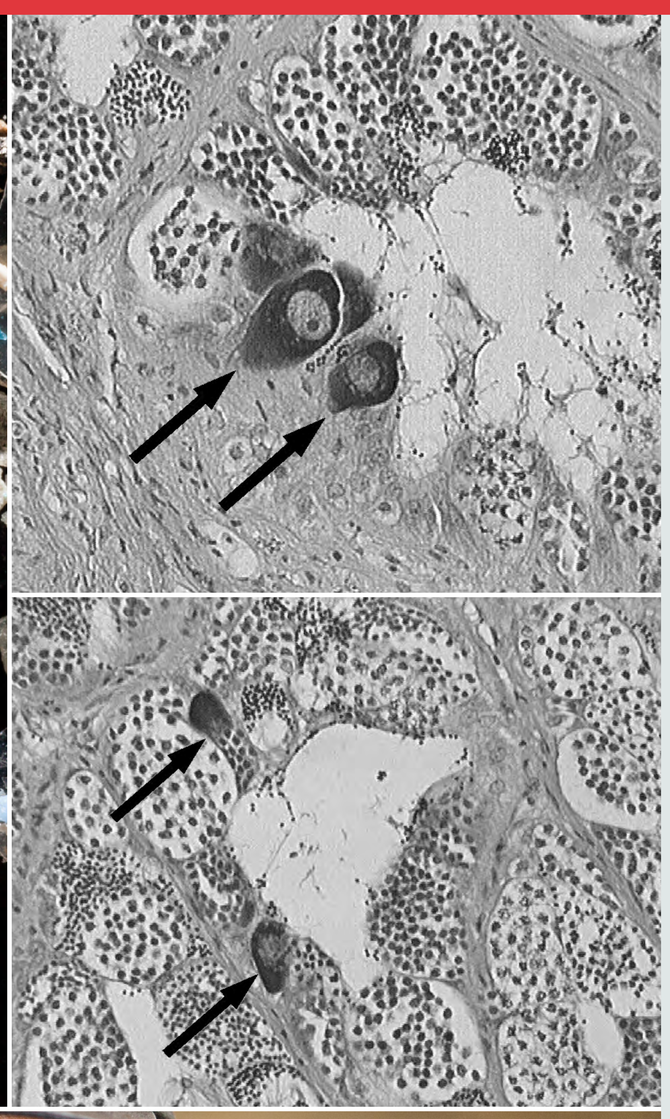
DEPARTMENT OF
ENVIRONMENTAL
SCIENCE & TECHNOLOGY

Undergraduate Program	Graduate Program
Ecological Technology Design	Soil and Watershed Sciences
Ecosystem Health	Ecological Technology Design
Soil and Watershed Science	Wetland Science
Natural Resources Management	Ecosystem Health & Natural Resource Management



Environmental Fate and Effects of Pollutants

As an Environmental Toxicologist Professor Lance Yonkos integrates fundamental and applied research to better understand and mitigate the sources, fate, and ecological effects of contaminants in the environment. He works primarily within the Chesapeake Bay and similar watersheds with complex mixtures of urban, industrial, suburban, and agricultural land-use. His research addresses three significant fields of inquiry:

Endocrine Disruption:

Research in this area aims to improve our understanding of the behavior of estrogens in complex environmental systems, essential in assessing ecological and human health risks of anthropogenic activities and to gauge the effectiveness of remediation strategies. One of the largest sources of estrogens to surface waters is runoff from animal manure-amended agricultural fields. Dr. Yonkos' research has demonstrated that this runoff is capable of inducing estrogenic effects on fish within receiving waters and may contribute to the feminization of male largemouth bass on Maryland's Eastern Shore (upper right images). His lab has also demonstrated the effectiveness of composting at degrading environmentally harmful estrogens in both poultry manure and municipal biosolids to environmentally benign levels.

Microplastics:

Dr. Yonkos performed the first study of microplastic pollution in the Chesapeake Bay (top left image), demonstrating that abundance in surface waters strongly correlates with population density, imperviousness, and proportion of urban/suburban development. Results were consequential in passage by the Maryland General Assembly of a statewide prohibition on manufacture and sale of products containing plastic microbeads. While buoyant microplastics can exit the region and become part of the ever-expanding garbage patches within Ocean Gyres, materials that are not buoyant (the majority of plastics entering the environment) deposit and accumulate locally within sediments. Currently Dr. Yonkos is comparing microplastic burdens in modern sediments to those from archived samples collected throughout the Chesapeake Bay during the early 1980s to determine changes in microplastics abundance, size/shape, and polymer-type in relation to changes in regional land use patterns over the past four decades.

Persistent "legacy" Contaminants:

While environmental legislation and improved technology and practices have significantly reduced polluting activities, many regions still suffer the effects of persistent organic pollutants (POPs). Dr. Yonkos investigates the severity and spatial extent of these legacy pollutants within surface waters, sediments and biota in Chesapeake Bay contaminant hotspots (e.g. Baltimore Harbor, Anacostia River) and other Northeast US industrialized watersheds (Delaware Bay DE, Newark Bay NJ). Research includes measuring the effects of exposure to contaminated sediments on embryonic development of resident fish (middle left image), and deployment of freshwater mussels for "active" monitoring of POPs in the intensely urbanized and degraded Anacostia River (bottom right image). Results inform decision-makers on approaches for contaminant remediation in regions with prolonged histories of industrial activity, and provide guidance on preventative measures for regions currently undergoing rapid industrialization.

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