TETRA TECH

Microplastics in the Chesapeake Bay

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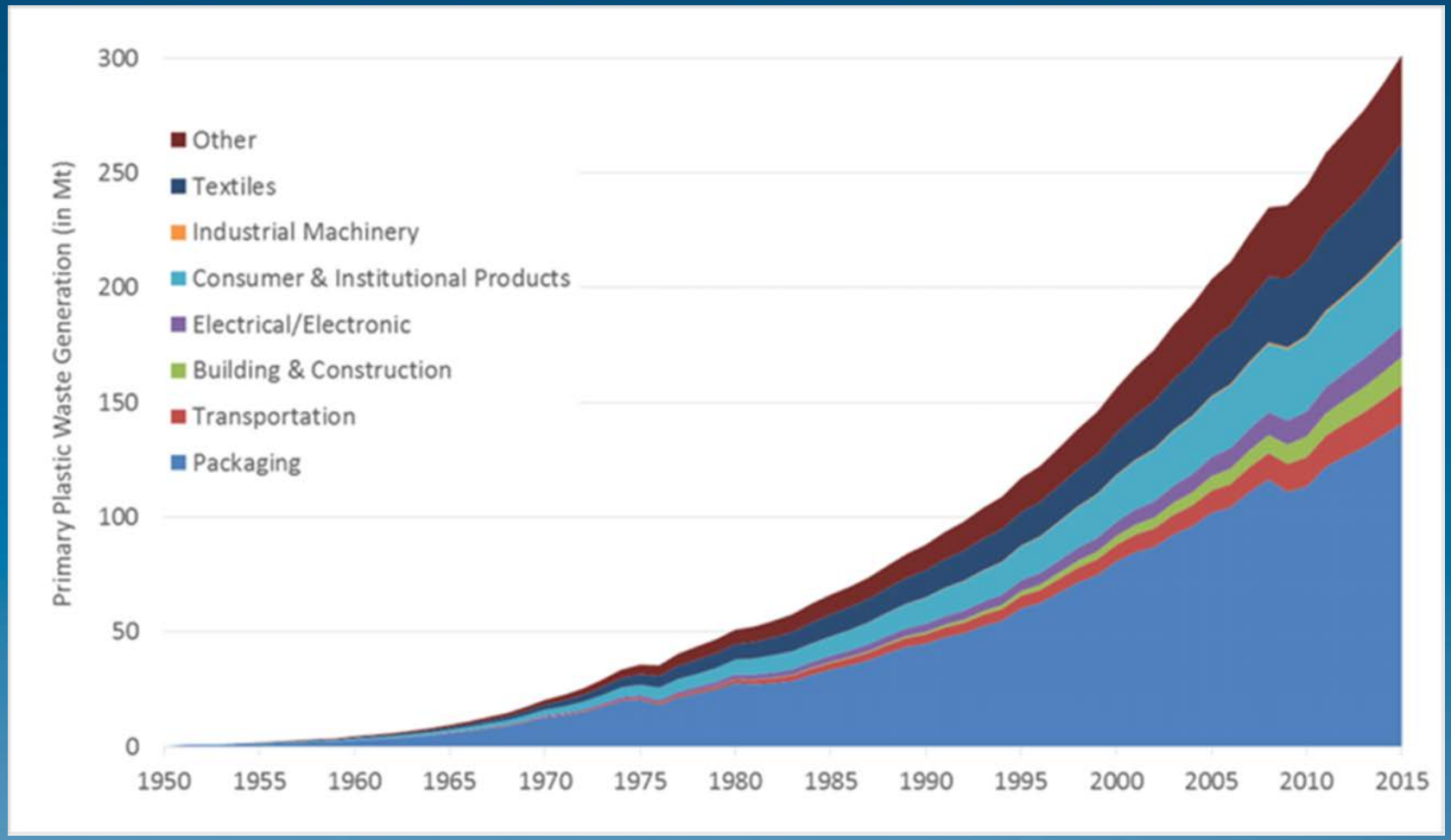
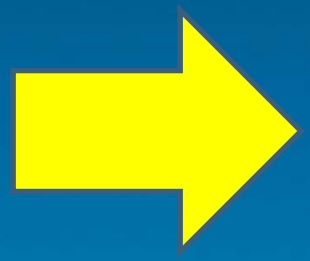
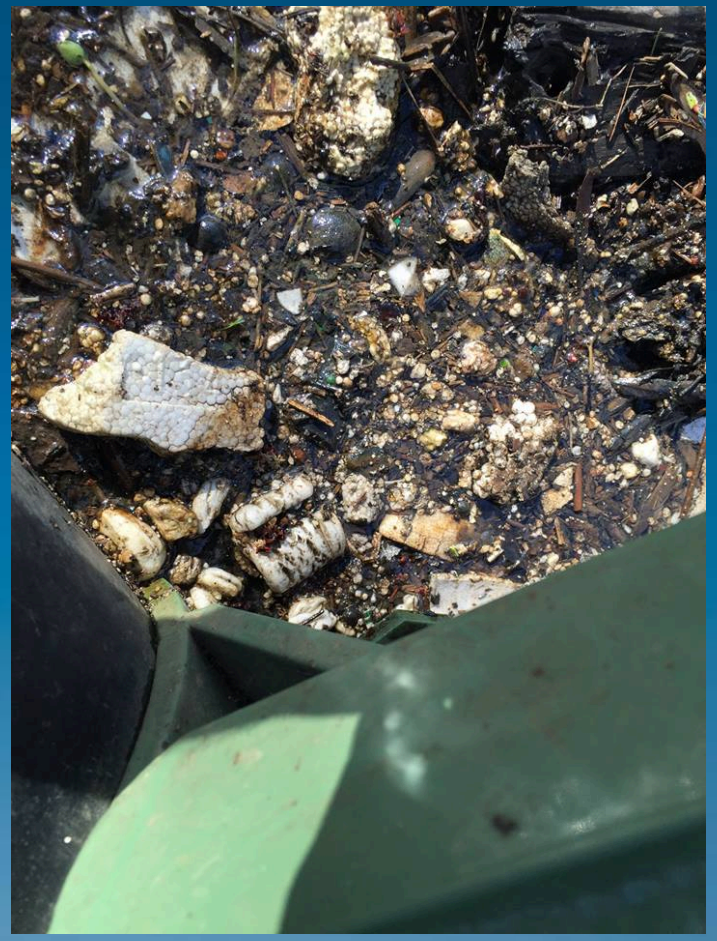
Plastics are a Global Problem



J. Geyer in Science Advances. 2017

Foam and other plastics start out as this…..





…but turn into this

Microplastics

Small plastic fragments, fibers, and granules

How small? Usage of the term “microplastic” in the literature varies from 0.1 um to 10mm – a size range of five orders of magnitude!

- **Primary Microplastics** – manufactured products used in:
  -Facial cleansers and cosmetics (microbeads)
  -As vectors for drugs
  -As air-blasting media for removing rust (often contaminated with heavy metals, e.g. cadmium, chromium, lead)
  -Virgin plastic production pellets – Pellets are convenient to ship and are eventually melted down and molded into manufactured products

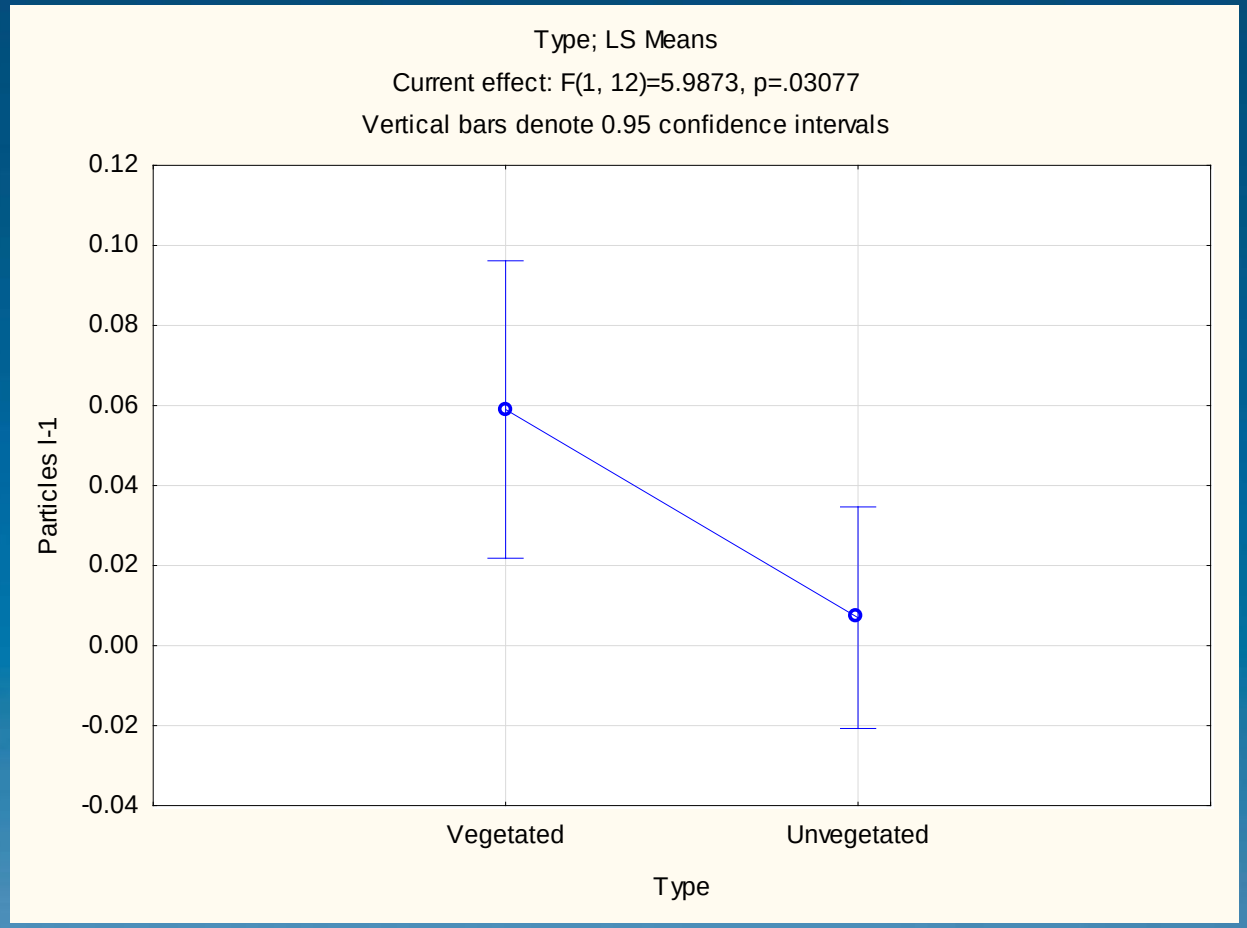
- **Secondary Microplastics** – pieces that have broken off larger plastic objects through physical, biological, or chemical processes

Where are those Microplastics likely to accumulate?

- 2000% increase in SAV in DC between 2009 and 2017
- Surpassed Chesapeake Bay Program goals for SAV restoration
- SAV also habitat for larvae of DC state fish, American Shad (*A. sapidissima*)

Question: could SAV beds be capturing microplastics?

Microplastics in SAV Beds



Mean microplastic particle concentration (#of particles/volume of sample) in SAV beds vs. unvegetated bottom (n=14, 5 vegetated, 9 unvegetated)

Scientific & Technical Advisory Committee Workshop

"Microplastics in the Chesapeake Bay: State of the Knowledge, Data Gaps, and Relationship to Management"

- SAV Workgroup Sponsored
  - Brooke Landry (MD DNR, SAV WG Chair)
  - Bob Murphy (TetraTech, SAV Workgroup; Workshop Co-Chair)
  - Matt Robinson (DC DOEE, SAV Workgroup; Workshop Co-Chair)

- **Emerging Issues of Concern**

Workshop Format

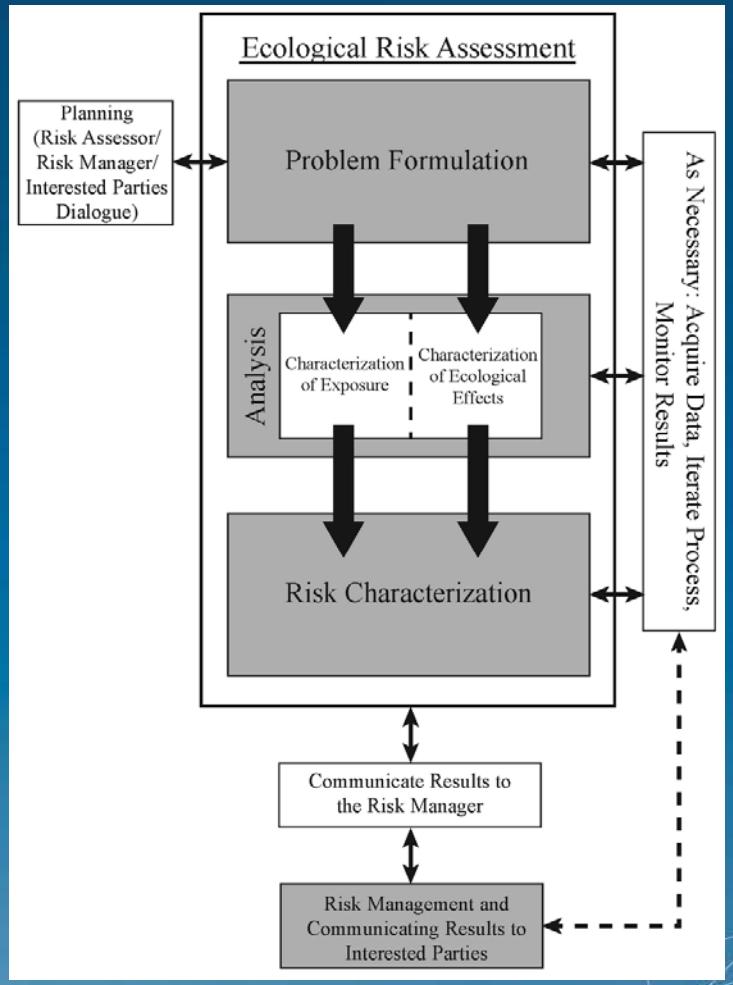
Steering committee decided early on that the workshop should be formatted around conducting an **ecological risk assessment (ERA)**

The Ecological Risk Framework consists of the following components:

1. **Problem Formula**tion: Determine assessment endpoints and measurement endpoints

2. **Risk Analysis**: Identify testable linkages between sources, stressors and assessment endpoints

3. **Risk Characterization**: What are the risk and effects? Ex. LC50 – Lethal concentration to kill 50% of a population



Ecological Risk Framework (EPA, 1992)

Ecological Risk Assessment