

Roadmap



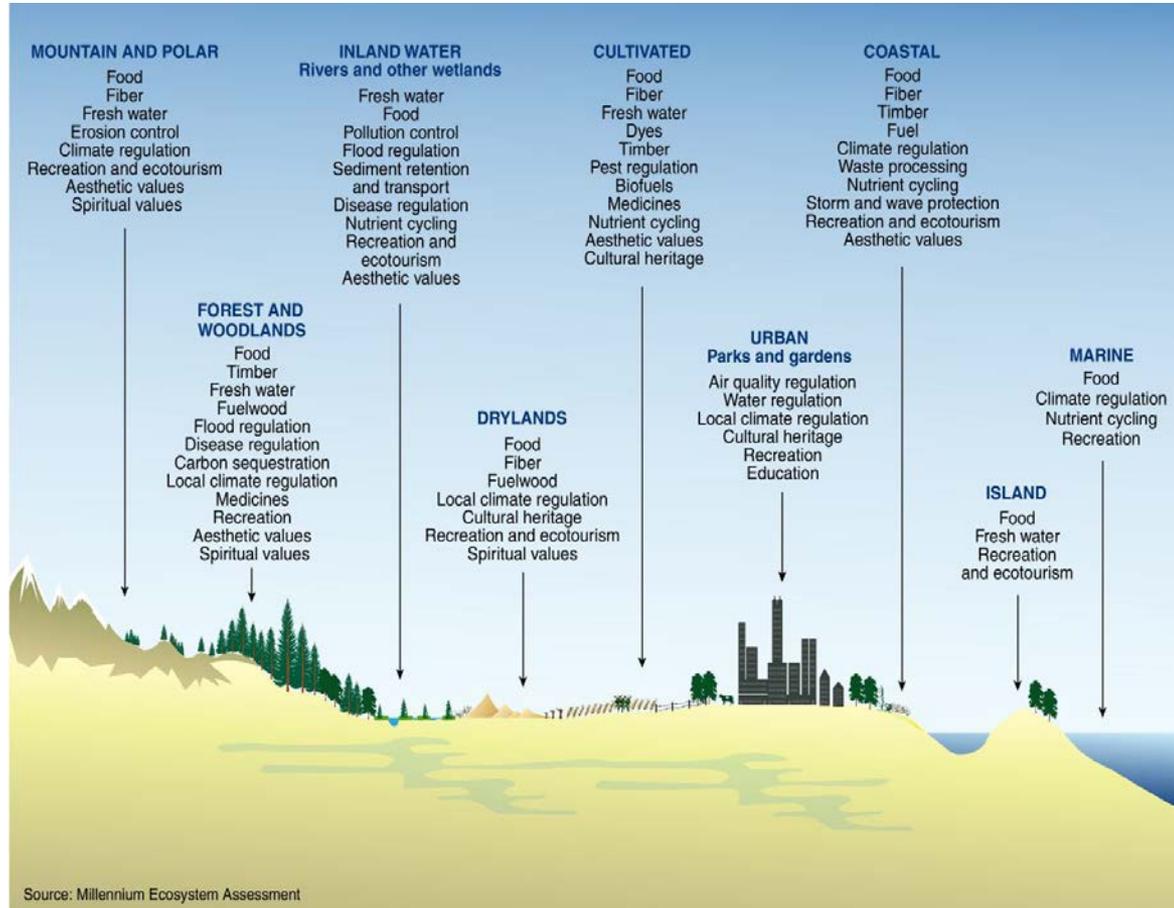
- Ecosystem services
- PES
- VT: key design elements
- VT; proposed design
- Final thoughts

Ecosystem Services

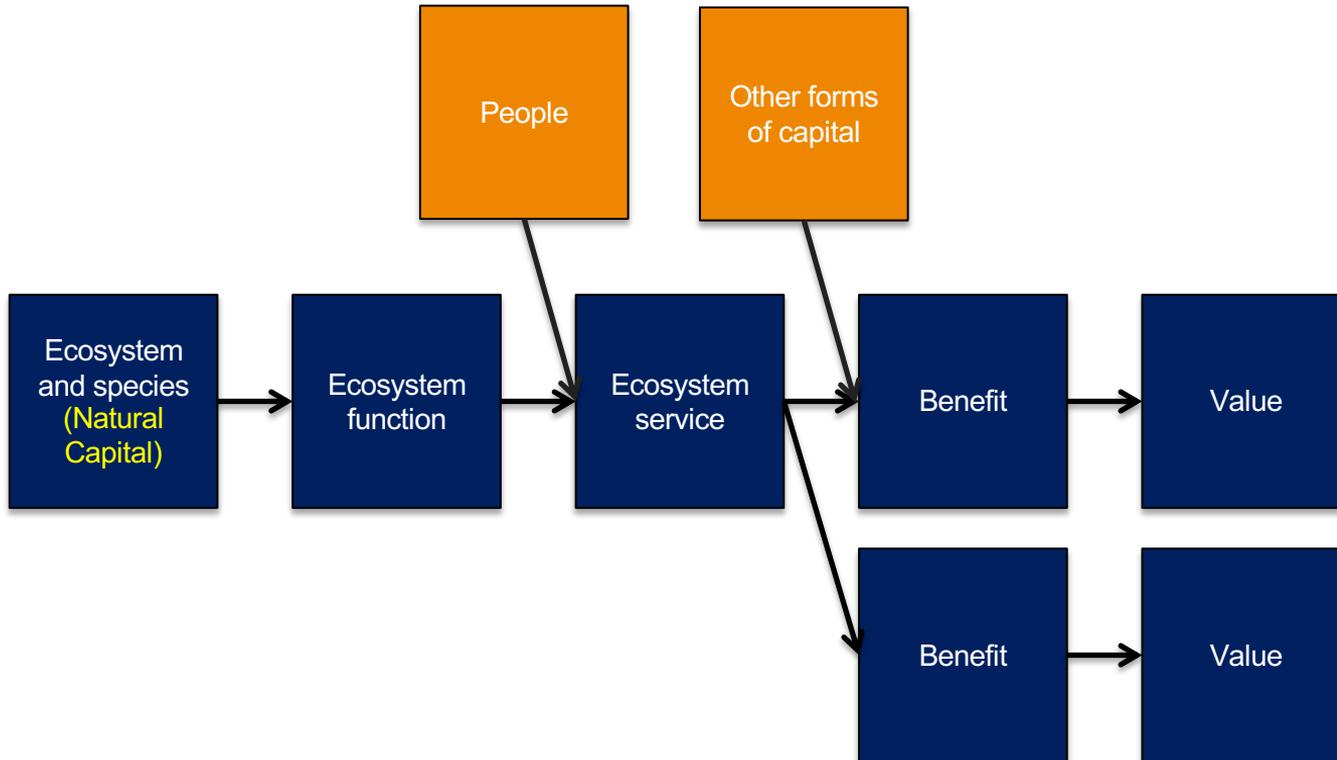
The conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life (Daily 1997)



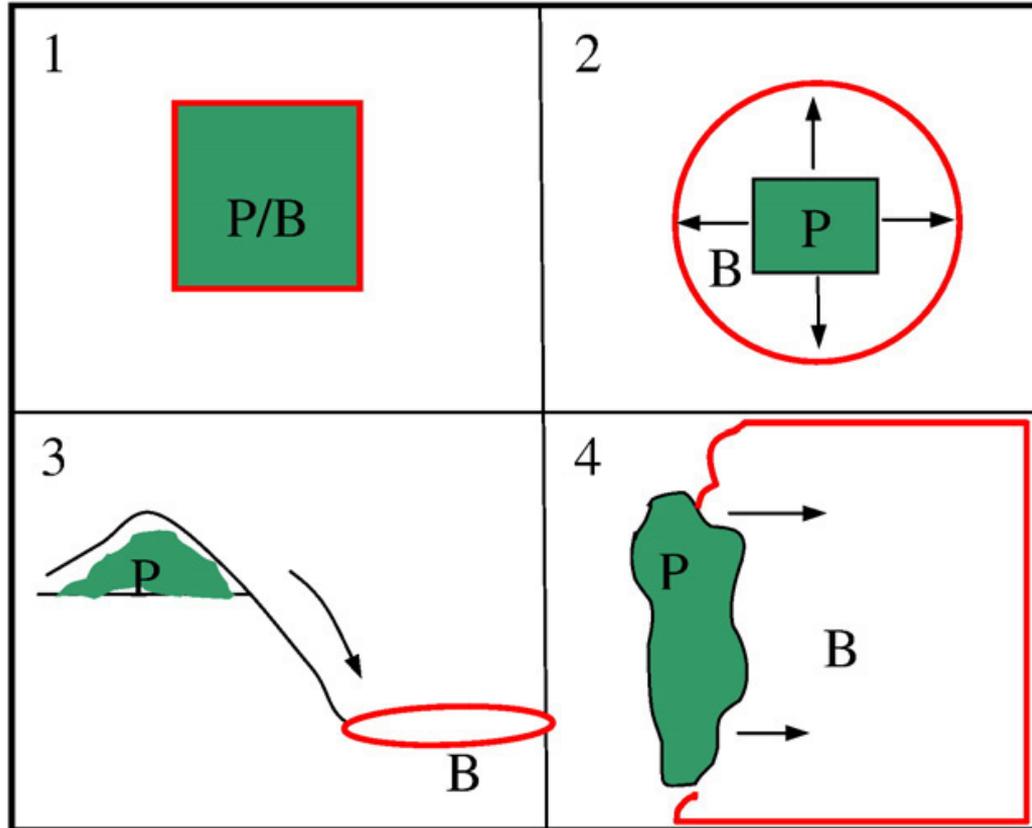
Ecosystem services supplied by...



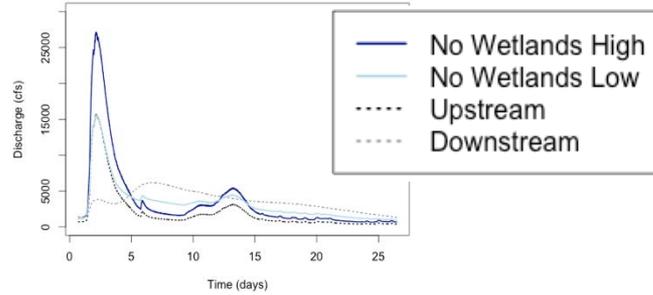
Linking the concepts



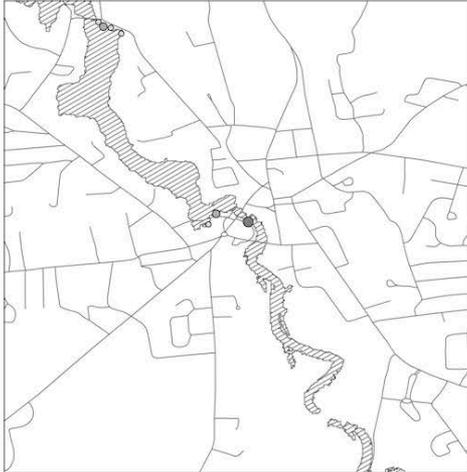
Flow of benefits to people



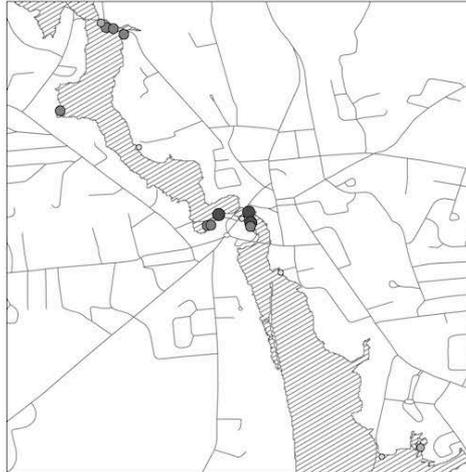
Flood control by wetlands/floodplains



Wetlands



No Wetlands Low

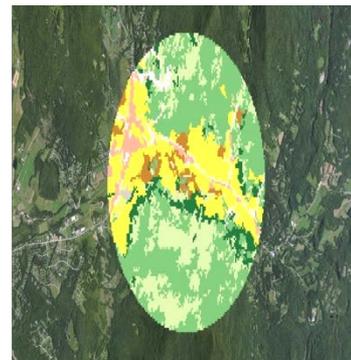
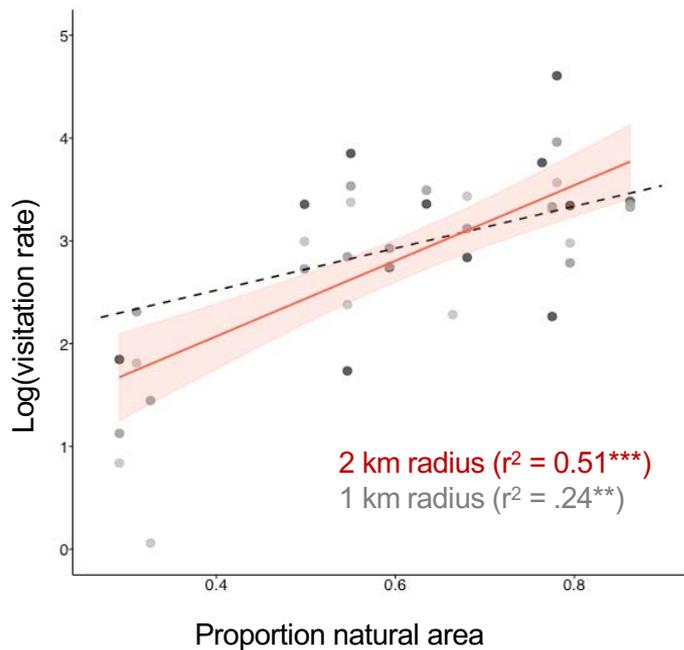


No Wetlands High



Middlebury, VT
Hurricane Irene

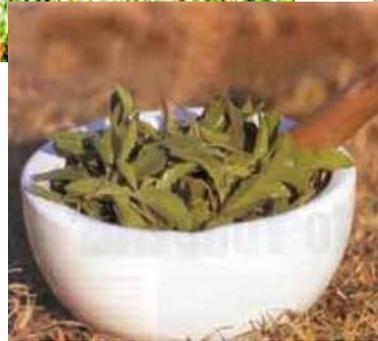
Natural areas supply bees to VT farms



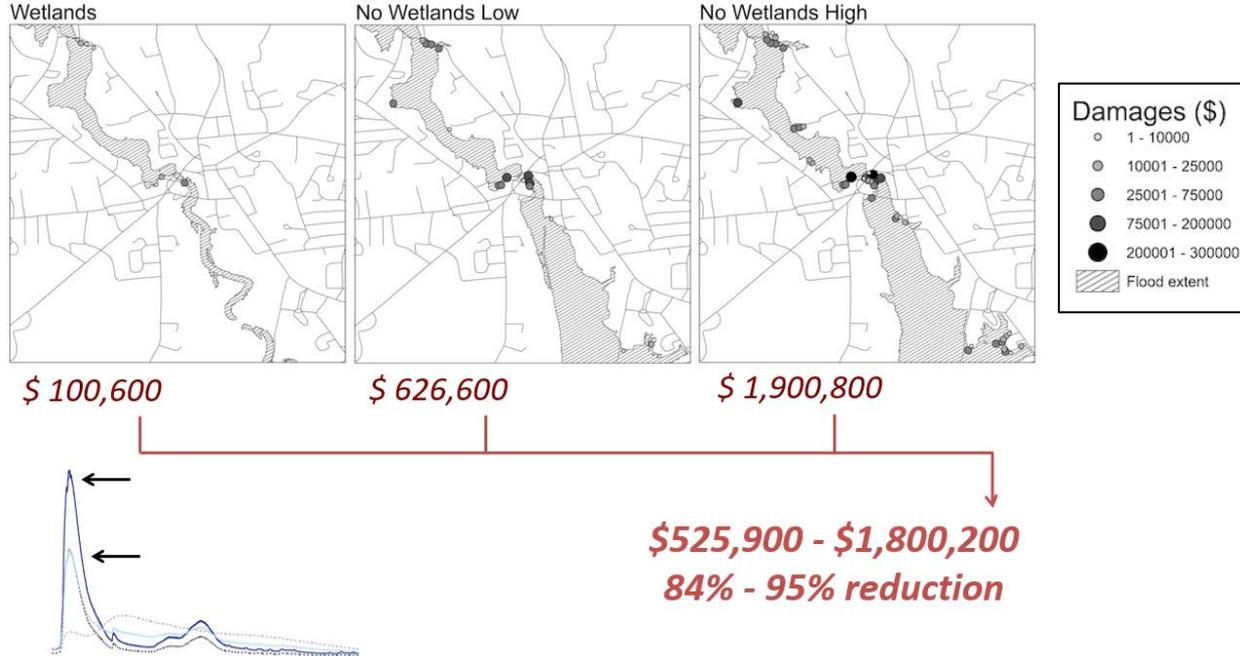
Valuation

Measuring the magnitude of the benefit. What's it worth?

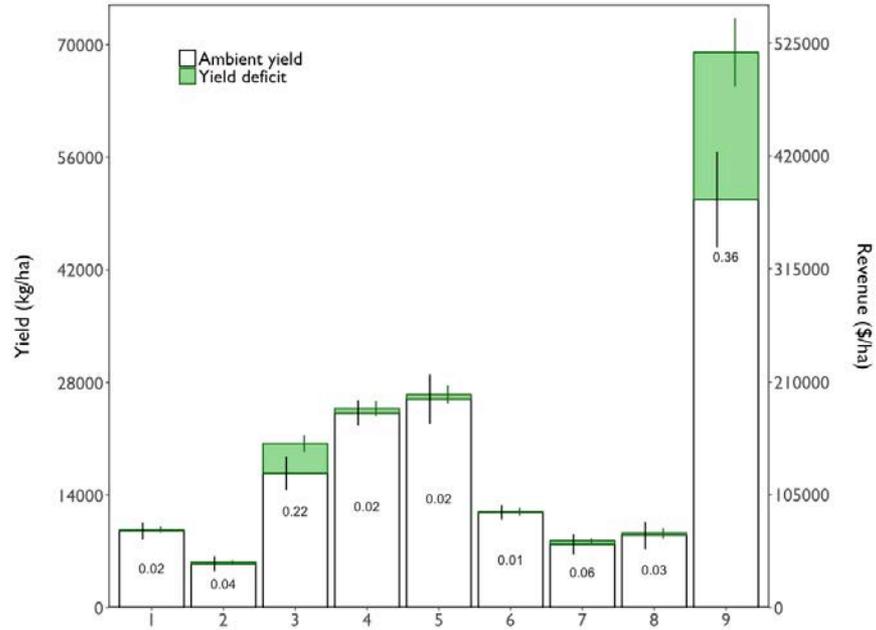
Not always measured in money.



Middlebury - economic damages



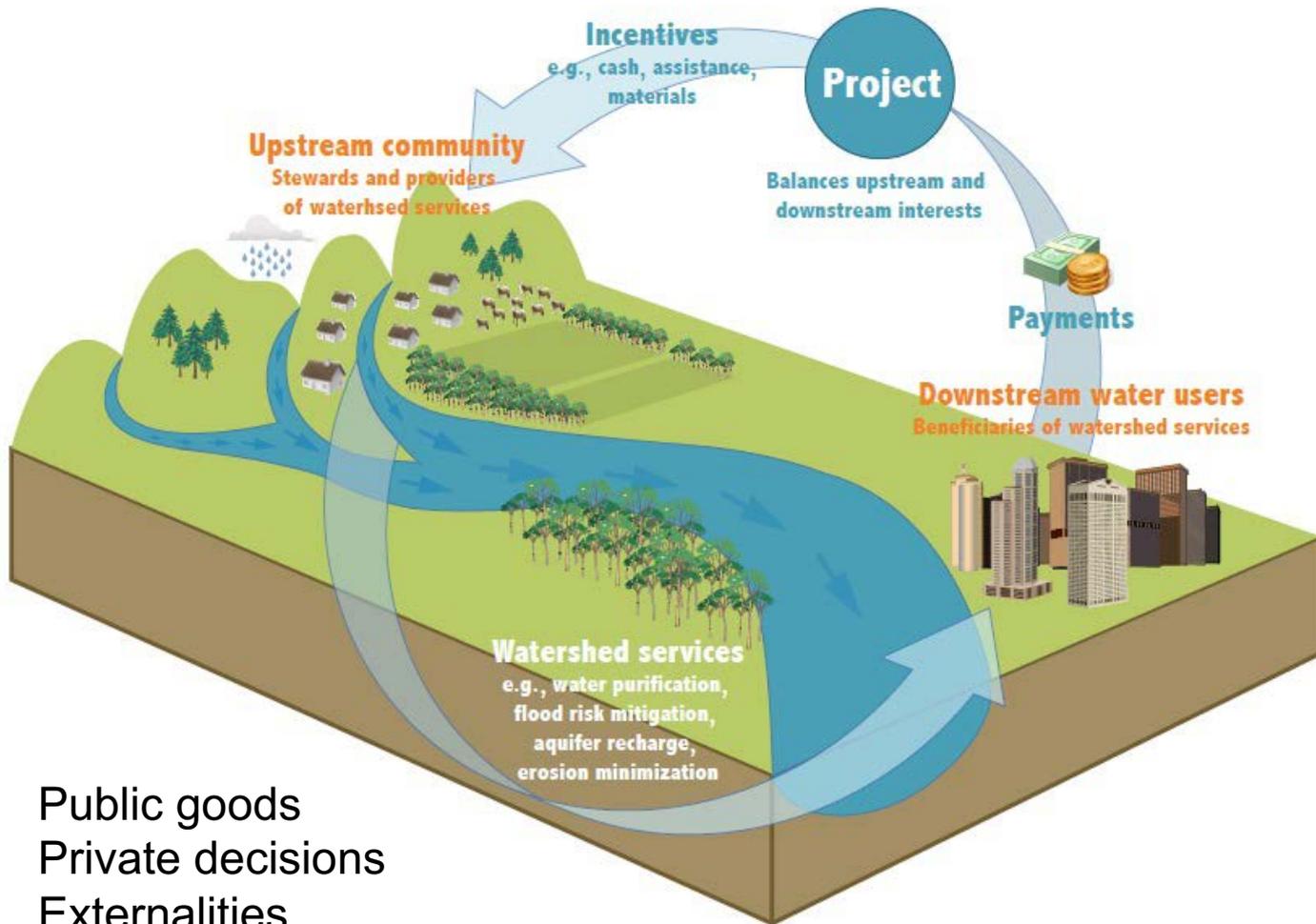
Pollinators – economic value



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Public goods
Private decisions
Externalities

Why PES?

- Ecosystem Services are often **Public Goods**
 - Markets don't effectively provide them
- How to ensure or enhance public goods?
 - **Regulation**
 - Landowners as potential polluters
 - **Incentives**
 - Farmers as stewards

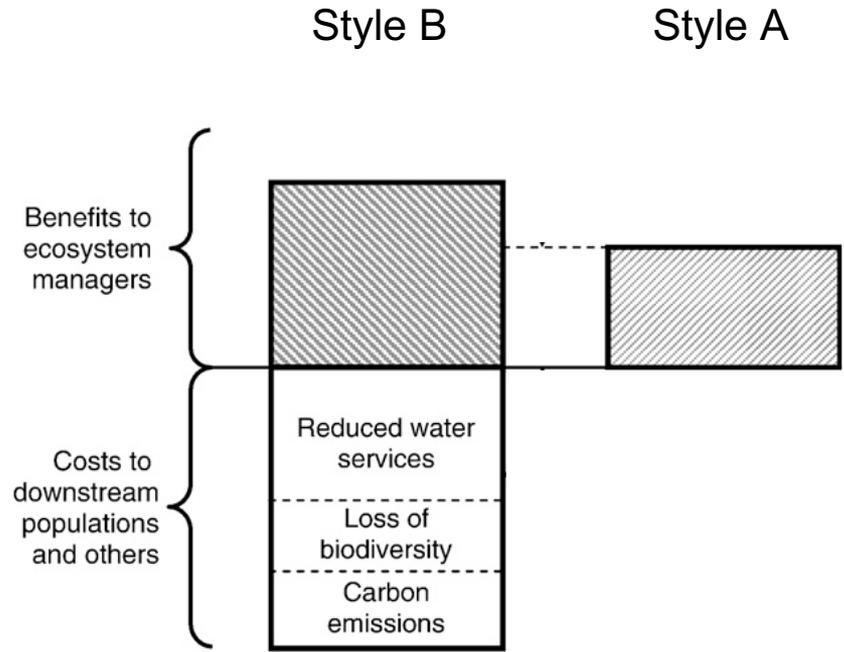


Fig. 1 – The logic of payments for environmental services. Source: Adapted from Pagiola and Platais (2007).

PES: A Formal Definition

1. A *voluntary* transaction where
2. a *well-defined* ES (or a land-use likely to secure that service)
3. is being 'bought' by at least one ES *buyer*
4. from at least one ES *provider*
5. if and only if the ES provider secures ES provision (*conditionality*)

Figure 1. The Northern Everglades



Northern Everglades PES Program

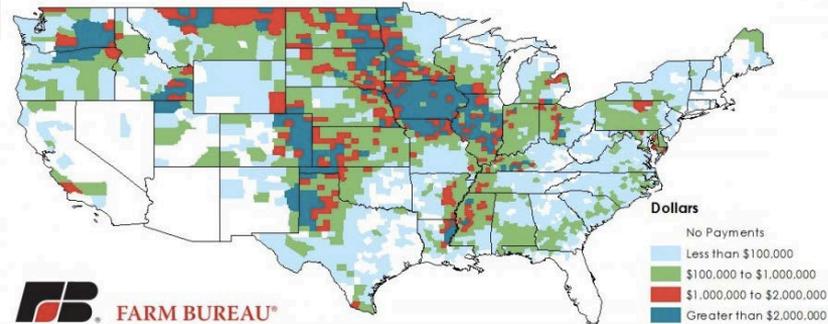


Rancher Jimmy Wohl inspects a berm and culverts with riser boards installed to retain water at Rafter T. Credit: E. Boughton/MAERC.

Conservation Reserve Program



Figure 4. Conservation Reserve Program Outlays
2016 Fiscal Year
U.S. \$1.7 Billion



The global status and trends of Payments for Ecosystem Services

James Salzman^{1,2*}, Genevieve Bennett³, Nathaniel Carroll³, Allie Goldstein³ and Michael Jenkins³

PAY-FOR-PERFORMANCE CONSERVATION: A HOW-TO GUIDE

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Key design questions to answer

1. What are the goals of the program?
2. What ecosystem services will be involved?
3. How will we measure them? Practice or performance?
4. Who gets paid and how much?
5. Who pays?
6. Who will administer the program
7. How do we balance fairness and efficiency?

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Payment for Ecosystem Services Proposal for VT

Jesse Gourevitch, Katie Horner, Eva Kinnebrew, Becky Maden, Eric Recchia, Adrian Wiegman, & Alissa White
Instructors: Taylor Ricketts, Eric Roy, & Courtney Hammond Wagner



Illustration and discussion purposes



The University of Vermont

1. Goals

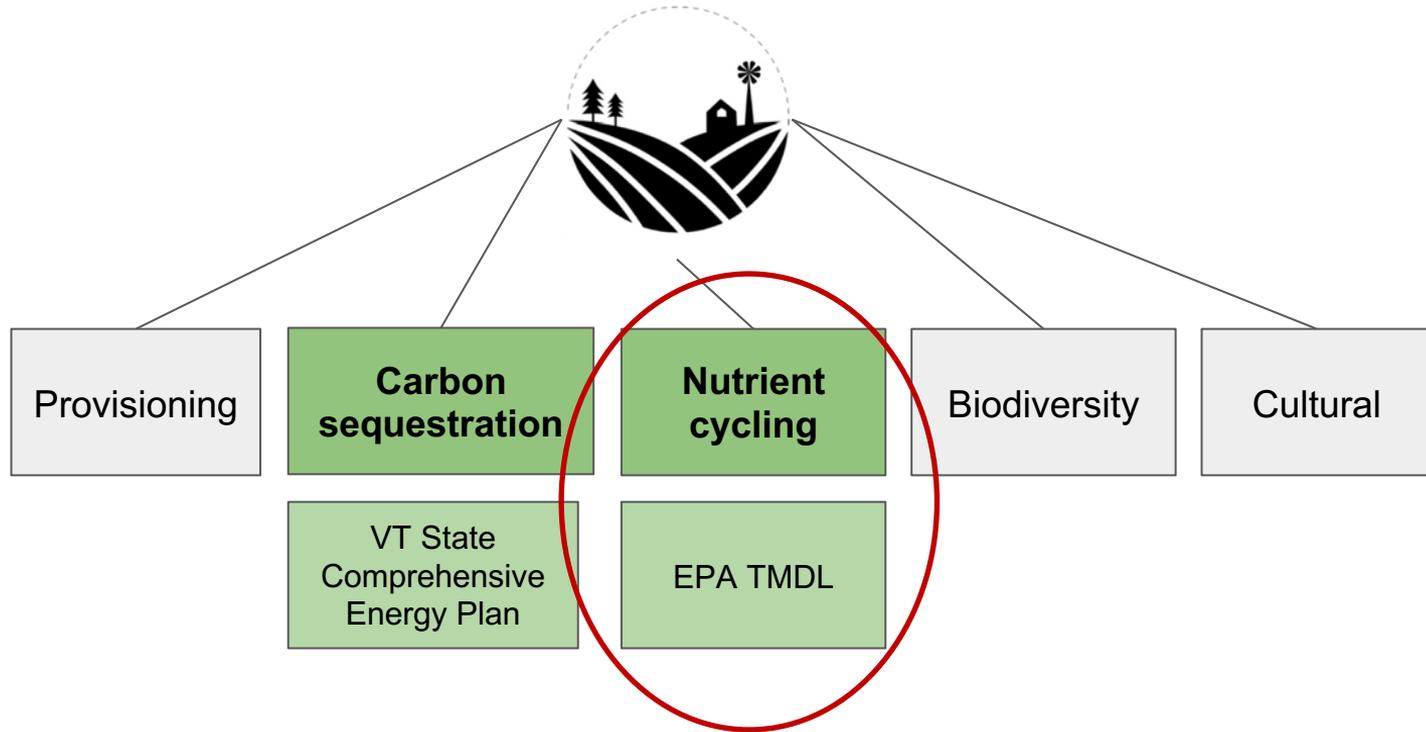
Measured contributions to environmental goals

Enhanced farm viability & public trust

Voluntary & equitable participation

Innovative & sustainable agriculture

2. Services: P retention and C sequestration



3. How to measure

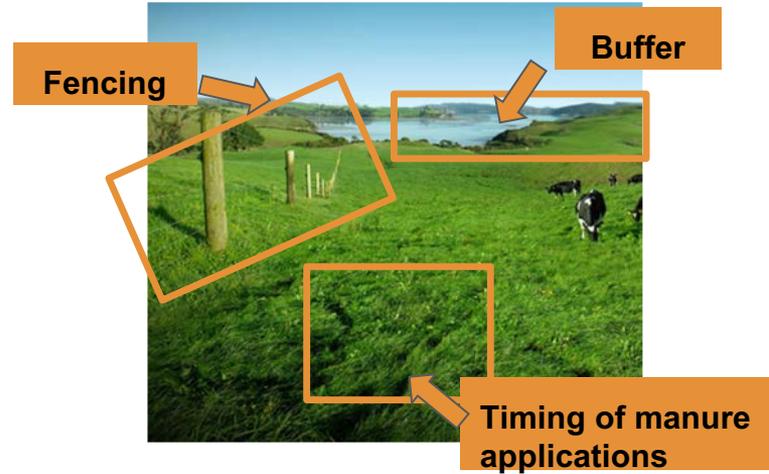
Performance, not practice

1. Focus on outcomes
2. Encourages innovation
3. RAPs already exist
4. Uncertain effectiveness of practice-based.

The Risks

1. Complicated
2. Costs of measurement
3. Practices may not work

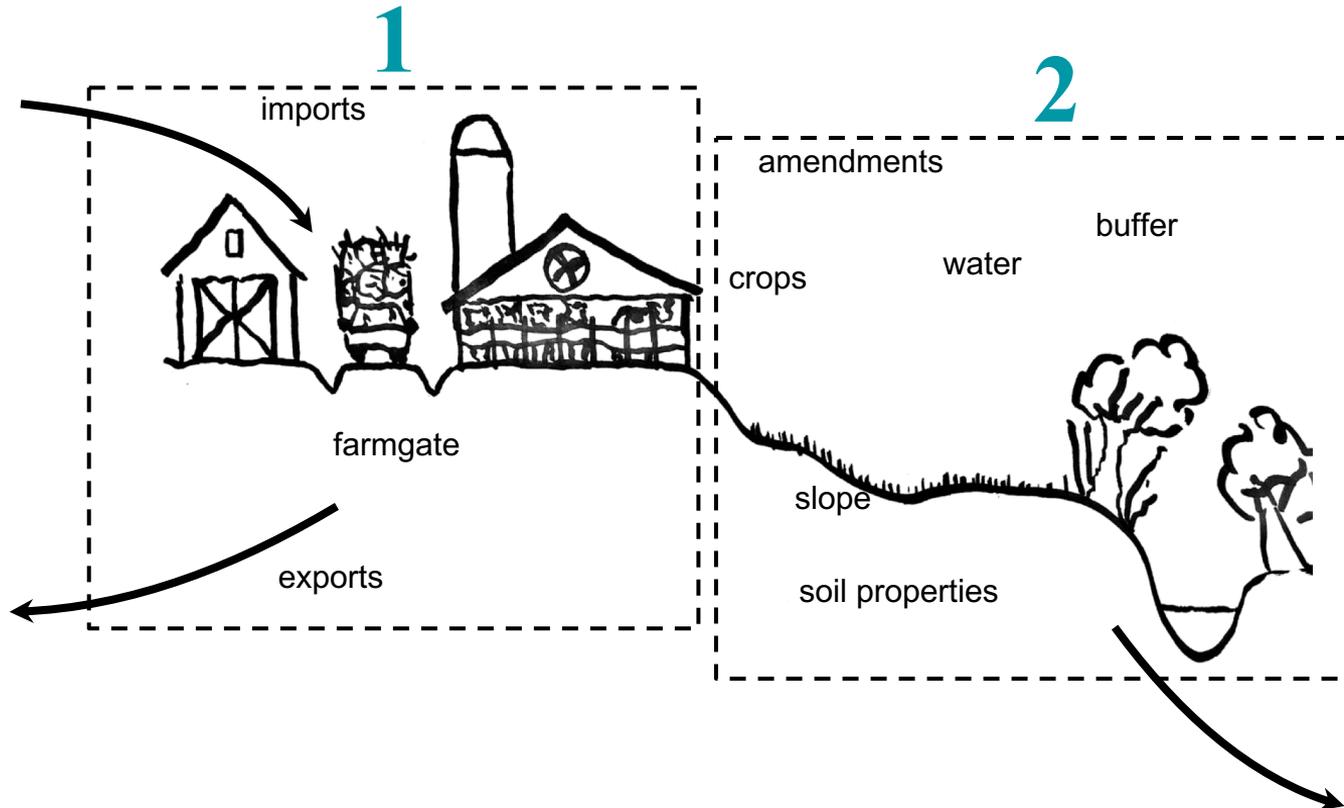
Practice-based



Performance-based



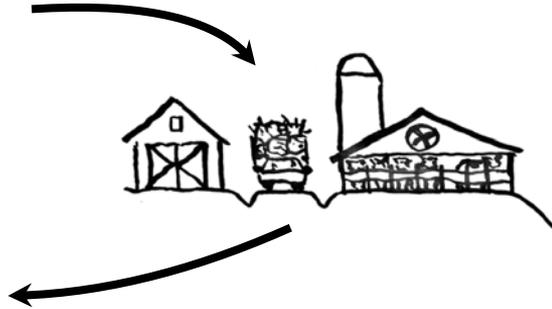
What would we measure?



How would we measure it?

Whole-Farm Nutrient Balance^[1]

- Mass surplus or deficit of P on farms
- Affected by farm management changes
- Targets the root cause of watershed eutrophication



Vermont P Index^[2]

- Risk of P loss to waterways from fields
- Affected by biophysical changes to fields
- Targets the symptoms of watershed eutrophication



(Existing data, supported by extension)

[1] Cornell University <http://nmsp.cals.cornell.edu/NYOnFarmResearchPartnership/MassBalances.html>

[2] UVM Extension <https://www.uvm.edu/extension/agriculture/vermont-phosphorous-index>

4. Who would get paid and how much?

Average payment to farmers (\$ / lb P / year)

- \$10 - \$100 (PfP, Newtrient, NRCS)

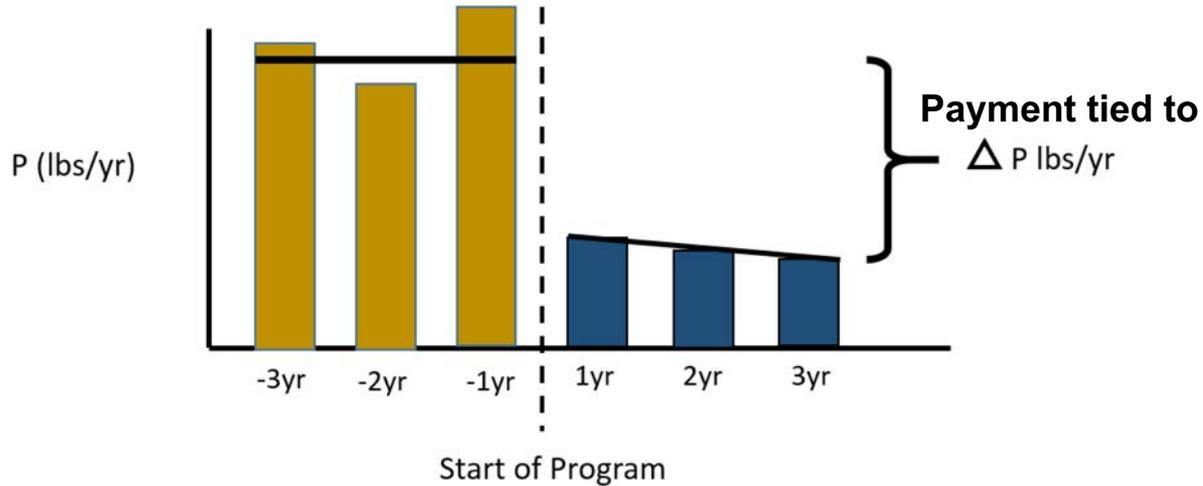
Payments:

- Differentiated - based on **farm size** and **farm location**
- Upfront payment to incentivize enrollment
- Annual payments based on performance

Rationale:

- Accounts for larger abatement costs often faced by smaller farms
- Incentivizes enrollment within high-priority sub-watersheds

Paying for improvements (additionality)



***Note: Must be compliant with RAPs in order to be eligible ***

5. Who pays?



Two options to finance PES:

- Public funded
- User funded

Public Funded PES

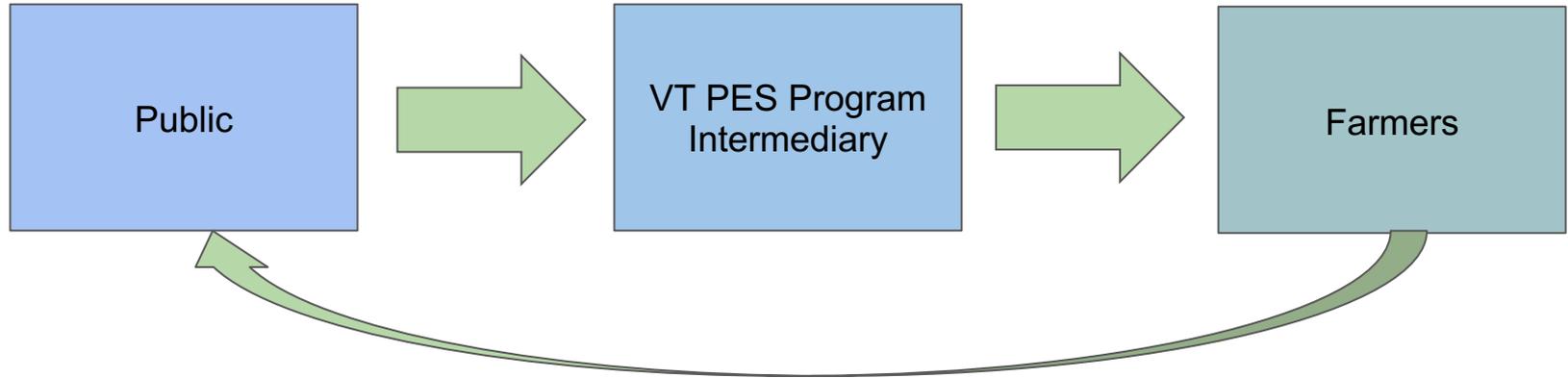
Option 1 - Reallocate current funding sources

- *Question:* Cost effectiveness of PES vs. other existing programs in reducing P

Option 2 - Expand funding sources

- *Question:* Political feasibility of expanding funding source (e.g. new tax?)

6. Who would administer the program?



Intermediary characteristics:

- Trusted by all stakeholders (farmers, policy, advisors, public)
- Experience in administering conservation incentives

Empower existing organization

- Crowded Field
- Need to complement existing work
- Potential options: Vermont Housing and Conservation Board, the Vermont Land Trust, NRCS

7. Balancing fairness and efficiency

- Central trade-off
 - Reward good past behavior
 - Maximize environmental improvements
- Equity actually improves efficiency
 - Participation, support, legitimacy
- Key levers:
 - Differentiated payments
 - Baselines

Final thoughts

- Farmers provide many ecosystem services
 - Food, habitat, water storage and purification, aesthetics
- PES promising option
 - Externality that needs fixing
 - Pay landowners to reduce runoff, avoid P loading, store C
- Doesn't work everywhere
 - Careful design
 - Usually needs regulation to get started
- Good models, opportunity for VT to be another