Lessons from Market-based Approaches for Watershed Protection: Water Quality Trading in the Chesapeake Bay Region

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Eye on LAC:
Green-Gray Infrastructure:
The Case for Investment

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Introduction

How to create incentives for optimal grey-green infrastructure investments in watershed protection?

- Command-and-control
- Incentive-based payment-for-watershed-services (PWS) approaches
  - Government taxes or subsidies
  - Beneficiary-financed
  - Market-based (cap-and-trade)

A market-based approach: water quality trading (WQT)

- Require sources to reduce pollutant loadings to their watershed (regulatory cap)
- Give sources the option to purchase load reductions (credits) from other sources (trading)

Given similarities between WQT and other PWS approaches, what can we learn from experience with WQT?

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Water Quality Trading Programs in the Chesapeake Bay Watershed

- Nutrient Credit Trading
  - **Virginia** passed initial trading program legislation in 2005. In 2013 enacted rules for urban developments to purchase nutrient offsets.
  - **Pennsylvania** established first trading policy in 2005 (legislation in 2010)
  - **Maryland** established policy in 2008

- In 2010, US Environmental Protection Agency established Total Maximum Daily Load (TMDL) limits to Bay for nitrogen, phosphorus, and sediment

- **Washington, DC** established Stormwater Retention Credit Trading Program in 2013

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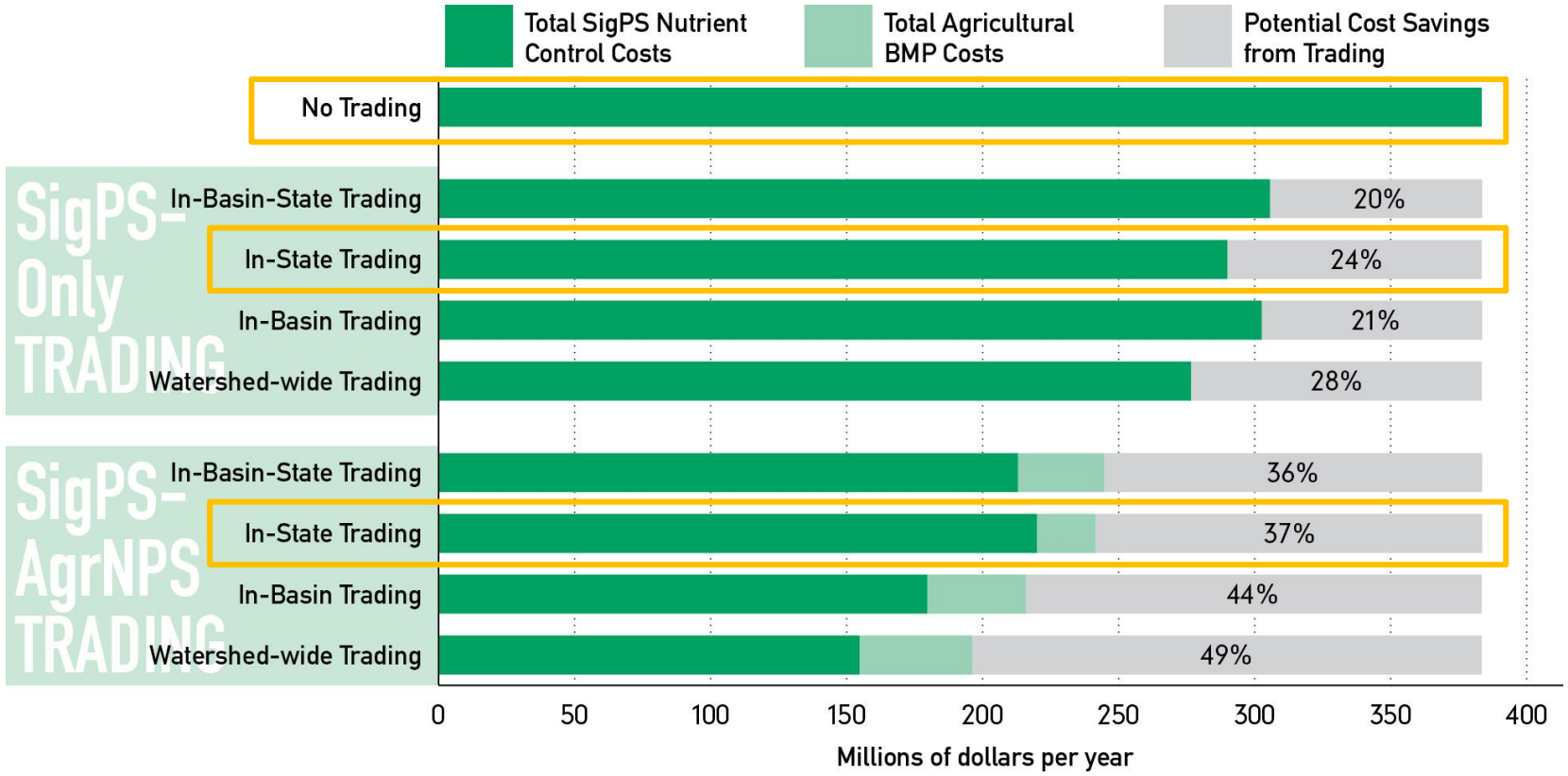
Potential Savings from Shifting Towards Green Infrastructure Approaches

- Economic study (CBC, 2012) estimated millions in potential savings for point sources if they had the option to purchase load reduction credits from agricultural nonpoint sources

- Co-benefits (carbon storage, air quality, recreation) from these green infrastructure approaches could be even larger then the potential cost savings (EPA, 2011)



Actual Gains from Nutrient Credit Trading Have Been Far Less

- Pennsylvania
  - the only program allowing point sources to meet *current* obligations through credit purchases from nonpoint sources
  - TMDL in 2010 created demand for credits, but the total volume of trades has been limited
    - In 2014, only 7 sellers of nonpoint source credits (mostly through aggregators)
    - In 2016, new stricter rules for nonpoint source credits has further limited trade

- Virginia
  - Program rules in effect preclude trading between point and nonpoint sources
  - Since 2012, new urban developments can purchase nonpoint source credits to offset a portion of nutrient
    - Must be permanent credits (conversion of agricultural land to forest)
    - 92 “nutrient banks” selling 3,300 phosphorus credits (lbs/yr)

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Factors Affecting Demand for Green Infrastructure Credits

	Type of Green Infrastructure (Nonpoint Source Credits)	
	Working Land Practices	**Land Conversion Practices**
Stringency of Load Limit (Cap)	+	+
Cost of Compliance (without trade)	+	+
Buyer Eligibility Restrictions	-	-
Transaction Costs		
Search costs	-	-
Contracting costs	- -	-
Verification costs	- -	-
Flexibility of GI for Adaptive Mgmt	+ +	+
Uncertainty		
GI maintenance	- -	-
GI performance	-	-
Extreme events	-	-

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Factors Affecting Supply of Green Infrastructure Credits

	Type of Green Infrastructure (Nonpoint Source Credits)	
	Working Land Practices	**Land Conversion Practices**
Seller Eligibility Restrictions	-	-
Additionality Requirements	-	-
Transaction Costs		
Program learning costs	-	-
Search costs	-	-
Contracting costs	- -	-
Flexibility for Adaptive Mgmt	+ +	+

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Factors Affecting Supply of Green Infrastructure Credits (Cont'd)

	Type of Green Infrastructure (Nonpoint Source Credits)	
	Working Land Practices	**Land Conversion Practices**
Cost of GI Implementation		
Baseline requirement	-	-
Start up cost	-	- -
O&M cost	- -	-
Offsetting revenue	+	+
Uncertainty ratio/penalty	-	-
Other Barriers		
Loss of identity	-	- -
Loss of privacy	- -	-
Lack of trust	-	-

Conclusion

Some implications for incentivizing green infrastructure approaches

- Third party aggregators/brokers have been effective for lowering transaction costs
- Land conversion practices can involve lower transaction costs, but they also offer less flexibility
- Uncertainty regarding GI performance must be acknowledged but should not be over-penalized
- When possible, compensate practices for co-benefits
  - Don’t rule out “stacking” payments for multiple ecosystem services due to additionality concerns
- Practices with internal benefits can be self-sustaining and reduce verification costs
  - e.g., agroforestry practices

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