Användning av utsläppsrättigheter för att minska övergödning

Dennis Collentine
Department of Economics
University of Gävle, Sweden
dce@hig.se

” I Östersjön och Västerhavet har övergödning, hårt fisketryck och utsläpp av miljögifter fått alarmerande konsekvenser…

…Alliansregeringen ska ta initiativ till en Havsmiljöstrategi som bl.a. omfattar:

-ett system för utsläppsrätter för kväve och fosfor till Östersjön”

Anförande av Miljöminister Andreas Carlgren vid Riksdagens allmänpolitiska debatt onsdagen 8 november 2006

"Trading is a way to address the entire needs of a watershed – not just isolated point source discharges. Water quality trading is gaining increased acceptance by our partners on the federal, state and local levels, by industry, and by advocacy as a cost-effective method to solve water quality challenges."

Remarks of Stephen L. Johnson, Administrator of the U.S. Environmental Protection Agency, at the Second National Water Quality Trading Conference, Pittsburgh, PA on May 24th, 2006.

Why Trading?

- Large differences in abatement costs
- Trading allows low cost measures to be substituted for high cost measures
- Result? Economic efficiency, lowest cost for reduced pollution

Traditional Pollutant Trading Programs

- ”Cap and trade”, three steps:
  - Determine a quantitative cap for permitted pollution
  - Issue permits to pollute, discharge permits (assign property rights)
  - Allow trading sources, holders of permits
- Successfull for air pollution (last 20 years)

Water Quality Trading

Cap and trade programs have not worked. Why?

- Few or no trades
  - low liquidity, weak price signal (low incentives for investment in abatement)
- Allocation problems
  - Quantification of property rights (nonpoint sources)
- High transaction costs
  - coordination of bilateral trades
- Liability and monitoring problems

Alternative Water Quality Trading Program Design

Composite Market Model

- Incremental implementation
  - partial information sufficient
- Property rights retained in the public domain
- Monetarization of discharges (PPP)
- Low transaction costs
  - not bilateral transactions
- High liquidity

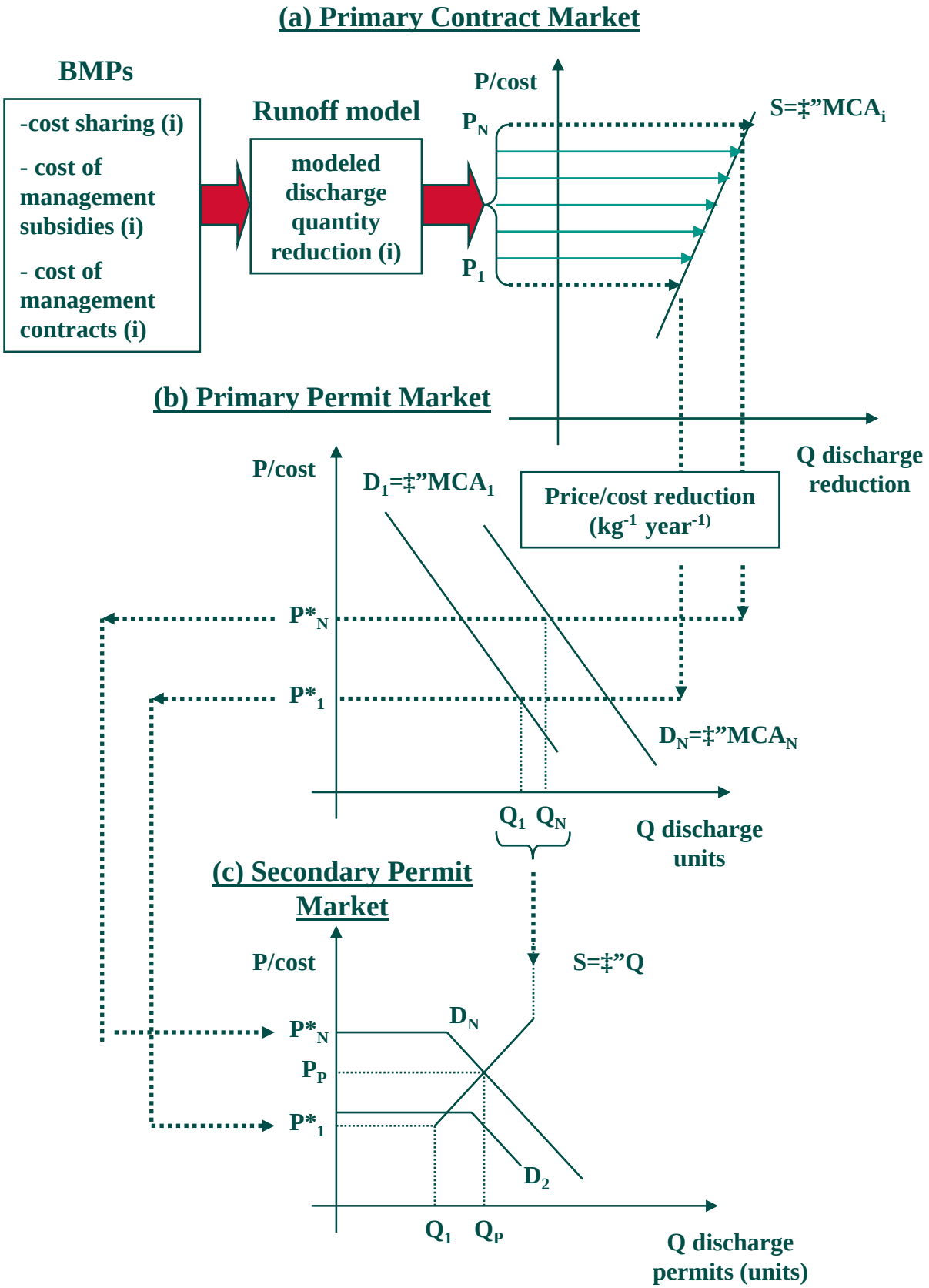
Composite Market System

- Published references
  - Collentine, D. (2006) Composite Market Design for a Transferable Discharge Permit (TDP) System, *Journal of Environmental Management and Planning*, 49 (6), 929-946.
  - Collentine, D. (2005) Phase-in of Nonpoint Sources in a Transferable Discharge Permit System for Water Quality Management: Setting Permit Prices, *Ambio* 34 (7), 573-578
  - Collentine, D., 2005. Including non-point sources in a water quality trading permit program, *Water Science and Technology 51, (3-4), 47-53.*

Composite Market System

- Three integrated markets:
  - a) Primary contract market
  - b) Primary permit market
  - c) Secondary permit market
- Different functions for each market
  - a) Setting permit prices
  - b) Issuing (selling) permits
  - c) Market exchange

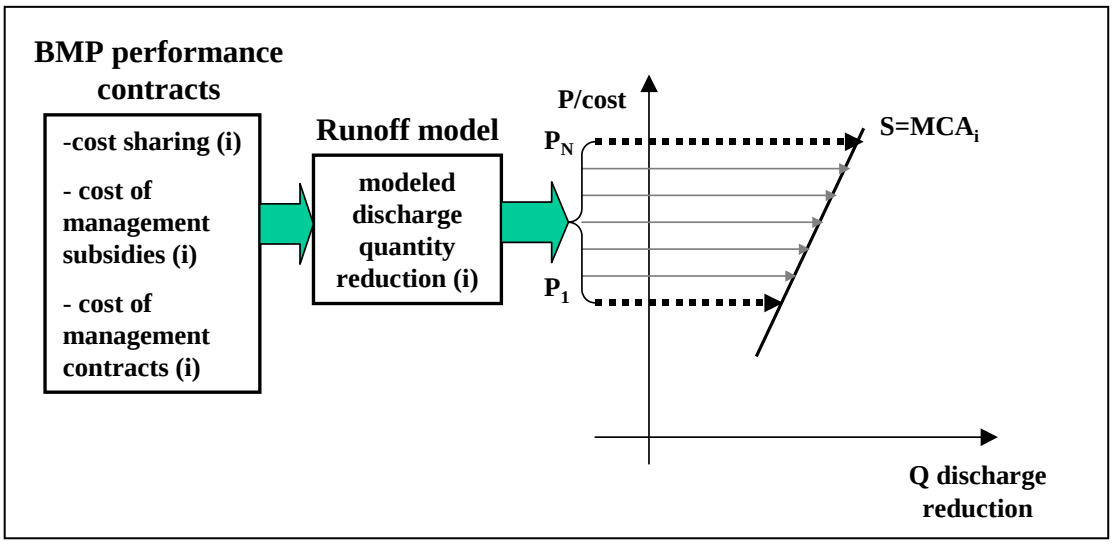
Figure 1. The composite market model for transferable discharge permits.



Setting Permit Prices

Application in the Rönneå Catchment

Primary contract market



Three steps

1) **BMPs: Catch crops, spring cultivation and combination (subsidies)**

2) **Runoff model: SOILNDB (TRK project), modelled discharge by soil type and subcatchment**

3) **Estimated MCA: Setting permit prices**

Tables and Figures

Figure 2. Rönne River basin

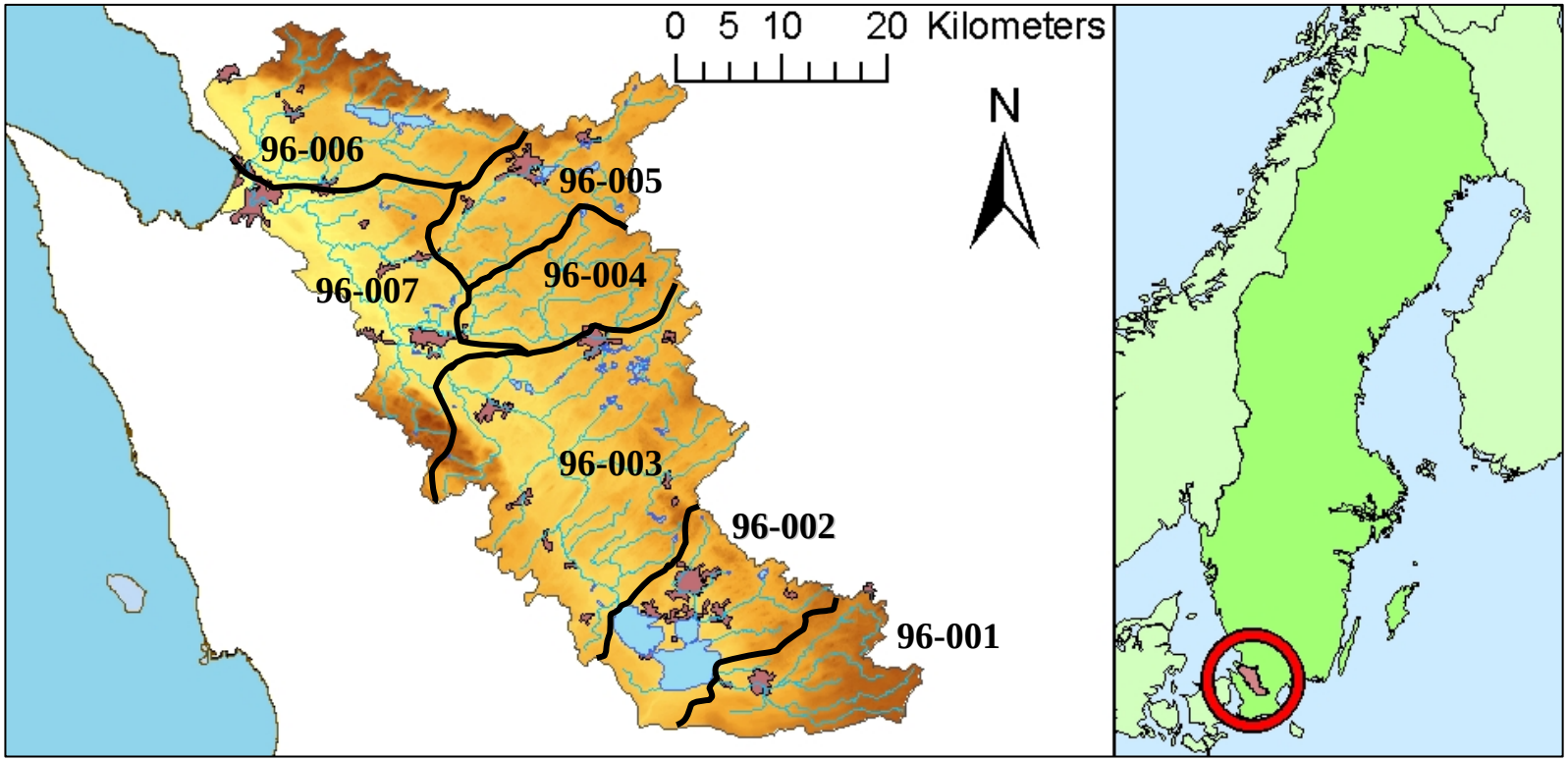


Table 1. Rönne River subcatchments: land area, cultivated land, soil types, potential area for selected BMP, gross N loads and net N loads.

	subcat 96-001	subcat 96-002	subcat 96-003	subcat 96-004	subcat 96-005	subcat 96-006	subcat 96-007	TOTAL
Total land area	15300	24200	55800	24100	19100	26100	24900	190000
Cultivated land	7100	7100	14400	3700	2000	7700	12500	54600
Loam	0%	9%	30%	15%	14%	17%	31%	21%
Potential BMP ha	0	342	2290	302	133	680	2056	6086
Loamy sand	0%	9%	7%	8%	25%	8%	10%	9%
Potential BMP ha	0	342	509	151	265	340	685	2567
Sandy loam	100%	82%	57%	77%	50%	42%	34%	56%
Potential BMP ha	3763	3079	4325	1508	530	1700	2284	16103
Gross N load (tons)	212.4	198.7	296.2	67.0	41.4	358.5	539.9	1714.1
Net N load (%)	47%	41%	83%	81%	82%	72%	84%	72%

Table 2. Estimated leaching by soil type and BMP (kg/ha) and subsidy.

	Loam	Loamy sand	Sandy loam	Subsidy USD/ha
No measures applied	53	70	62	
Catch crop and spring tillage (reduction)	29 (24)	36 (34)	33 (29)	$162.50
Catch crop only (reduction)	38 (15)	51 (19)	44 (18)	112.50
Spring tillage only (reduction)	45 (8)	58 (12)	52 (10)	50.00

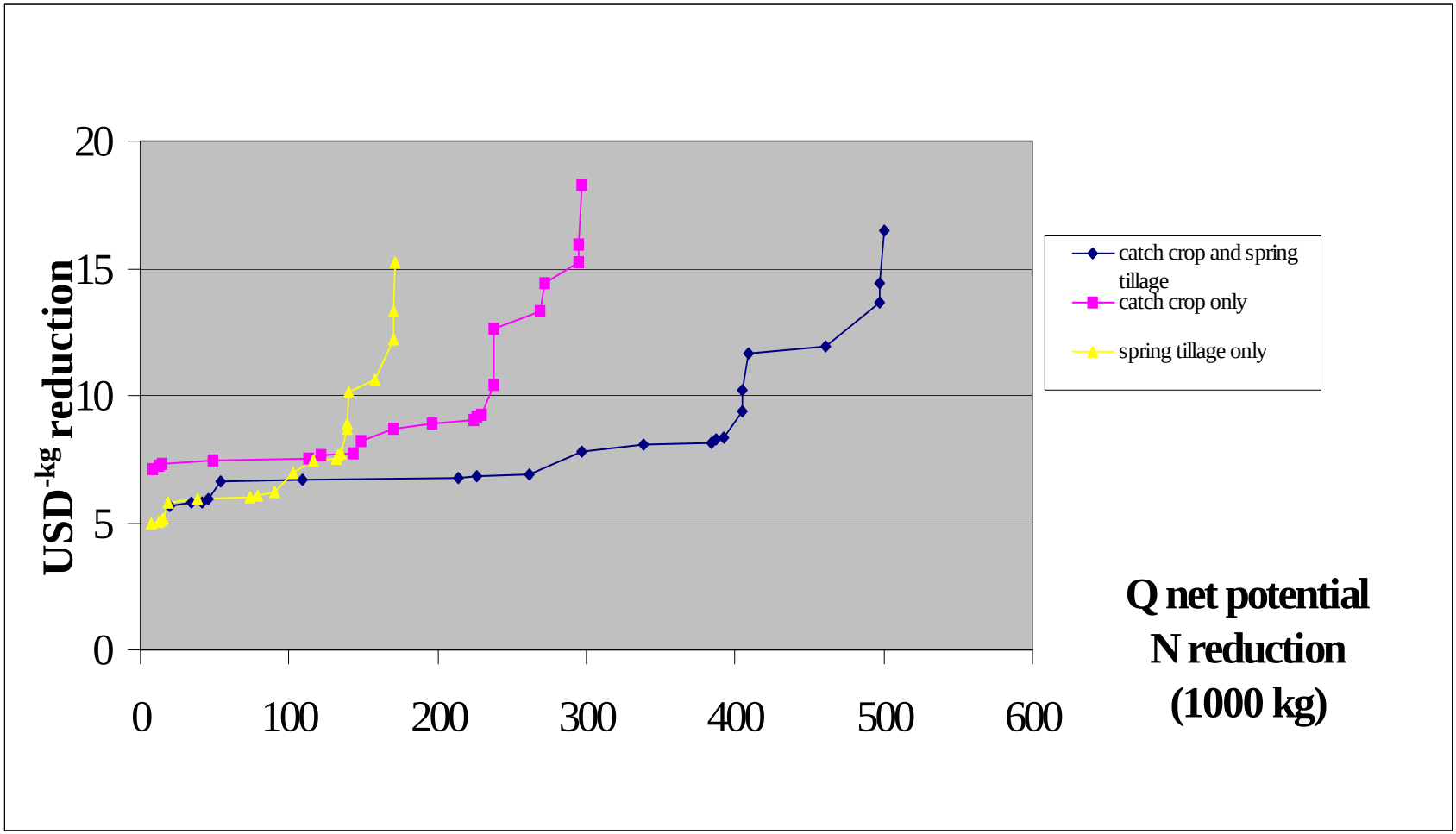
Table 3a: Cost per kg per unit of net leaching reduction (USD/kg)

	subcat 96-001	subcat 96-002	subcat 96-003	subcat 96-004	subcat 96-005	subcat 96-006	subcat 96-007
Catch crop and spring tillage							
loam	$14.40	$16.51	$8.16	$8.36	$8.26	$9.40	$8.06
loamy sand	10.18	11.66	5.76	5.90	5.83	6.64	5.69
sandy loam	11.93	13.66	6.75	6.91	6.84	7.79	6.68
Catch crop only							
loam	15.96	18.29	9.04	9.26	9.15	10.41	8.93
loamy sand	12.60	14.44	7.14	7.31	7.23	8.23	7.05
sandy loam	13.30	15.25	7.53	7.71	7.63	8.68	7.44
Spring tillage only							
loam	13.30	15.25	7.53	7.71	7.63	8.68	7.44
loamy sand	8.86	10.16	5.03	5.15	5.09	5.79	4.96
sandy loam	10.64	12.20	6.03	6.18	6.10	6.95	5.95

Table 3b: Total potential reduction (in tons).

	subcat 96-001	subcat 96-002	subcat 96-003	subcat 96-004	subcat 96-005	subcat 96-006	subcat 96-007
Catch crop and spring tillage							
loam	0	3.4	45.6	5.9	2.6	11.7	41.4
loamy sand	0	4.8	14.4	4.2	7.4	8.3	19.6
sandy loam	51.3	36.6	104.1	35.4	12.6	35.5	55.6
Catch crop only							
loam	0	2.1	28.5	3.7	1.6	7.3	25.9
loamy sand	0	2.7	80.2	2.3	4.1	4.7	10.9
sandy loam	31.8	22.7	64.6	22.0	7.8	22.0	34.5
Spring tillage only							
loam	0	1.1	15.2	2.0	0.9	3.9	13.8
loamy sand	0	1.7	5.1	1.5	2.6	2.9	6.9
sandy loam	17.7	12.6	35.9	12.2	4.3	12.2	19.2

Figure 3. Supply curve for selected BMPs



Conclusions

Results

- Limited data can lead to price differentiation
  - Uniform program payments
  - Soil types
  - Retention
- Sufficient price differentiation for potential gains from trading
- Marginal abatement supply curve can be used to set permit prices

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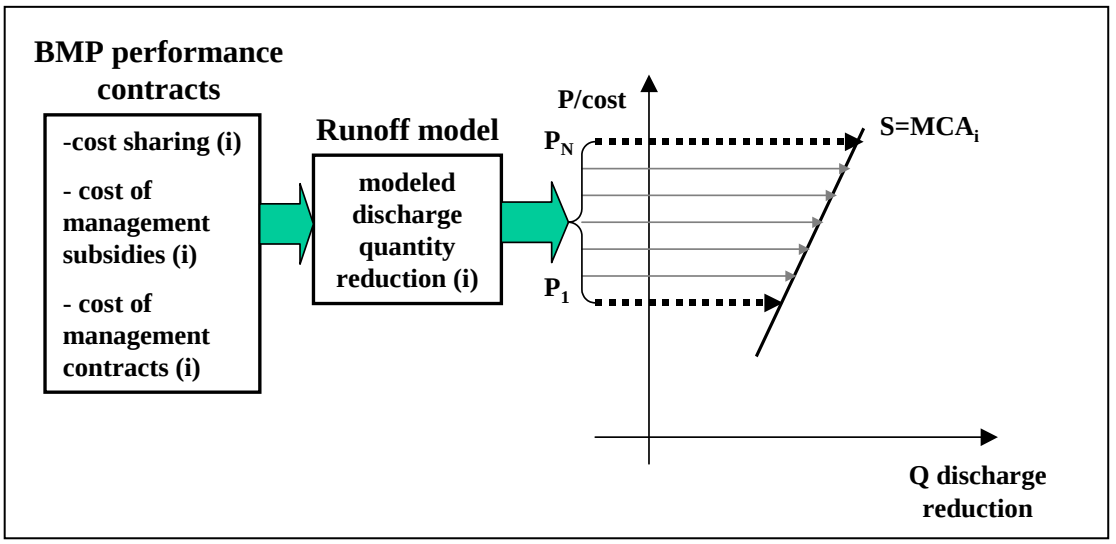

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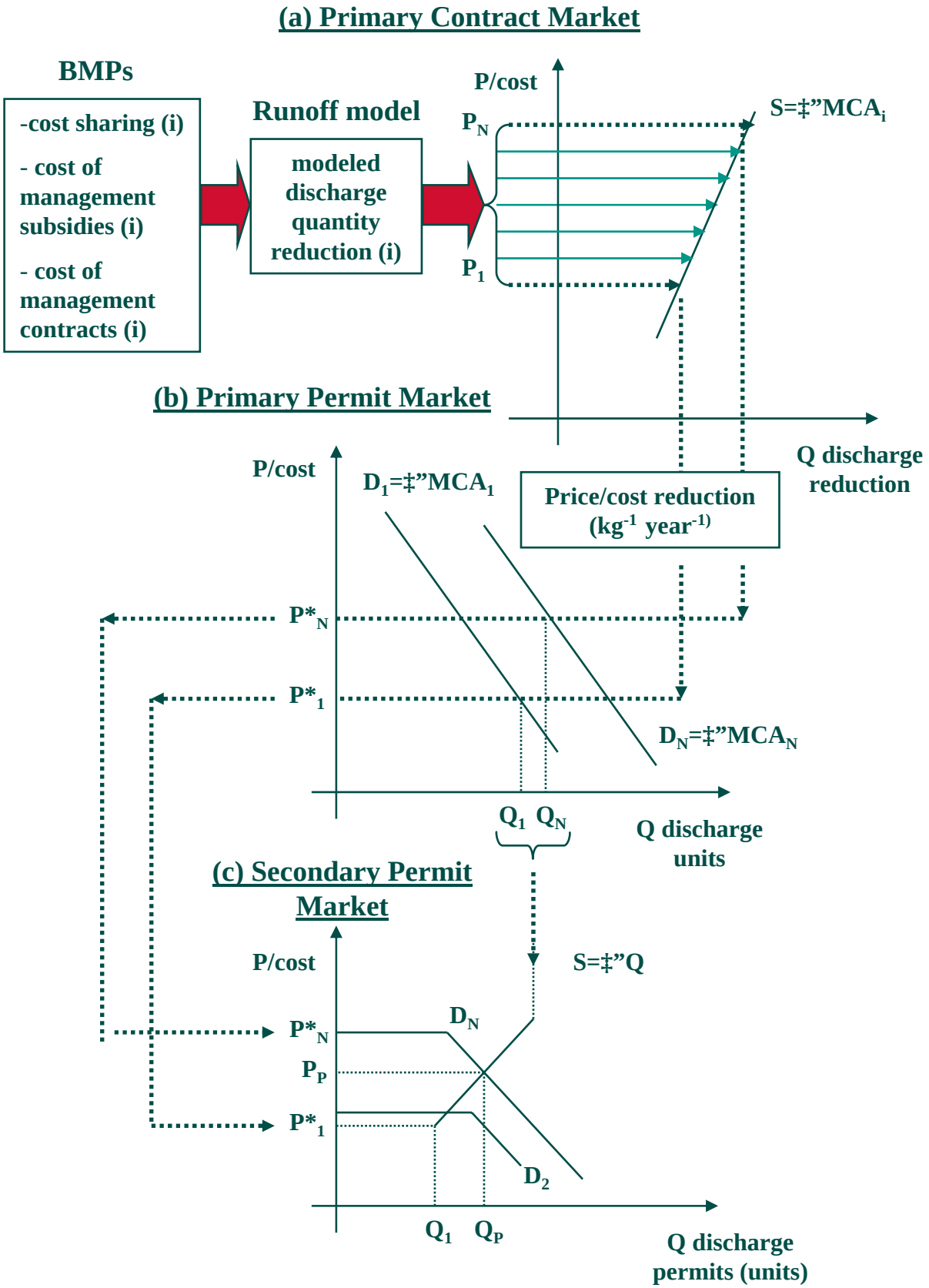

Discussion

- Spatial information should be incorporated into agri-environmental program reporting (database)
- Available information can be continually expanded and updated for use in deriving the supply curve
- Benefits of early cooperation between process modellers and policy analysts

Next steps

- Expanding the information in the abatement supply curve
  - Phosphorus loss BMPs and modelling!
  - Other BMP measures (wetlands, buffer strips)
  - Other modelling factors
  - Quantification of potential abatement
- Pilot study of the primary permit market, constraining dischargers
- Phase-in of the composite market scheme in a pilot area

Water Quality Trading Information sources

- 2nd National Water Quality Trading Conference, May 23-25, 2006 Pittsburgh PA USA
  http://www.farmfoundation.org/projects/06-30WQTHomepageTWO.htm
- Environmental Trading Network
  http://www.envtn.org/index.htm
- US EPA Water Quality Trading News
  http://www.envtn.org/WQT_EPA/Trading%20Newsletter%20August%202006.pdf