 10 minutes. It includes two metrics, one for the total population and one for diverse groups, including people who are Black, Asian, Native American, Hispanic, Pacific Islander, two or more races, and other races. Data are from 2019.

Moderate bay health and good watershed health in 2020

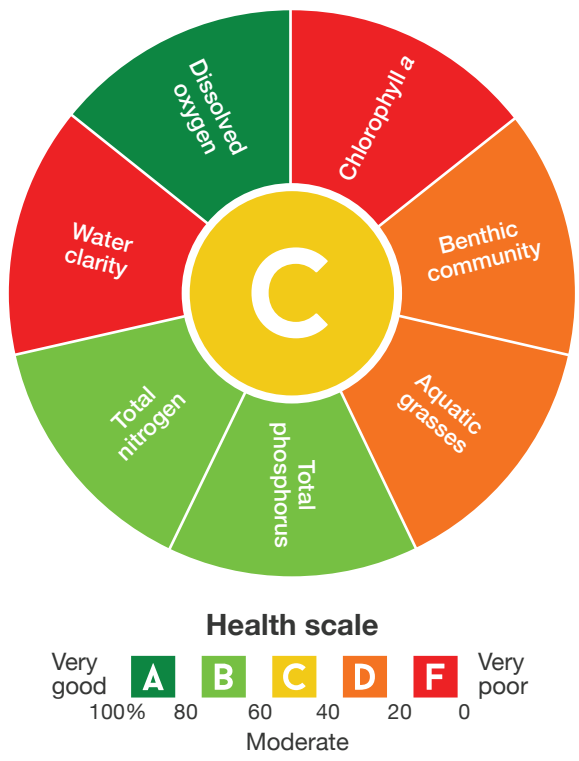


Bay health fluctuates between C and C+ over the past 5 years

Overall, Chesapeake Bay scored 45% in 2020, a slight increase from the previous year. Bay-wide, dissolved oxygen scored 87% in 2020, an increase from 2019. The benthic community score remained low for a second year at 37%, a drop from 59% in 2018. Water clarity scored 8%, a slight decrease from last year's 10%. Aquatic grasses scored 33%, a slight decline from last year's 35%.

In 2020, data gaps occurred in March, April, and May due to the COVID-19 pandemic. Indicators strongly affected by this were chlorophyll *a*, total phosphorus and total nitrogen. Chlorophyll *a* scored 14%, a decrease from 26% in 2019. Total phosphorus scored 72%, a slight decrease from 2019. Total nitrogen scored 64%, a strong improvement from 39% in 2019. While these scores are the best data we have to describe conditions in 2020, they may miss important water quality issues that occurred from March to May.

The highest-scoring region was the Lower Bay (57%). The lowest-scoring region was the Patapsco and Back Rivers (23%). Long-term trends are still showing improvement. Seven regions are showing significantly improving trends over time, and the overall bay is showing a slightly improving trend.



Thank you to those who monitored the bay in 2020

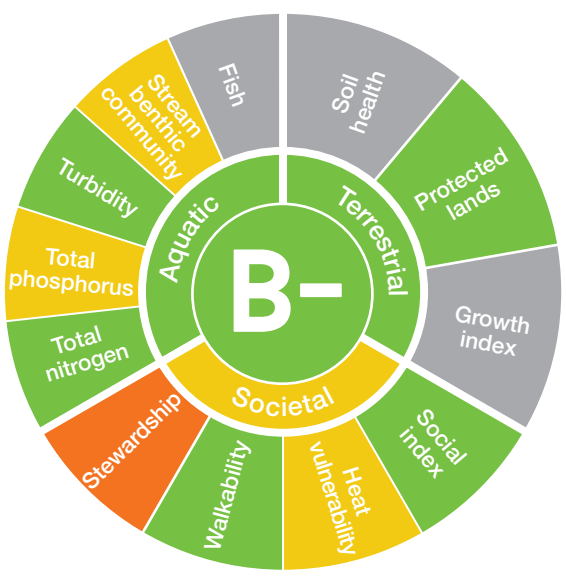
Monitoring groups from around the watershed, including the Maryland Department of Natural Resources and Virginia Institute of Marine Science, worked tirelessly, and in the face of great danger, to continue monitoring and conducting labwork during the COVID-19 pandemic. It cannot be overstated how important their work is and how their sacrifices helped the scientific community come together to continue the important work of protecting the Chesapeake Bay for generations to come.

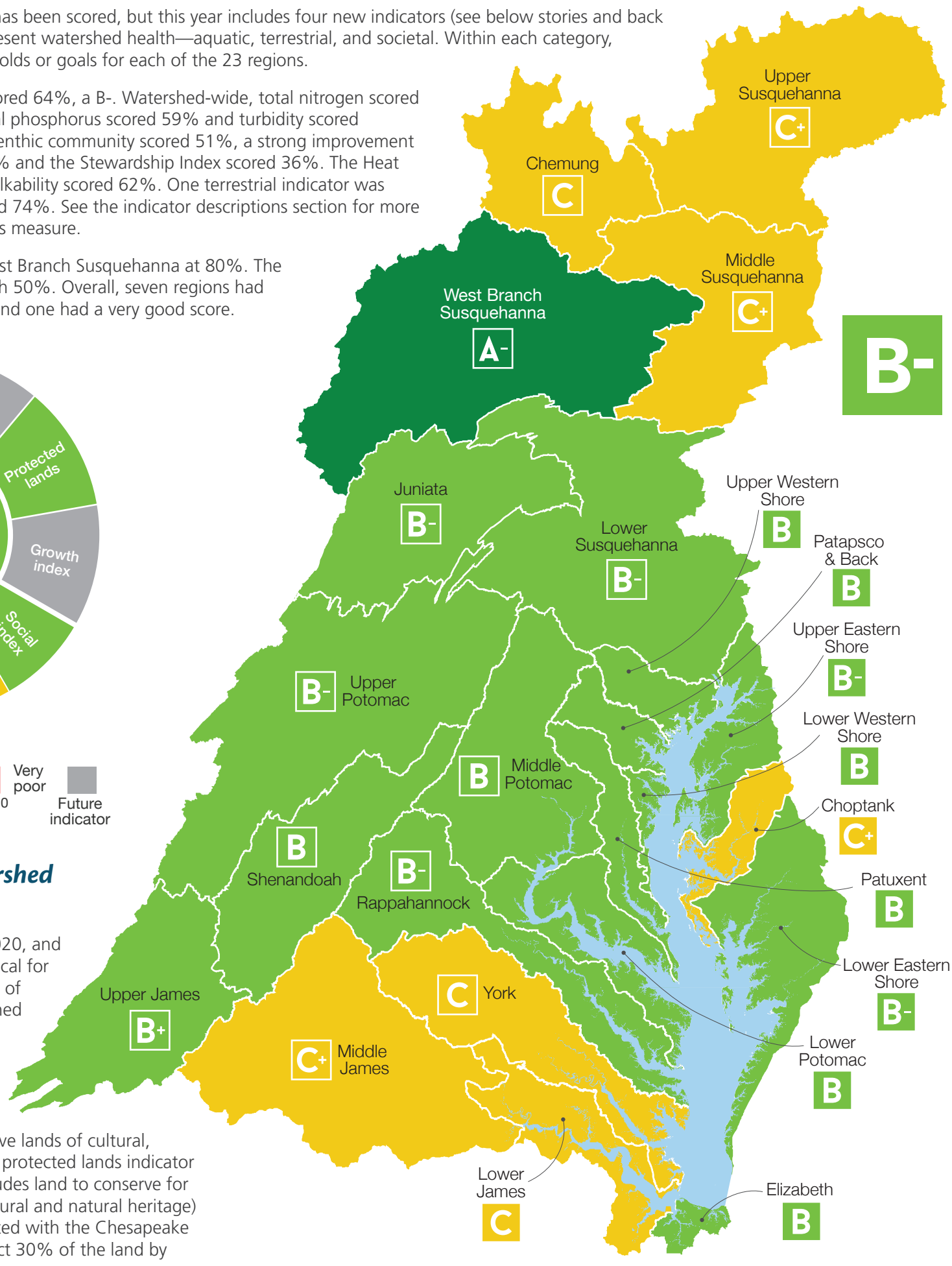
New indicators add to a clearer picture of Chesapeake Watershed health

This is the second year the watershed has been scored, but this year includes four new indicators (see below stories and back page for details). Three categories represent watershed health—aquatic, terrestrial, and societal. Within each category, indicators were assessed against thresholds or goals for each of the 23 regions.

Overall, the Chesapeake Watershed scored 64%, a B-. Watershed-wide, total nitrogen scored 78%, a slight decrease from 79%. Total phosphorus scored 59% and turbidity scored 66%—both declined by 2%. Stream benthic community scored 51%, a strong improvement from 46%. The Social Index scored 60% and the Stewardship Index scored 36%. The Heat Vulnerability Index scored 58% and walkability scored 62%. One terrestrial indicator was included, Protected Lands, which scored 74%. See the indicator descriptions section for more details about what these new indicators measure.

The highest-scoring region was the West Branch Susquehanna at 80%. The lowest-scoring region was the York with 50%. Overall, seven regions had moderate scores,15 had good scores, and one had a very good score.





Protecting land in the watershed is a priority

Protected lands is a new indicator in 2020, and scored 74% (B). Conserving land is critical for the health of the watershed and is part of the Chesapeake Bay Program's Watershed Agreement. This Agreement, signed in 2014, strives to preserve 2 million acres by 2025. The goal is to conserve landscapes to maintain water quality and habitat; sustain forests, farms, and maritime communities; and conserve lands of cultural, indigenous, and community value. The protected lands indicator examines all valuable lands (which includes land to conserve for farms, forests, wildlife habitat, and cultural and natural heritage) and compares them to the land protected with the Chesapeake Conservation Partnership goal to protect 30% of the land by 2030. The data used was from 2018.

Room to grow in environmental stewardship

Stewardship by individuals and communities is vitally important to enhance and maintain the health of our local waterways and the bay as a whole. Small actions and behaviors of millions of individual people all across the watershed add up to big results for healthy waters. The Chesapeake Bay Program developed the Stewardship Index, which examines individual stewardship within the categories of behavior, volunteerism, and civic engagement. These data can tell local success stories and identify areas for increased efforts. The Stewardship Index is a new report card indicator in 2020, and scored 36%, D+. The data used were from the initial survey (in 2017) of 5,212 watershed residents, and is used as a baseline for measuring future improvement.

A healthy local economy supports a healthy bay

Since late 2020, new local economy indicators for the watershed have been in development. These indicators strive to go beyond Gross Domestic Product and basic employment data by focusing on a holistic picture of healthy, local economies. Five indicators covering income to equality to entrepreneurship will incorporate elements that contribute to local economic strength. County-level data are provided by the American Community Survey and U.S. Census and compare local economic factors within the Chesapeake Bay watershed. These indicators are being developed by Council Fire, a global management consultancy organization, conjointly with UMCES.

Environmental equity is vital for our communities

Diversity is what makes the communities of Chesapeake Bay special

The Chesapeake Bay watershed includes a huge area of land and water, covering six states and the District of Columbia. The people living in our region are diverse and varied across their communities. Incorporating socio-economic indicators that take into account issues of social justice, equity, inclusion, and diversity are vitally important. In the Chesapeake Bay Watershed Report Card, there are currently three indicators that address some diversity issues: the Social Index, walkability, and the Heat Vulnerability Index. Additional indicators will be added next year, especially those that address economic disparities. In early 2021, UMCES held a course on developing an environmental justice index for the Chesapeake Bay watershed. For further details visit: https://ian.umces.edu/publications/developing-a-framework-for-an-environmental-justice-index-in-the-chesapeake-bay-watershed/.



A 4th grade student learns about water quality and the environment with educators. Photo Will Parson.

An easy walk to a park benefits people and communities

A new indicator this year is walkability which had a good score, 62%. It measures how many people can walk to a park within ten minutes. This idea was developed by the Trust for Public Land. Access to parks within a ten-minute walk provides space for people to gather with friends, exercise, and maintain mental health in a safe outdoor environment. Often, communities of color and underrepresented communities do not have the same access as other groups. Walkability includes two metrics. One is the total amount of people that can walk to a park. The second examines how many people in diverse groups can walk to a park. Diverse groups include people who are Black, Asian, Native American, Hispanic, Pacific Islander, two or more races, and other races.



Patterson Park offers the only green space to much of the surrounding Baltimore neighborhoods. Photo Will Parson.

Climate safe neighborhoods are key in the face of climate change

A Heat Vulnerability Index, developed by NASA and Groundwork USA, is a new indicator in the report card. The Heat Vulnerability Index had a moderate score, 58%. This index includes four metrics: tree canopy, impervious surface, land surface temperature, and households in poverty. The index identifies places where there is greater vulnerability of people to heat-related and flooding-related risks, which are often in neighborhoods with race-based housing discrimination. Other groups at risk are communities of color, low-income communities, children, and the elderly. This index can help managers prioritize locations for restoration projects such as tree plantings and conversion of abandoned impervious surfaces to green space.



A street lacking trees in Washington D.C. near the U.S. Department of the Treasury. Photo Paula Abrahao (Flickr).

Acknowledgements

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