Water clarity in Chesapeake Bay is an important factor regulating submerged aquatic vegetation (SAV) growth. SAV is a vital habitat for shellfish and finfish, food for waterfowl, and an influencer of nutrient cycling, sediment stability, and turbidity. Clarity also plays important roles in predator-prey interactions.

Management efforts seek to improve clarity by reducing sediment and nutrient inputs through best management practices and restoration actions. Reducing these inputs, in turn reduces concentrations of parameters that impair clarity such as algal biomass (chlorophyll), dissolved organic carbon, and total suspended solids. Dissolved and particulate matter, as well as the inherent properties of water, reduce clarity through the absorption and scattering of light. Particle size, shape and type also affect clarity.

Measures of water clarity include depth of Secchi disc visibility, turbidity in nephelometric turbidity units (NTU) as measured by optical sensors, and underwater photosynthetically active radiation (PAR) by light sensors (LI-COR). Ultimately, the water column light attenuation coefficient (Kd) is used as an indicator of light reaching SAV beds.

Kd is calculated in a number of ways. The most direct is through comparisons of surface PAR and PAR readings collected along an underwater depth gradient. Conversion factors can also be developed between Secchi depths and light attenuation coefficients, although spatial and temporal differences in water column parameters can affect that relationship. For purposes of water clarity criteria assessment, regional (Chesapeake Bay Program segments) models of Kd are developed using calibration data where concurrent PAR, chlorophyll, and turbidity data are collected. Those models are then used to calculate Kd across a Chesapeake Bay segment from spatially intensive surface mapped chlorophyll and turbidity data. Kd is then evaluated at 0-1, and 1-2 meter depths to determine the area of habitat sufficient to support SAV.

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