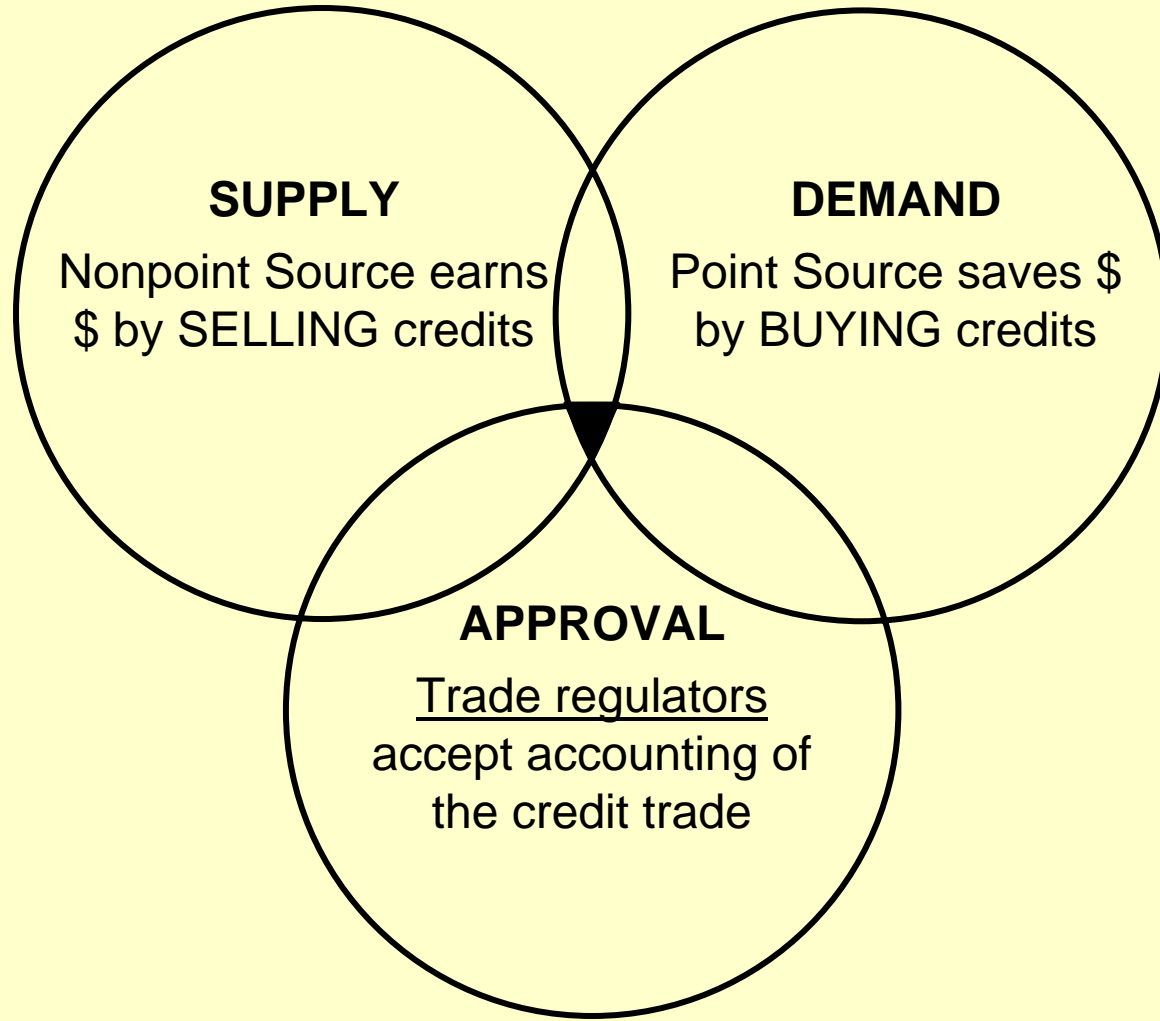


Necessary Conditions for P/NP Nutrient Credit Trading



King and Kuch 2003 Nutrient Trading Review Paper in the Environmental Law Reporter

Focus

Initial: How are people “scoring” nutrient credit trades? **A: They were not**

Eventual: Why are no WQ trades taking place ? **A: No buyers, no sellers**

Approach

Reviewed 37 on-the-ground water quality trading systems

(Noted barely any trading, and no point/non-point trades)

Evaluated Supply conditions, Demand conditions, and Institutional conditions

(Concluded: no incentives to participate ...and many disincentives)

Results

- 1) **Institutional/Technical Problems** are significant, but can be overcome
- 2) **Supply/Demand Problems** are far more important... and outside the control of regional watershed organizations.
- 3) **Centralized Trading Systems** (e.g., government-run offset and bidding programs) have much more near-term potential than the **decentralized** (market-style) credit trading programs that most of us would prefer.

King 2005 “Choices” Article on Nutrient Trading

Focus

Initially – Again, how are trades scored ? Also, what’s happening ? What’s working ?

Eventually – Why is nutrient credit trading still not happening ?

Results

- Lots of interest, support, and even start up funding,
- 70 or so water quality trading systems at various stages of development
- Still almost no trading taking place

Conclusions

- Serious Supply and Demand Problems (few willing buyers and sellers) because of:
 - Regulatory programs that dictate treatment methods & levels
 - Subsidy programs that require treatment methods & levels
 - No binding discharge restrictions
 - Weak enforcement of discharge restrictions
 - TMDL’s will help, but not without finding market savvy of regulators.

Results of Quick 2006 Phone Update on WQ Trading

Focus: What's the status of environmental trading programs that seemed on the verge of success in 2006 ?

Results:

- About 88 regional WQ trading programs,
- a few trades active.
- Evidence of some effective or promising government managed offset programs and government run tax/subsidy programs that are not quite trading programs, but promising nonetheless.
- Still lots of meetings, workshops, conferences, websites, discussion groups, publications, etc.
- An unfortunate increase in trading being peddled as a market-based **alternative** to regulation.
- Evidence that some political leaders are using the hope of trading to delay the implementation of regulations that would actually be necessary to make trading work
- Lots of trading advocates counting on TMDL's to be the driver. We'll see.

Useful Operating Assumptions

1. There are no “natural” markets for environmental services
 - Supply and Demand Conditions are always contrived by regulators
2. The real unit of exchange is a low-cost allowance credit
 - “Scoring” and external quality control must link offsets to a credits
3. Regulators can stop good trades with overly strict standards
 - e.g., Can push too hard for riskless “commodity-type” trading
4. Regulators can encourage bad trades with lax standards
 - E.g., Can push too hard for ad hoc “political” trades
5. Trade risks are unavoidable, and, if not assigned to buyers or sellers, are borne, by default, by the general public

Broad Market Context

2003 Nobel Prize winning economic research

by Jonathan Nash (of "Beautiful Mind" Fame)

- **Asymmetric Information problems** in markets results in *gaming behavior* causing excessive firm/product branding, less competition, and winner-take-all markets.

In Environmental Markets:

Buyers and Sellers both have incentives to exploit and perpetuate quality uncertainty, and to collude against trade regulators and the public interest.

2004 Nobel Prize winning economic research

by Edward Prescott and Finn Kydland

(of "Rational Expectations" Fame)

- **Time inconsistency problems** with the way markets are regulated results in widespread *gaming behavior* that causes regulatory programs to fail.

In Environmental Markets:

WTP for credit is not based on marginal treatment costs, but the expected cost of not complying after adjusting for political/legal maneuvering

Broad Market Context (continued)

2005 Nobel Prize winning economic research

by Tom Schelling and Robert Aumann

Focus:

- **Models of markets based on interactive decision and strategic interaction theories explain more of what we observe than conventional market models.**
- **Why observed market behavior that seemed irrational, once filtered through the lense of “rational expectations” seems rational and is understandable.**

Relevance In Environmental Markets ?:

I think strategic behavior explains why people favor and oppose environmental trading, why prospective buyers and sellers may not be interested in engaging in trading despite the apparent cost savings, and, perhaps, why we are all here today.

Typical Ten Stage Industry strategy for dealing with an Environmental Challenge

Stage 1 There is no environmental problem.

Stage 2 If there is a problem, it is not significant.

Stage 3 If there is a significant problem, we are not responsible.

Stage 4 If we are responsible, our economic impacts are far more important.

Stage 5 If we must respond, we will voluntarily self-regulate.

Stage 6 If voluntary isn't working, let's have a cap and trade solution

Stage 7 Caps too low, rules too stringent, enforcement unacceptable

Stage 8 Enforcement provisions are fine, but the penalties are excessive.

Stage 9 These regulations must change or we will be forced out of business.

Stage 10 Wow, we found a technical innovation - now the costs are not bad at all.

Emerging Environmental Service Markets
 Potential for Marginal Cropland Conversion in the Mississippi Delta

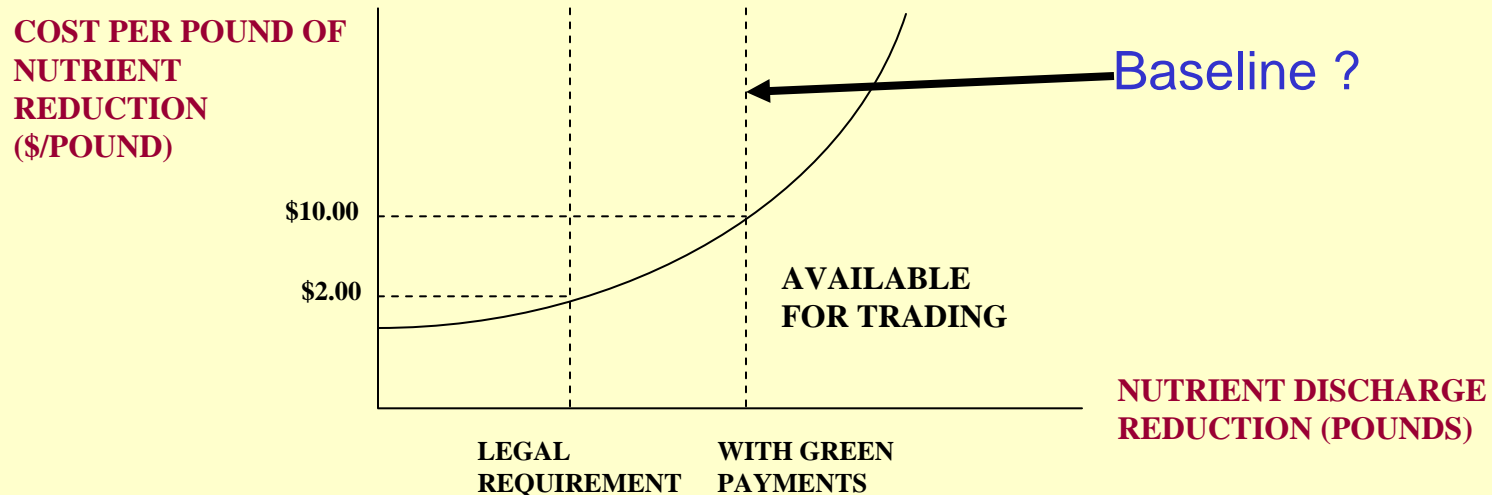
<u>Land Use</u>	<u>Product/ Service</u>	<u>Annual Earnings</u> (per acre)
# 1 Soybeans only	Soybeans	\$ 10
<hr style="border-top: 1px dashed black;"/>		
# 2 Timber only	Timber	\$ 5
<hr style="border-top: 1px dashed black;"/>		
# 3 Environmental services *	Carbon credits*	\$ 7
	Nutrient credits*	\$ 6
	Hunting Rights	\$ 5
	Biodiversity credits*	\$?
	Other Recreational \$?	
	plus some Timber	\$ 3
	Total	\$ 21
<hr style="border-top: 1px dashed black;"/>		
# 4 Biomass Energy	Higher than #1, #2, or #. 3 ??...To be determined	\$?

** Value in Emerging (Potential) Environmental Service Markets*

THE BASELINE/ADDITIONALITY ISSUE

BASELINE: - nutrient discharge reduction expected prior to trading

ADDITIONALITY: - additional nutrient discharge reduction expected with a trade



QUESTIONS

- Can landowner sell credits for meeting legal obligation or voluntary commitments ?
- Can landowner sell credits for nutrient reductions that resulted in “green payment”?
- I “baseline” for tradable nutrient credit beyond other commitments ?
- If existing requirements/commitments are significant, what’s left to sell ?

Conceptual Model for Nutrient Enforcement Economic Decision Support (NEEDS) Model

- P_d = probability of a violation being detected
- P_{se} = probability of an enforcement action, given detection
- P_p = probability of prosecution, given enforcement action
- P_c = probability of conviction, given prosecution
- \mathbf{P} = dollar penalty if convicted
- r = discount rate
- t = time between initial detection and payment of penalty
- CNC = cost of not complying
= $(P_d \times P_{se} \times P_p \times P_c \times \mathbf{P}) / (1+r)^t$