The Economics of Nutrient Harvest: Overview of Alternatives and Challenges to Creating Incentives

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Outline

1. Alternatives: Costs & advantages of nutrient harvest technologies
2. Incentivizing nutrient harvest: How to pay?

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1. Alternatives: Costs & Advantages

- Shellfish aquaculture
- Seaweed
- Algal harvest
- Many variations/technologies

How do these compare to source (nonpoint) reductions?

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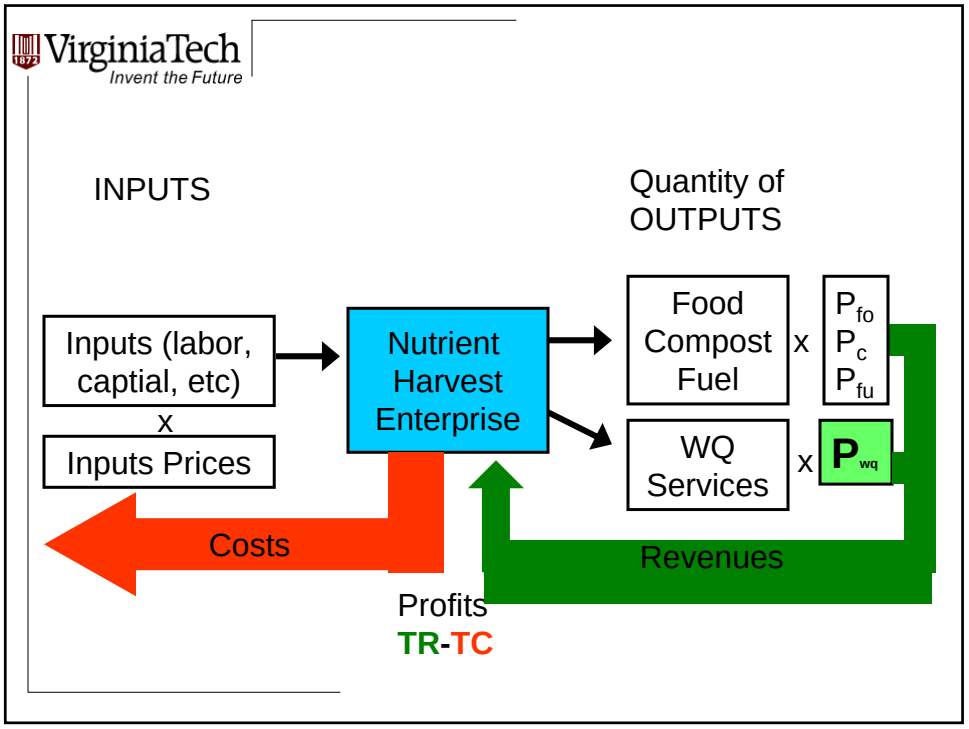
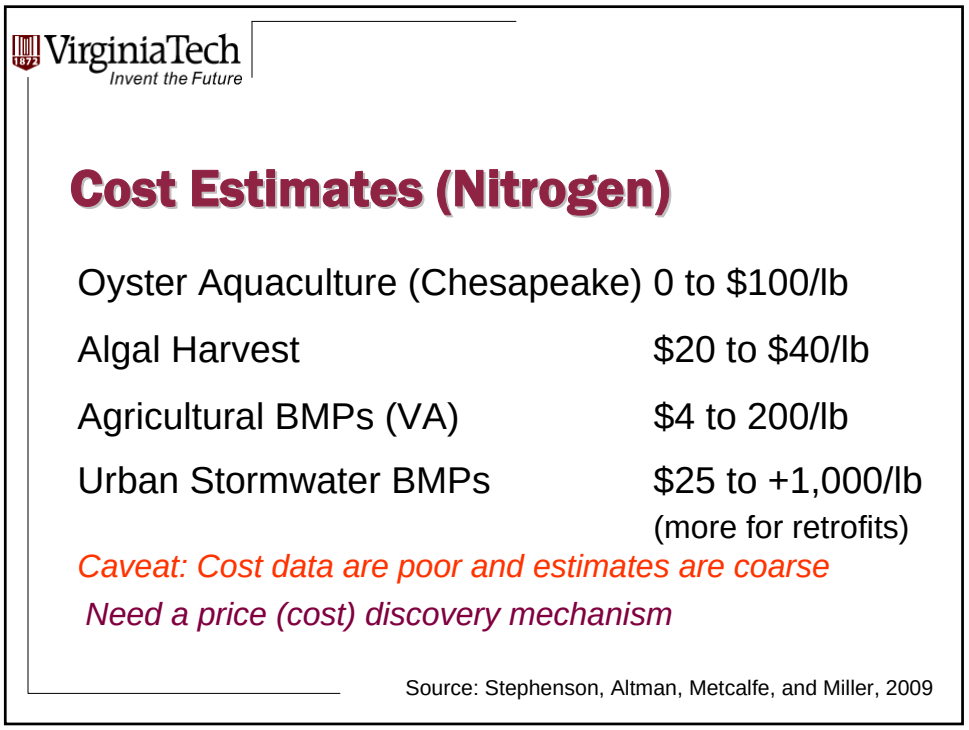
Nutrient Removal Costs

- Conceptually, how can we estimate nutrient removal costs from bioextractive technologies anyway?





Cost Estimates (Nitrogen)

Oyster Aquaculture (Chesapeake)	0 to $100/lb
Algal Harvest	$20 to $40/lb
Agricultural BMPs (VA)	$4 to 200/lb
Urban Stormwater BMPs	$25 to +1,000/lb (more for retrofits)

Caveat: Cost data are poor and estimates are coarse

Need a price (cost) discovery mechanism

Source: Stephenson, Altman, Metcalfe, and Miller, 2009

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Advantages of Nutrient Harvest

- Nutrient load reductions from most nonpoint sources are modeled estimates, surrounded by very large/unknown error bands, and rarely verified.
- Nutrients removed from nutrient harvest generally easily quantified and verified.

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2. Incentivizing Nutrient Harvest

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How to Pay for Nutrient Harvest?

How can financial incentives be created to expand this service?

1. Offsets for Regulated Discharge Sources ("WQ Trading")
2. Public Sector Purchase
3. Voluntary Private Sector Offsets & Donations
4. Market Development of Related Products

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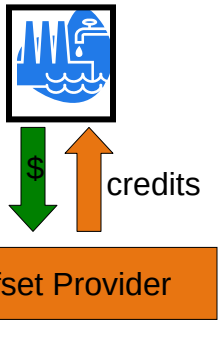
1. Regulated Offsets: Water Quality Trading

Discharge Source

Point Sources (WWTP)
Developers (stormwater)
etc

Regulatory Obligation



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Demand Side Challenges for Regulated Offsets ("trading")

- *Regulator perspective:* Need to approve and/or promote
- *Discharger perspective:* Need to accept/adopt

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Demand Side Challenges for Regulated Offsets ("trading")

Regulator perspective:

- Avoid and minimize logic/direction
- "In-kind" & "on-site" preferences
- Legal Issues
- Permanence
- "Additionality"

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Minimize Load from Permitteed Sources

- Textbook definition of trading allows dischargers discretion to select most cost-effective combination of controls (onsite or offsite w trading)
- Most permitting programs do not work this way. Preference and direction to maximize controls at regulated point sources.

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"In-kind" and "On-site" Preferences

- Regulators in water quality/wetland programs consistently demonstrate preferences for offsets that are as close, and as similar, to the permitted impact as possible
- Another part of a "sequencing logic" that limits demand for offsets (of any kind)

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Clean Water Act: *Zero Discharge*

(a) Restoration and maintenance of chemical, physical and biological integrity of Nation's waters; national goals for achievement of objective

(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;

Title 33, Chapter 33, §1251

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No "Instream Treatment"

- Administrative rulings in the 1970s forbid use of instream treatment technologies (e.g. aerators) by permitted discharge sources in lieu of advanced wastewater treatment.
- Some regulators express concern that nutrient harvest/extraction is "instream treatment"

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Pinto Creek Case

"A new decision from the Ninth Circuit Court of Appeals prohibits EPA from issuing an NPDES permit under the Clean Water Act ("CWA") for discharges into waterways that do not meet water quality standards, even if the new discharge is offset by the elimination of an existing source upstream"

ABA Water Quality and Wetlands Newsletter (12/07). *Friends of Pinto Creek v. EPA*

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Other Accounting/Legal Issues

- Additionality – Would nutrient harvest activities have occurred in absence of a water quality payment (e.g. new nutrient removal capacity)?
- Permanence – Risks of offsetting permanent increases in permitted pollutant loads

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Demand Side Challenges for Permitted Offsets

Discharger (permittee) perspective:

- Regulatory Risks
- Other on-site alternatives
- Scale & Feasibility

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Conclusion for Regulated Offsets:

- Many difficult institutional challenges
- Despite over 10 years of experimentation with water quality trading, very little revenue has ever been generated for nonpoint sources, much less ecosystem services/Nutrient harvest.

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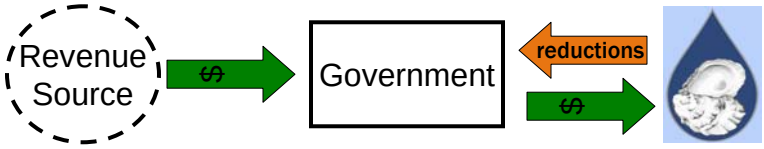
2. Public Sector Purchase



Examples of Government Supported Efforts Remove N&P/improve water quality:

- Agricultural BMP cost share programs
- Public Capital Grant Programs
- Restoration of put-and-take shellfish grounds

But could think of many other potential models

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2. Public Sector Purchase

Potential

- millions spent to convince/compensate point and nonpoint sources to reduce discharges

Demand Side Challenges

- Funding hardwired to particular constituents
- Focus on practices (BMPs), not outcomes (lbs removed); (we buy inputs rather than outputs)
- Preference for source reductions

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3. Voluntary Private Sector Offsets & Donations

Examples:

Voluntary donations

Corporate Green Campaigns, PR, etc.

Voluntary NGO campaigns

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3. Voluntary Private Sector Offsets

Potential

- Could be more flexible, competitive

Demand Side Challenges

- Limited funding
- Can revert back to preferences for conventional practices

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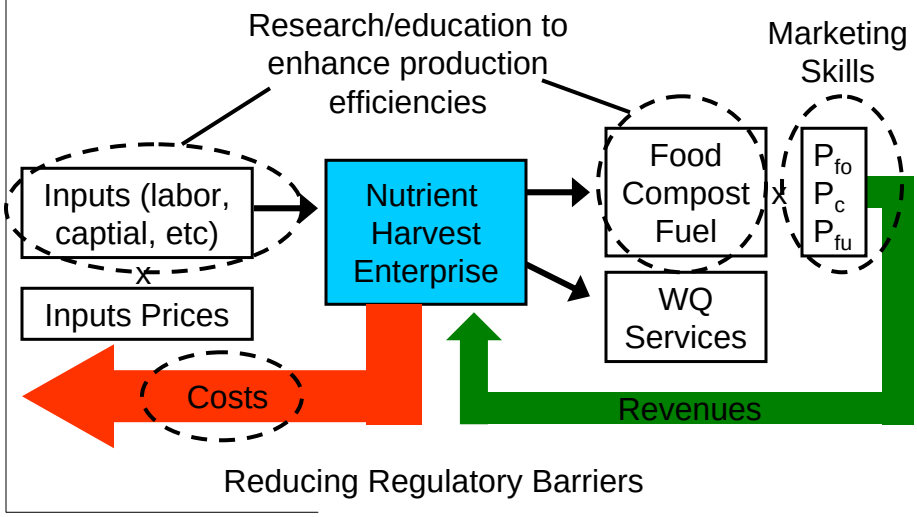
4. Market Development of Related Goods



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Conclusions:

Nutrient harvest provides public with relatively certain removal, ancillary benefits, at possibly reasonable costs.

Significant policy barriers to the creation of incentives to expand nutrient harvest activities

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Thank you!

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