What's Upstream? GIS's critical role in developing nutrient reference conditions for estuaries

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Eutrophication due to excess levels of nitrogen and phosphorus can seriously impair ecological function in estuaries. Protective criteria for nutrients are difficult to establish because the source can vary spatially and seasonally, originate either from the watershed or the ocean, and be natural or anthropogenic. GIS tools and processes can help in developing nutrient criteria by establishing reference conditions representative of natural background nutrient levels. Along the Oregon Coast in the Pacific Northwest, the primary source of nutrients in the wet season (November-April) is generally riverine. We delineated and extracted explicit spatial data from watersheds upstream of riverine water quality monitoring stations for parametric comparison to recorded nutrient levels. The SPARROW model (Wise and Johnson, 2011) was used to estimate relative contributions of nutrient sources at each station. Both raster and vector spatial data were used and include land use / land cover, demography, geology, terrain, precipitation and forest type. The relationships of nutrients to spatial data were then explored as an approach to establishing the reference expectation.