



THESIS DEFENSE

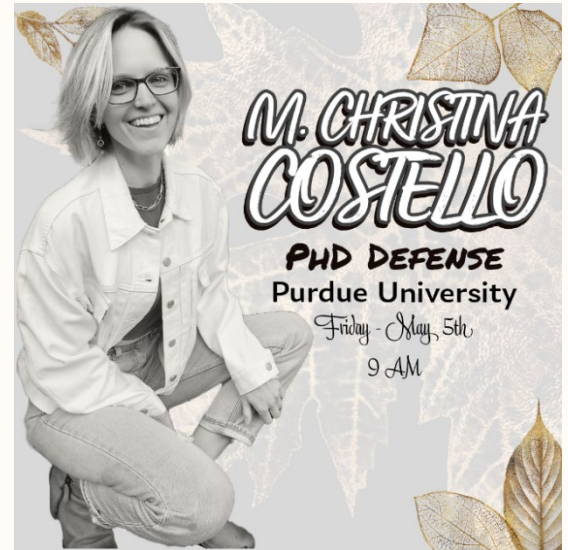
Friday, May 5, 2023

9:00 AM

Lilly Hall, Room 2-425

Fate and Occurrence of Unregulated Organic Chemicals (UOCs) in Municipal, Agricultural, and Aquatic Systems

Organic chemicals have become ubiquitous pollutants of aquatic and terrestrial ecosystems. Pharmaceuticals, chemicals in personal care products and/or consumer goods, illicit drugs, agrochemicals, industrial chemicals, and fire retardants like per- and poly-fluoroalkyl substances (PFAS) are all organic chemicals. These compounds have both unidentified toxicological risks and often well-known impacts (e.g., endocrine disrupting chemicals) on wildlife and humans. While most organic contaminants remain unregulated, select compounds are regulated albeit with regulations differing vastly between countries. As climate change exacerbates droughts, flood events, and access to water sources, understanding unregulated organic chemicals (UOCs) will continue to be a priority for managing freshwater resources and waste-management. In the developed world, we manage our sewage through well-established water resource recovery facilities (WRRFs), which primarily targets minimize discharge of nutrients and suspended solids to receiving waterbodies. One byproduct of this process is biosolids produced from the residual solids and can serve as an excellent fertilizer; however, land-applied biosolids can serve as an unintentional conduit of UOCs from human and industrial use to agricultural systems. On the other hand, many developing nations do not have any treatment infrastructure or a robust and enforceable regulatory framework to protect water resources from contamination. The aim of this research was to reduce the knowledge gap associated with UOCs in both the developing and developed contexts. This included, but was not limited to, evaluating seasonal variation of UOCs in Northern Pakistan riverine ecosystems, and quantifying and comparing UOC occurrence in two WRRF process types pre- and post-digestion. Overall approach and key findings of these aims will be presented as well as highlights across all dissertation objectives.



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