

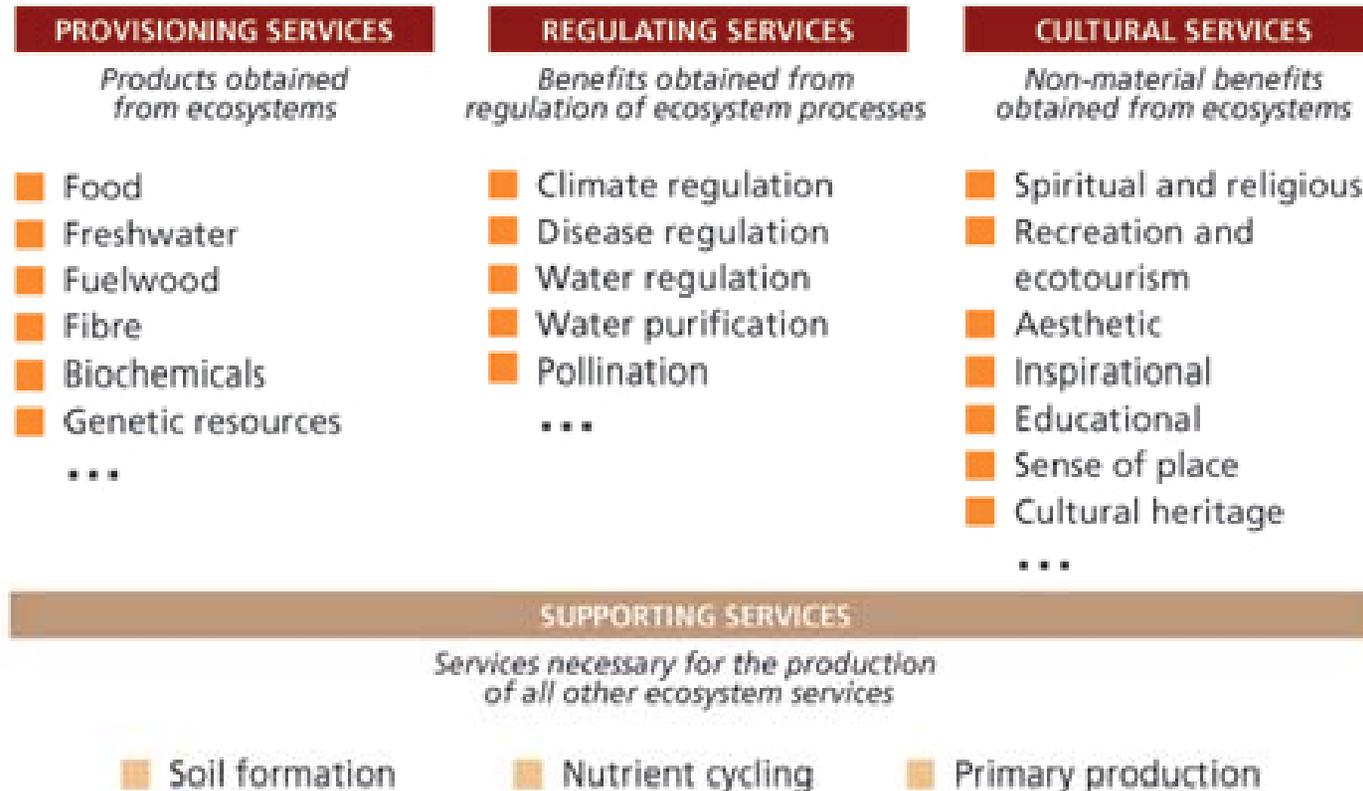
Using ecosystem service models to assess land use impacts and land use options



The Nature Conservancy



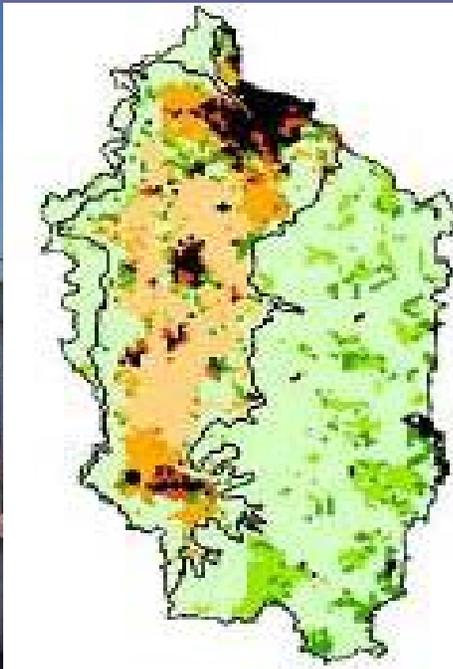
Millennium Ecosystem Assessment Ecosystem Service Categories



LIFE ON EARTH – BIODIVERSITY

Ecosystem Services Applications

- Payments for Ecosystem Services (PES)
- Planning
- Trade-off analysis



Types of Ecosystem Services Tools

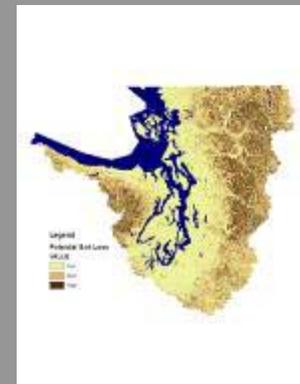
Guidance



Screening



Mapping / valuation



Guidance Tools

- Ecosystem Services: A guide for decision-makers (WRI)
- Getting Started: An introductory primer to assessing and developing payments for ecosystem services (Katoomba Group)
- Nature's Services (RAND)
- Pay: establishing payments for watershed services & Value : counting ecosystems as water infrastructure (IUCN)
- Ecosystem Valuation (USDA & NOAA)

TNC / NatCap Screening Tool

Framework for Assessing the Viability of an Ecosystem Service Approach to Conservation: The Top 10 Screening Criteria

Setting	Criteria	Best-case	Some questions to consider
Delivery of services and conservation	1. Service delivery	<ul style="list-style-type: none"> Clear evidence that feasible actions will increase services Minimum time from actions to delivery Delivery where demanded Low variability in delivery 	<ul style="list-style-type: none"> Is there clear evidence of a cause-effect relationship between proposed actions and service delivery? What are the current conditions and trends in service delivery? How long will it take for the intervention to result in service delivery? Will the services be delivered where they are demanded? Are there unacceptable trade-offs within/among services?
	2. Measurability of service	<ul style="list-style-type: none"> Clear units Accurate/cost-effective measurement 	<ul style="list-style-type: none"> How accurately & cost-effectively can changes in the production of services be measured? Can the measurement be influenced by other factors? Is there a clear unit (e.g., ton CO₂ equivalent, nutrient credit) that adequately captures the attributes of the service delivered? If it is not possible to measure service delivery, can a closely linked activity be easily measured as a proxy?
	3. Conservation delivery	<ul style="list-style-type: none"> Contributes to conservation 	<ul style="list-style-type: none"> Would proposed actions both increase services <i>and</i> advance conservation goals? Does the approach entail a proven effective conservation strategy?
	4. Scalable and replicable	<ul style="list-style-type: none"> Supports conservation at scale 	<ul style="list-style-type: none"> Will the proposed ES strategy deliver conservation benefits at scale? Is the approach likely to be replicable? If so, within what spatial area (e.g. same basin, region wide, globally)?
	5. Superior to alternatives	<ul style="list-style-type: none"> ES strategy is best available option compared to both technological substitutes & alternative conservation approaches 	<ul style="list-style-type: none"> What are the possible alternatives to an ES-based strategy for delivering service benefits (e.g., infrastructure/technology)? Would other approaches (perhaps unrelated to conservation) produce service benefits more cost-effectively with less risk? Would other conservation approaches achieve conservation goals at less cost and risk?
Legal, institutional, social and economic conditions	6. Providers and beneficiaries	<ul style="list-style-type: none"> Providers and beneficiaries exist and are not widely dispersed Strong on-going demand with beneficiaries willing to pay 	<ul style="list-style-type: none"> Is there demand for services? How is it projected to change over time? Are there entities willing to pay for improvements in ES (public sector program, institution, or constituency, private sector market or buyer)? Are there many potential providers and beneficiaries? Are they concentrated in a particular area or dispersed?
	7. Benefits and costs	<ul style="list-style-type: none"> High value/important benefits with potential to translate into financial support for the project Costs not prohibitive Policy cost-effective for society and key stakeholders 	<ul style="list-style-type: none"> Would proposed actions produce <i>meaningful</i> service benefits (i.e., significant enough benefits to generate support/buyers for the actions)? What are the likely costs of proposed actions (implementation, monitoring, measurement, enforcement, transaction and opportunity costs)? Are costs potentially prohibitive (compared to expected benefits)? If so, could they be reduced without compromising the approach? Can ecosystem service benefits be translated into financial returns for providers?
	8. Legal context, institutional and field capacity	<ul style="list-style-type: none"> Strong legal/regulatory framework Supportive policies Clear property rights Strong institutions Sufficient field capacity to implement project 	<ul style="list-style-type: none"> Are there legal or regulatory drivers that support an ES approach (e.g., Clean Water Act)? Are management and use rights clear for the services? Are property rights clear for the areas where the service is sourced and delivered? Is resource use effectively governed by informal rules (not captured in the current legal and regulatory framework)? Are there strong existing institutions that could support the ES strategy? Is there sufficient institutional and field capacity to use an ES approach (funding, technical skills, leadership)? Would an intermediary coordinating mechanism be required to facilitate exchange? Could any existing organization potentially fill this role? Are there existing ES projects in the area? How successful have they been?
	9. Stakeholders, equity and political viability	<ul style="list-style-type: none"> Stakeholder support with local champion Participation by and trust among stakeholders No 'big losers'; poor made better off or compensated Approach is politically feasible; will not be blocked by adversely affected groups or powerful interests. Stakeholders support policies that enable ES approach 	<ul style="list-style-type: none"> Are key stakeholders likely to be supportive? Are there local champions for taking the ES approach forward? Is there public understanding and support for ES provision? Are people concerned about degradation of ecosystem services? Are there existing mechanisms for participation and conflict resolution that would be useful for an ES approach? Are there clear "winners and losers"? Are poor communities likely to be made better/worse off (both providers and non-providers of the service)? Would poor people be able to participate in the ES scheme? Is there political support/capital for solutions to preserve ES? Will the approach adversely affect the interests of politically influential stakeholders? Are stakeholders sufficiently supportive of current or additional required policies that are needed for an ES approach?
	10. Economic context	<ul style="list-style-type: none"> Sufficient budget available Current incentives favor ES approach Resilient to future changes in markets. 	<ul style="list-style-type: none"> Is there sufficient budget available to implement an ES approach? Are there existing subsidies or taxes that would undermine incentives to provide ES? Could an ES approach have secondary effects on prices, creating incentives that could undermine conservation? How would future predicted price changes affect the viability of the ES approach? Could other land uses soon become more financially attractive?

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Mapping and valuation tools

- Multiple services vs. single service
- Spatial vs. nonspatial
- Newer tools created explicitly for ES vs. adaptation of existing tools
- Intended for different users (technical vs. decision makers)
- Regional vs. site specific

The Natural Capital Project

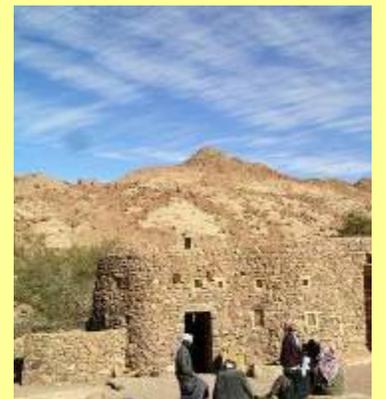


Integrated Valuation of Ecosystem Services and Tradeoffs

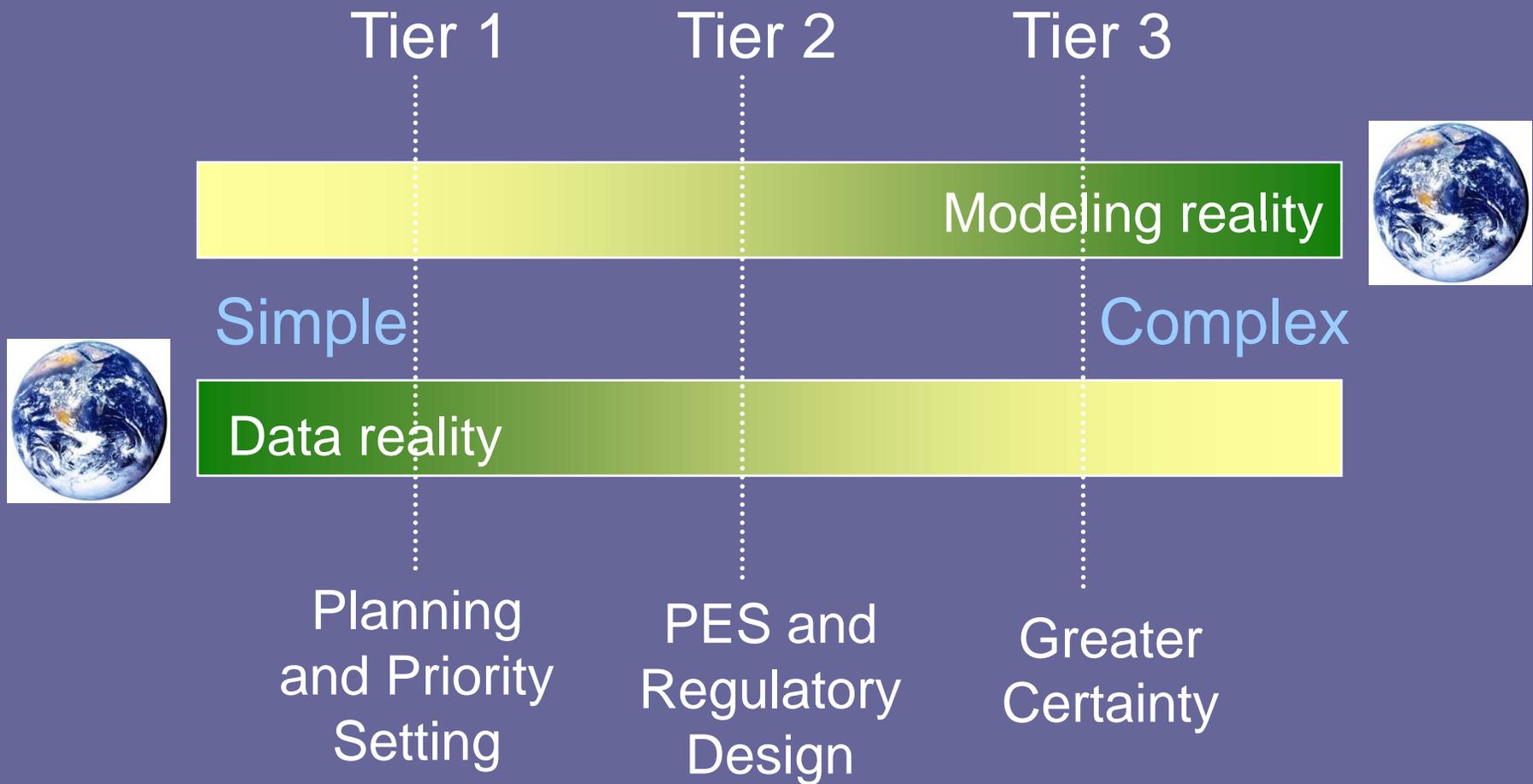
Heather Tallis, Steve Polasky, Erik Nelson, Guillermo Mendoza, Jim Regetz, Peter Kareiva, Taylor Ricketts, Gretchen Daily, Vic Adamowicz, Robin Naidoo, Eric Lonsdorf, Kai Chan, Rebecca Shaw, Dick Cameron, Neil Burgess, Andrew Balmford, Driss Ennaanay

InVEST: key features

- Biodiversity and Multiple services
- Biophysical or economic results
- Spatially explicit (mapped)
- Tiered design: simple or complex
- Driven by scenarios



Tiered Approach

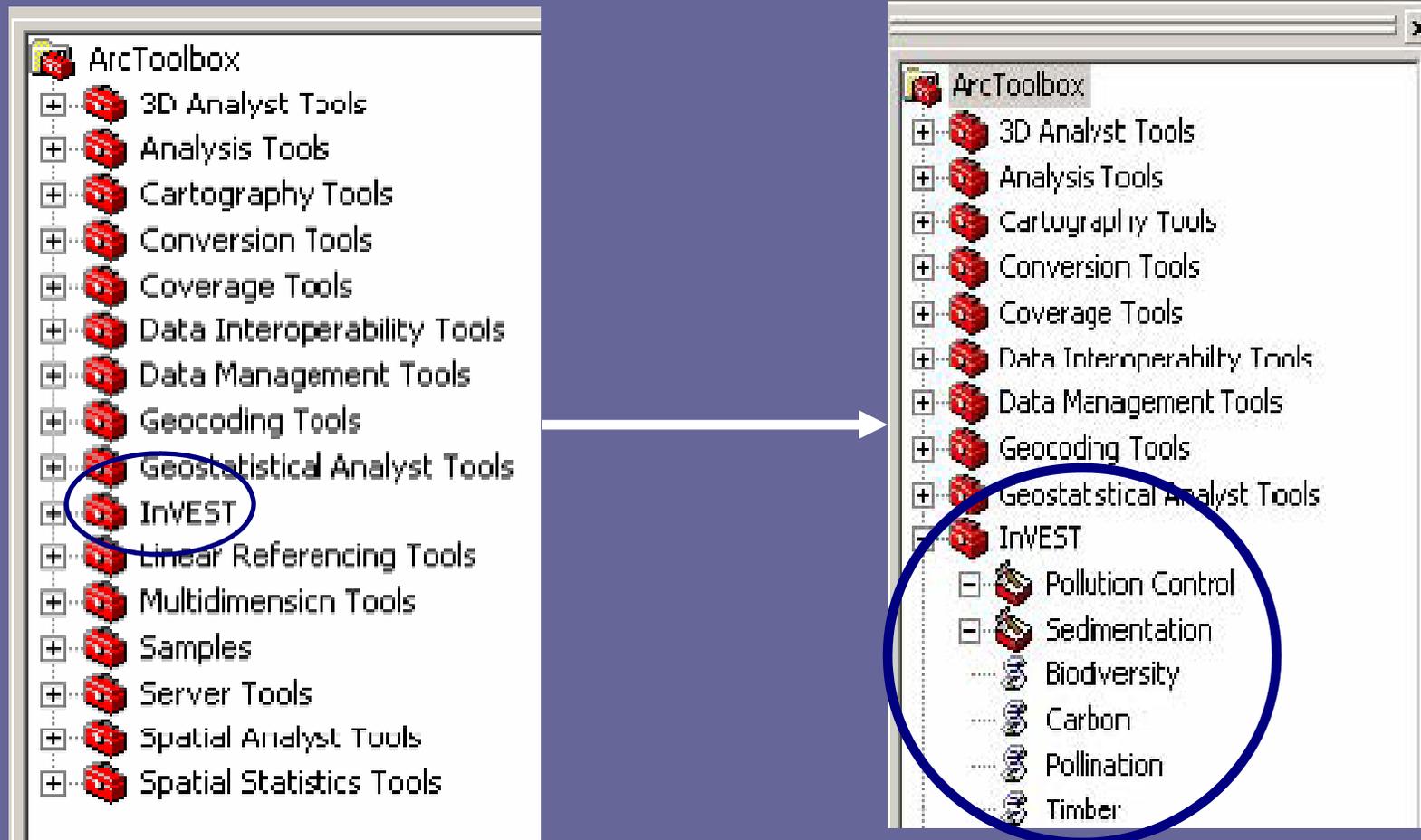


Available & Planned Models

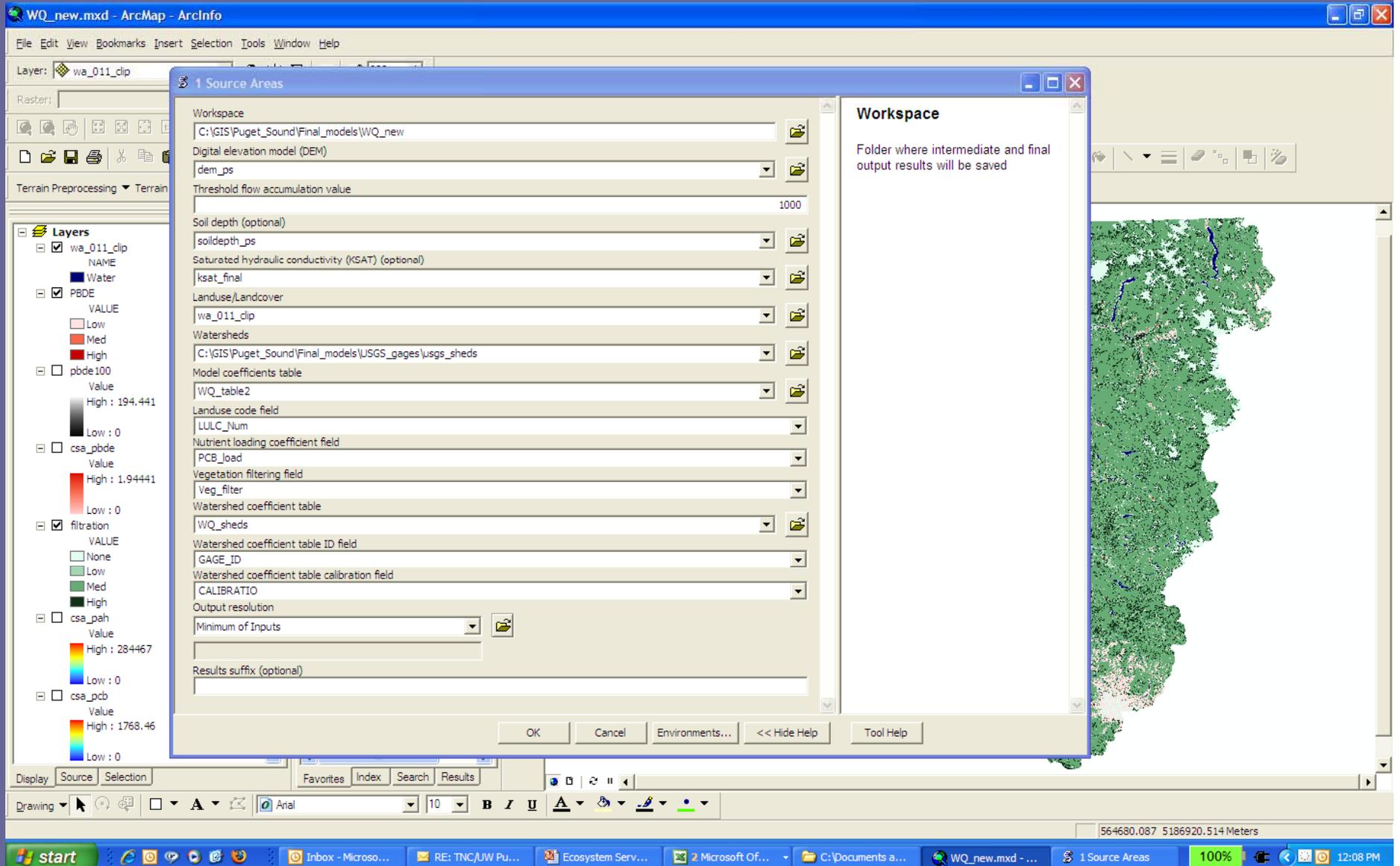
- Biodiversity
- Ecosystem services
 - Water retention
 - Sediment retention
 - Water pollution regulation
 - Hydropower
 - Carbon sequestration
 - Commercial timber production
 - Crop pollination
 - Flood control
 - Irrigation water
 - Non-timber forest products
 - Real estate value
 - Recreation and tourism
 - Cultural and aesthetic values
- Marine Services



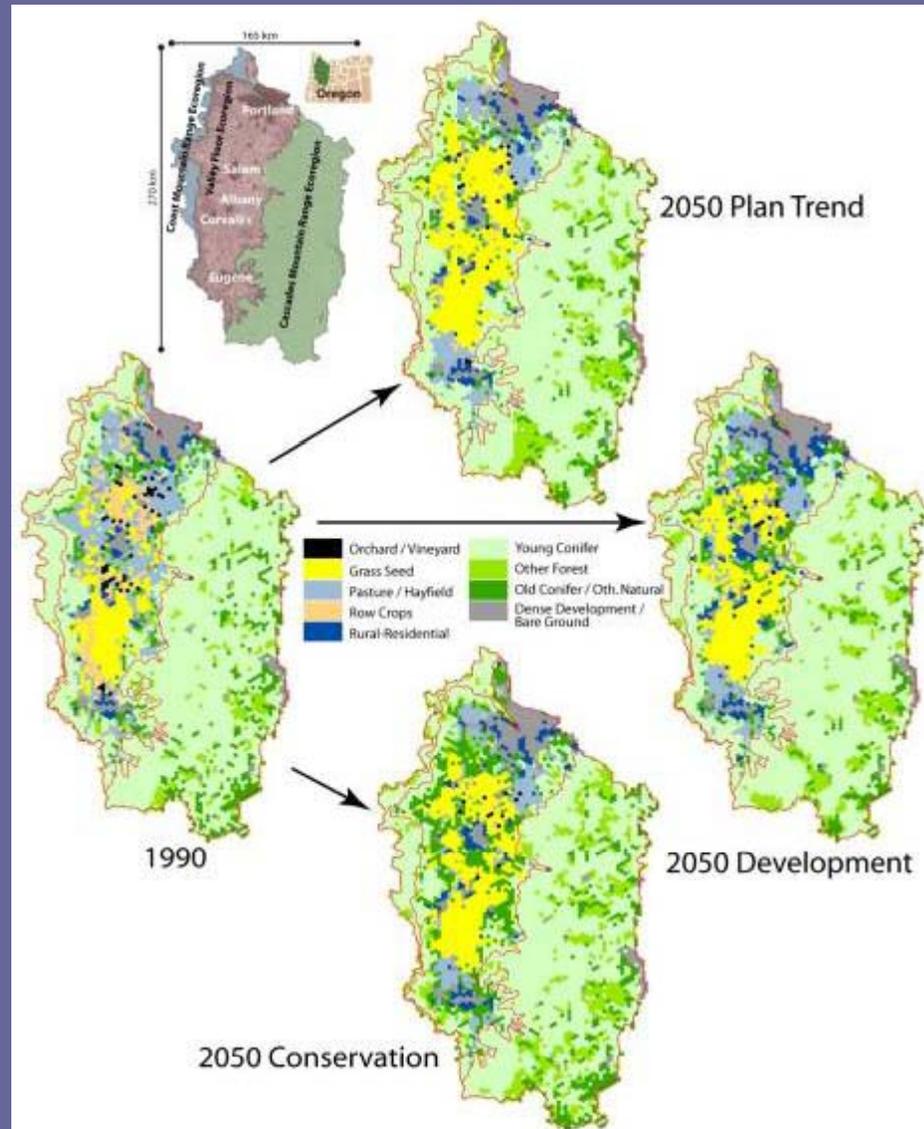
InVEST appears as a toolbox in ArcMap



Model Interface



Willamette Development Futures



Outputs

Change Maps 1990-2050

Water Quality

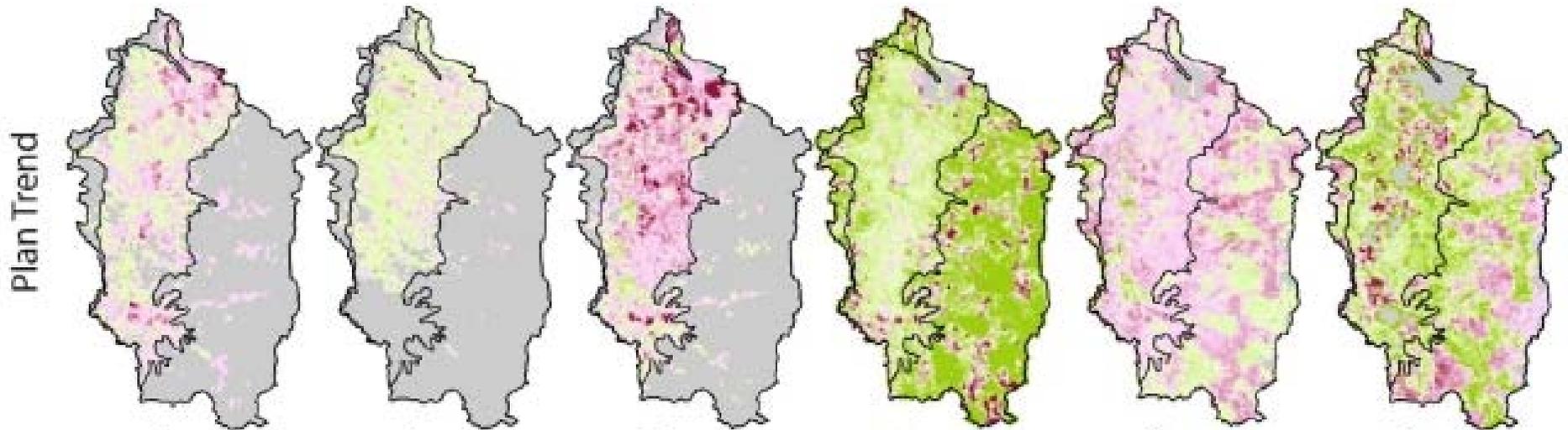
Potential Soil
Conservation

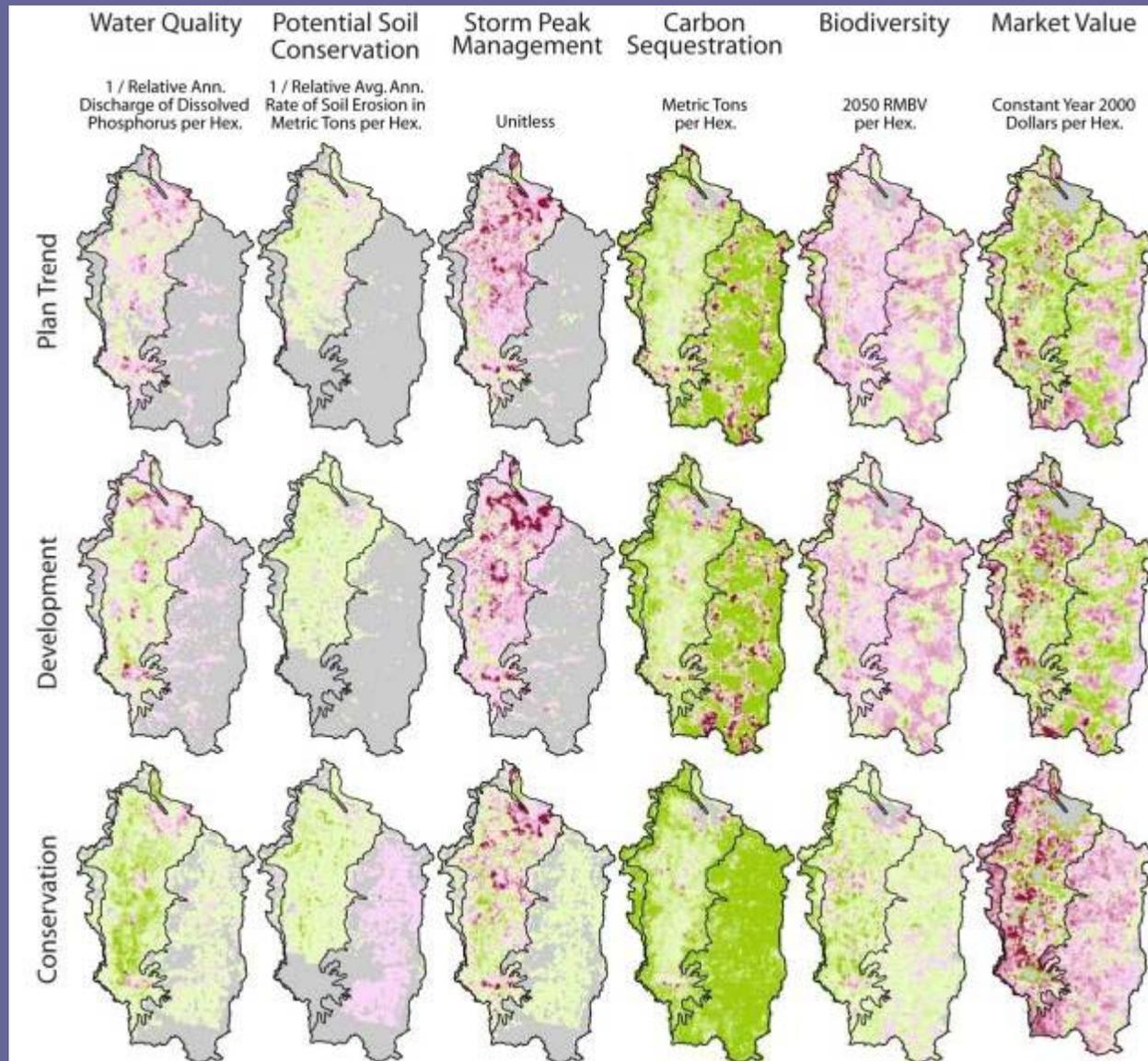
Storm Peak
Management

Carbon
Sequestration

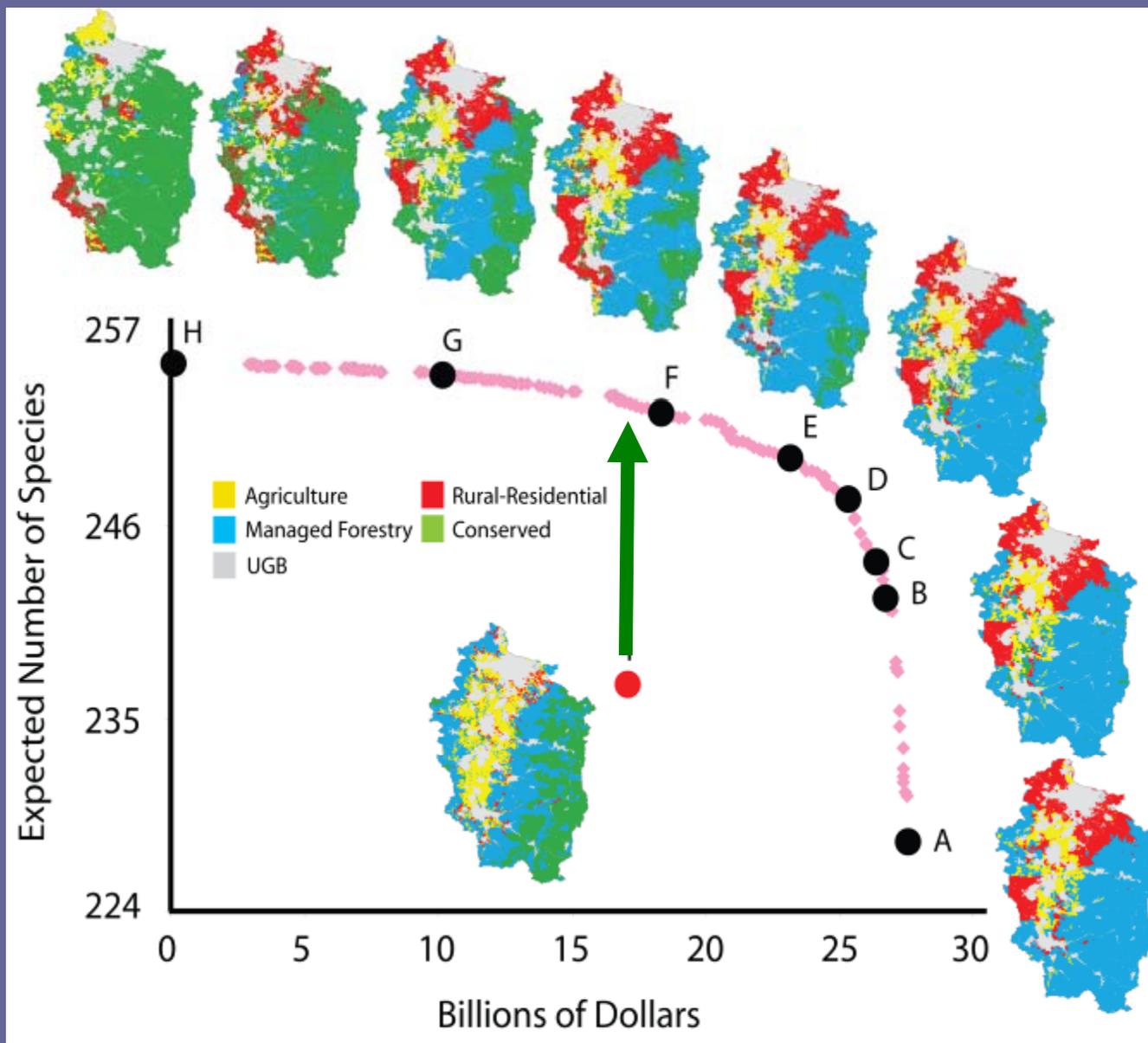
Biodiversity

Market Value





Biodiversity and Commodities



InVEST and NRDAR

- Ecosystem service loss
 - Spatial extent
 - Valuation
- Compare restoration scenarios
- Monitoring
- Other applications..

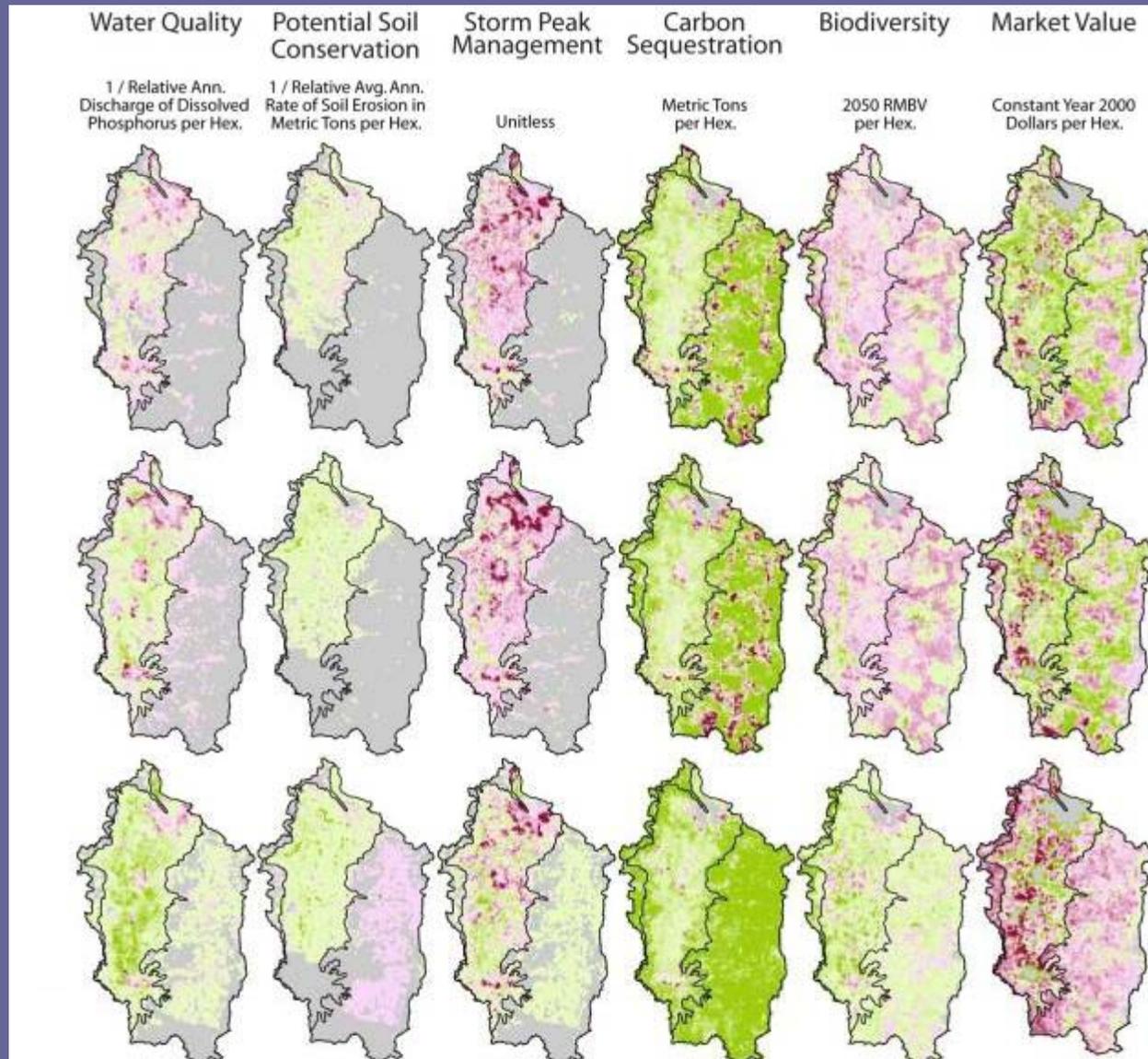


Restoration Options

1

2

3



Questions?

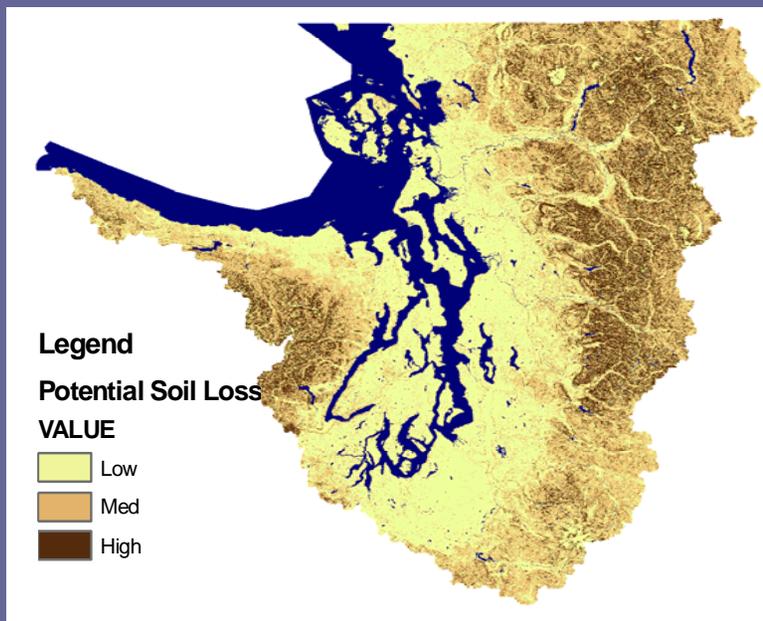


Kari Vigerstøl

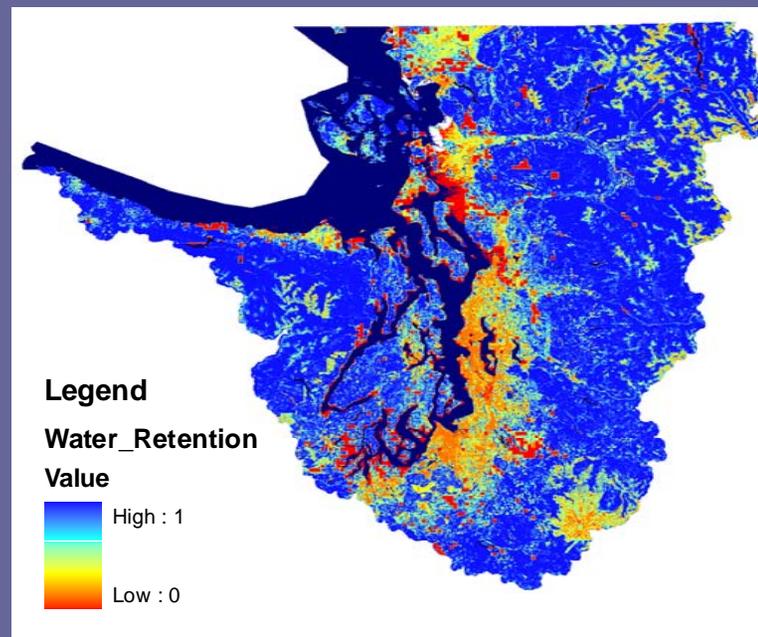
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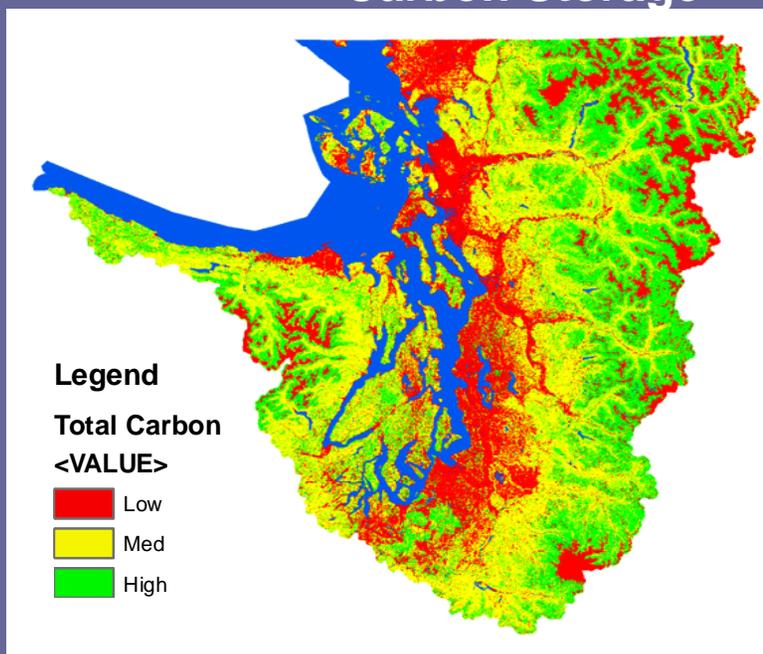
Sediment Retention



Water Retention



Carbon Storage



Water Filtration

