Prototyping Decision Support and Monitoring Tools for Equitable Management of Salt Contamination of Water Supplies in Tidal Rivers: Application to the Chesapeake Bay

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Presented to Climate Resiliency Workgroup
Chesapeake Bay Program
August 15, 2024

SaltCast.

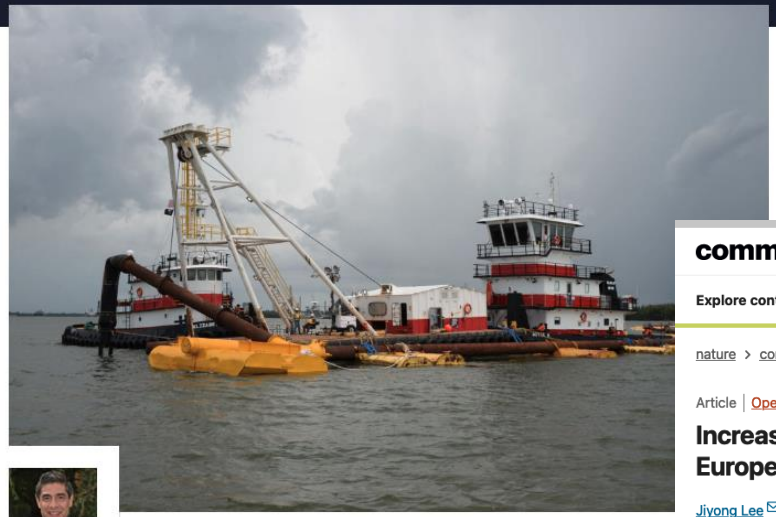
Outline

- Project overview
- Intake identification and characterization
- Prototype of decision support tool, SaltCast (Kanika Kumar)

Salt water intrusion into tidal rivers is in the news

PBS NEWS

Menu Full Episodes Podca



By —
Roby Chavez

Leave your feedback

Why the saltwater wedge climbing up the Mississippi River is a wake-up call to the region

DROUGHT

Salt water creeping into drought-depleted Bay Area fresh water supply

CBS NEWS BAY AREA

Updated on: August 8, 2022 / 8:07 AM PDT / CBS/AP

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Increasing risks of extreme salt intrusion events across European estuaries in a warming climate

Jiyong Lee, Bouke Biemond, Huib de Swart & Henk A. Dijkstra

Communications Earth & Environment **5**, Article number: 60 (2024) | Cite this article

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Climate Forward

Uruguay Wasn't Supposed to Run Out of Water

A devastating drought has hit a country that seemed to have abundant fresh water.

Share full article

Paso Severino reservoir in Uruguay last month. Gaston Britos/EPA, via Shutterstock

By Manuela Andreoni

Motivation

- Water withdrawn from tidal waters for:
  - Power plant cooling
  - Irrigation of crops
  - Industrial and manufacturing applications
  - Human consumption
  - Many other uses
- Climate change is altering the salinity of coastal waters
- Intakes on the Chesapeake Bay and other estuaries will be threatened by future salinity increases
- Decision support tools are needed to manage this threat

Our proposal

- Develop a new coupled watershed–estuary model that simulates the transport and fate of major salt ions
- Use model and artificial intelligence (AI) algorithms in a planning tool—co-developed with stakeholders—to identify management strategies and quantify the tradeoffs between competing needs for freshwater resources

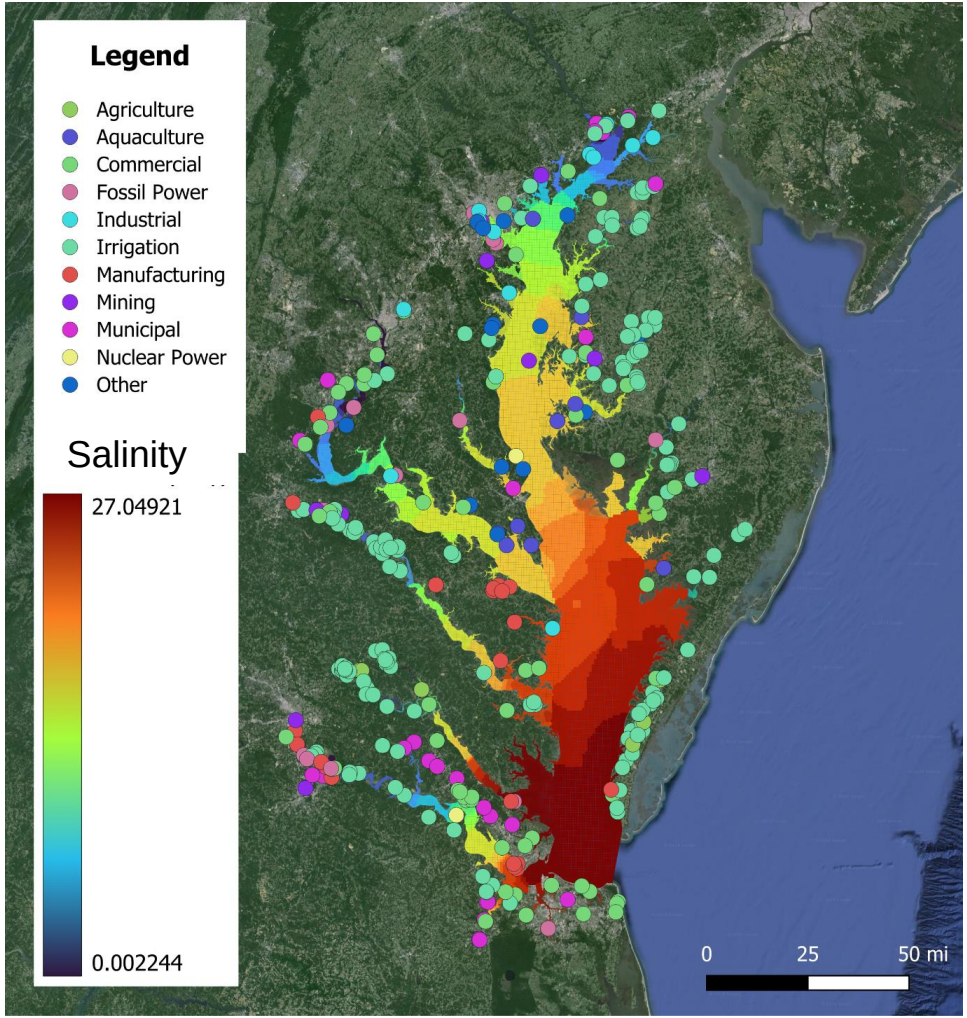
NSF Convergence Accelerator Program

- Phase I: 1 year proposal ($600K) to develop low-fidelity prototype (where we are)
- Phase II: 3-year proposal ($5 million) to fully develop product (deadline next month!)
- Both phases involve intensive coursework with NSF

Final Chesapeake Bay water intake map

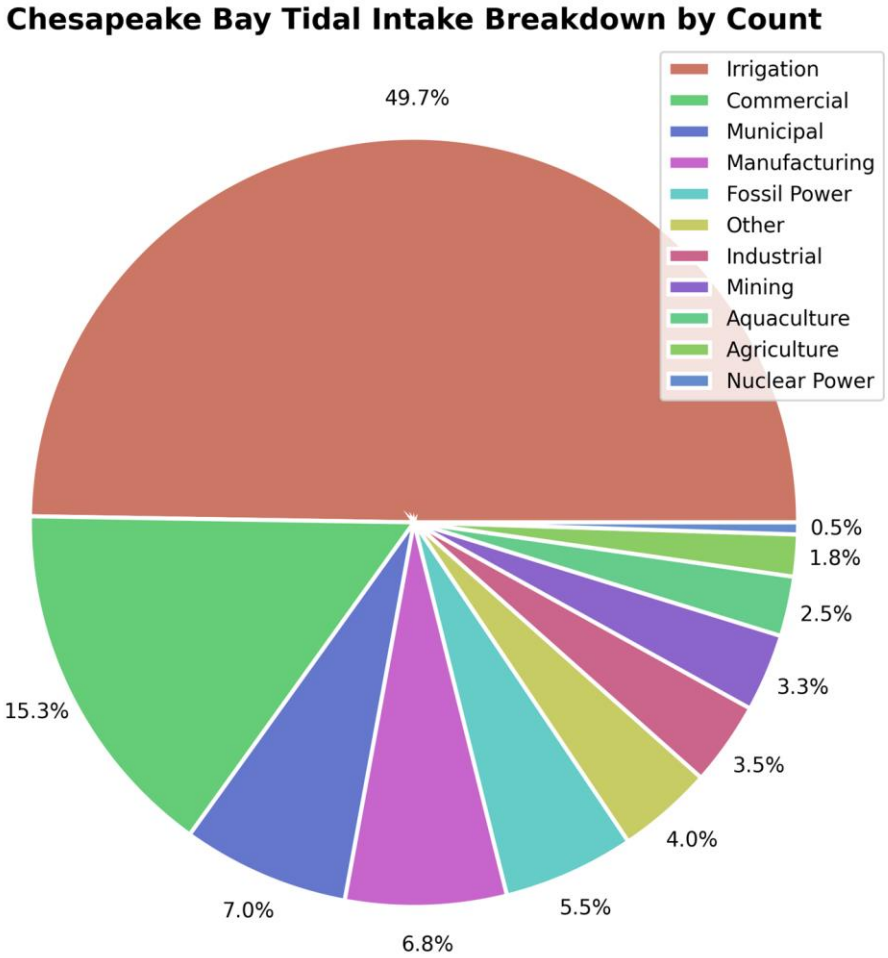
391 sites:

- 238 in Virginia
- 153 in Maryland



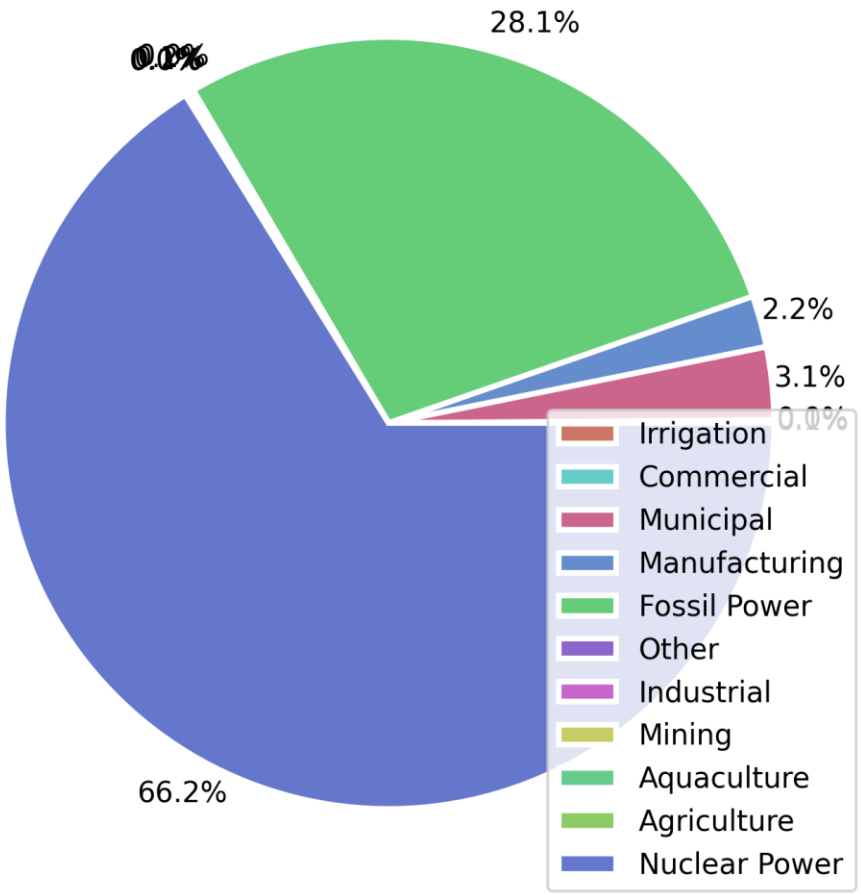
Breakdown of intakes by use type

About half the intakes are used for irrigation



Breakdown of use type by volume withdrawn

Most of the water withdrawn is for power generation



Intakes sorted by salinity

Intakes are in all salinity categories, but mostly tidal fresh and mesohaline