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2008

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SLIDES: Protecting Biodiversity Through Ecosystem Services

Barton "Buzz" Thompson

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Protecting Biodiversity Through Ecosystem Services

Buzz Thompson

**Perry L. McCarty Director, Woods Institute for the
Environment at Stanford University**

**Robert Paradise Professor of Natural Resources, Stanford
Law School**



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Ecosystem Services



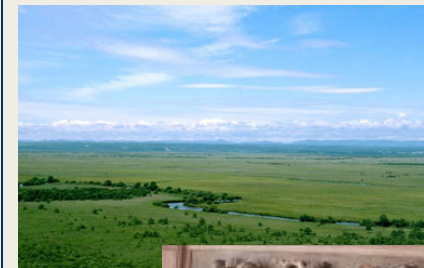
Provisioning
Goods produced
or provided by
ecosystems



Regulating
Benefits obtained
from regulation of
our environment



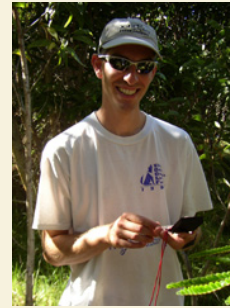
Cultural
Non-material
benefits from
our environment





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The Natural Capital Project



Biology & Science

Economics & Business



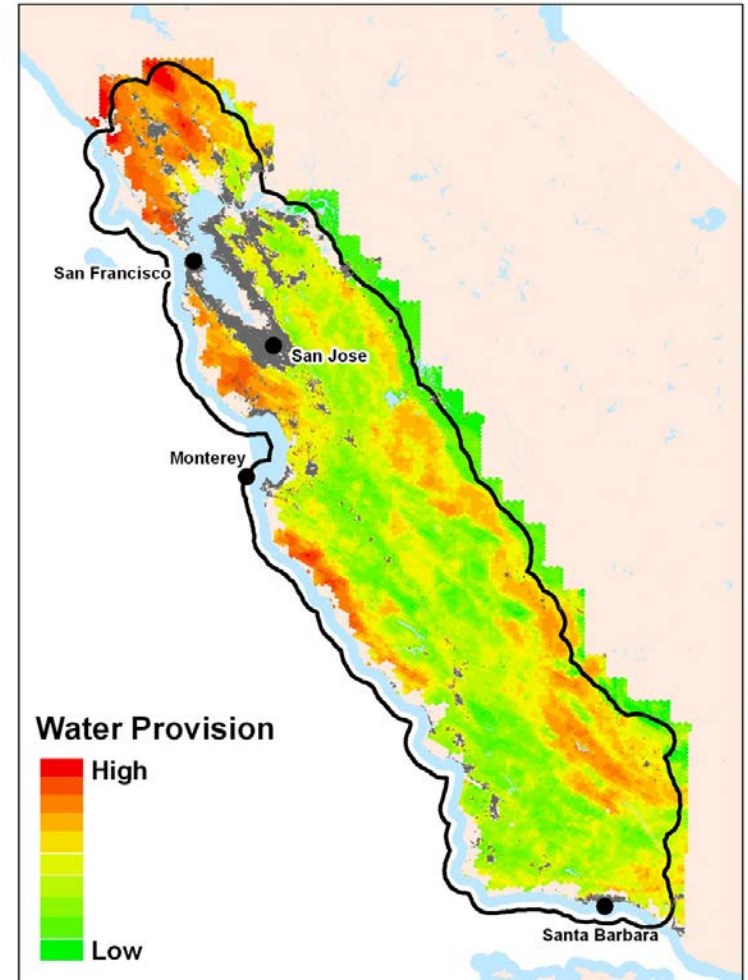
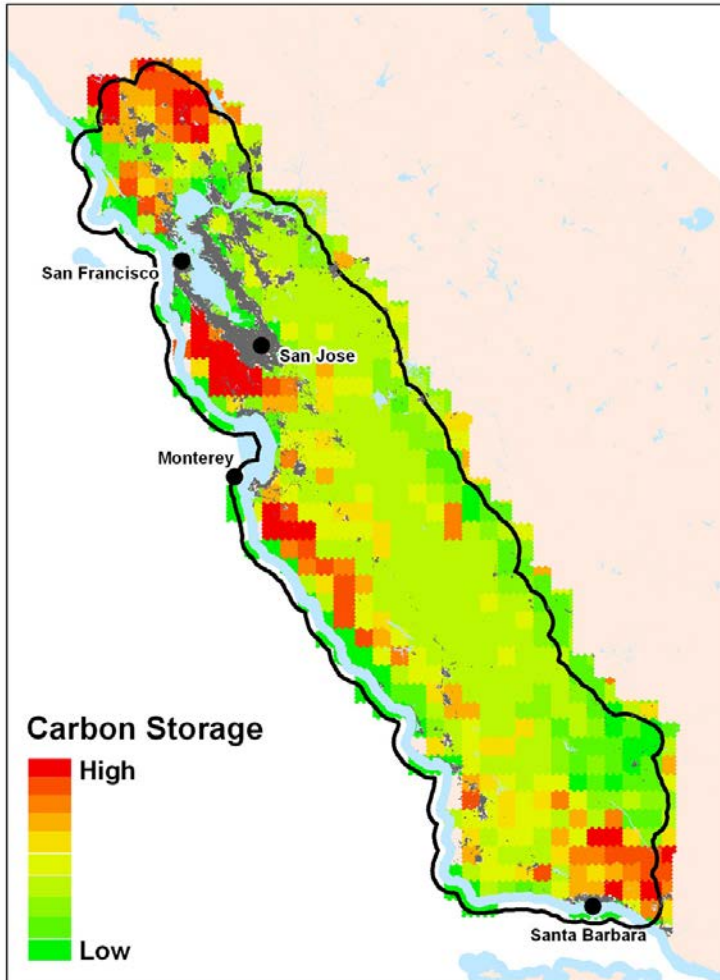
Policy





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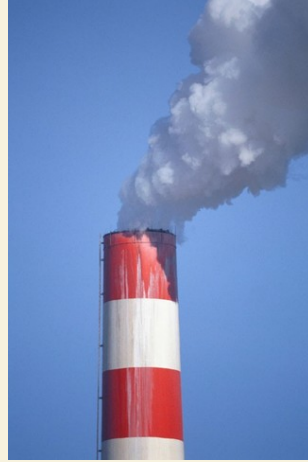
InVest: Mapping Ecosystem Services





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Testing the Concept in Hawaii



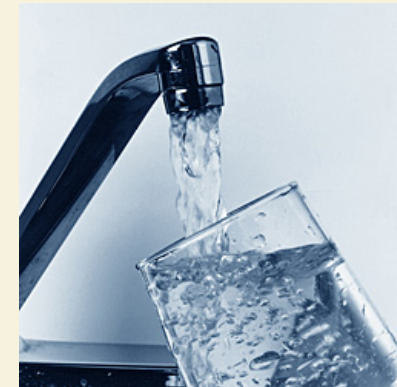
**Carbon
Sequestration**



**Sustainable
Wood Product**



**HAWAII ECOTOURISM
ASSOCIATION**



**Drinking
Water**



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Current Demonstration Sites



California



Hawaii



Tanzania



Mesoamerican Reef



China



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Government's Critical Roles



- Creating a Baseline of Protection
- Facilitating Transactions
- Requiring or Encouraging Investment in Ecosystem Services
- Creating Market Intermediaries





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Failures in the Market for Ecosystem Services



- **Failure to Appreciate Risk**
 - > Ignorance
 - > Myopia
 - > Optimism
- **Failure to Identify Natural Solutions**
- **Inability to Value Natural Solutions**
- **Free Riding**





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Governmental Approaches



- **Regulatory Requirements/Standards**
 - > **Safe Drinking Water Act**

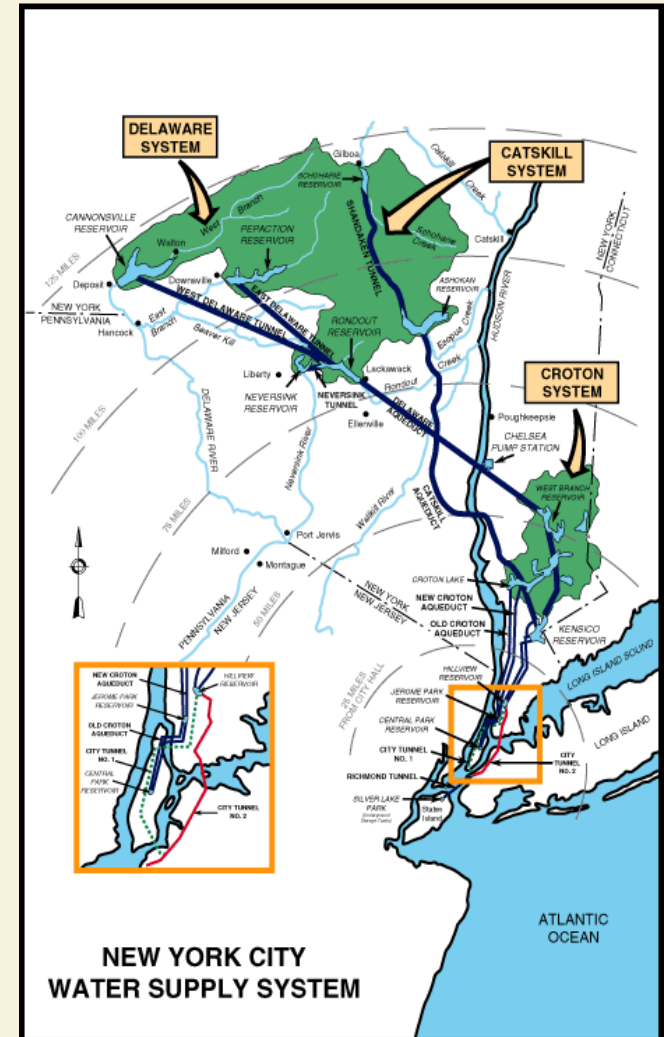


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The New York City – Catskills Example



- **New York City**
 - **Delaware & Catskills Watersheds**
 - **Filtration Facility**
 - \$6 billion capital cost
 - \$300 million operating costs
 - **Watershed Preservation**
 - \$1 billion cost
- **EPA Surface Water Treatment Rule**
 - **Encourages non-filtering suppliers to protect watershed**
- **97% already filter**





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Other Governmental Approaches



- **Regulatory Requirements/Standards**
 - > Safe Drinking Water Act
 - > Carbon Cap & Trade Systems
 - > Clean Water Act
- **Ecosystem Service Impact Analyses**
 - > California Drinking Water Source Analyses
- **Disclosure Rules**
- **Certification Programs**
- **Financial Incentives**

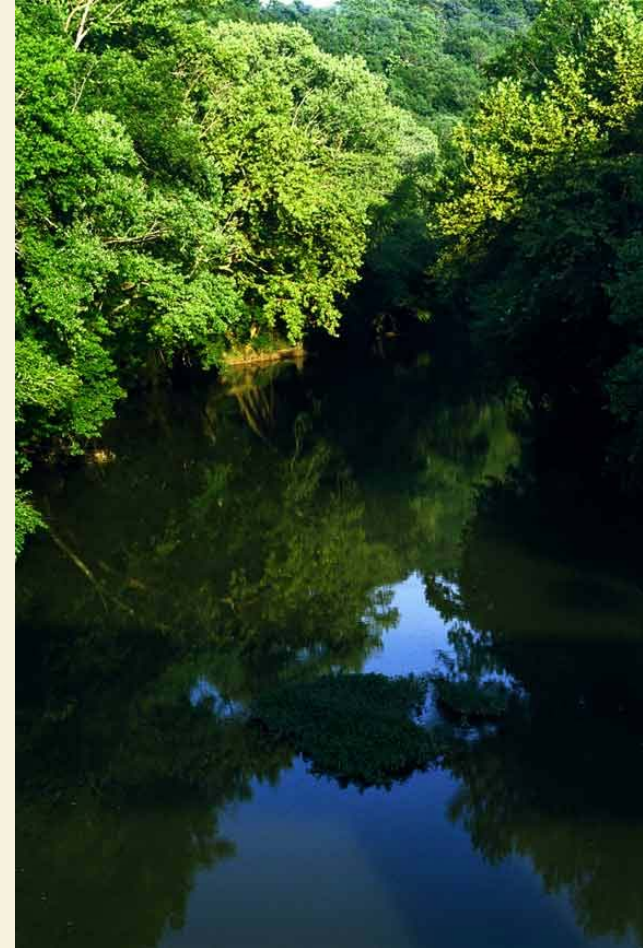


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Ecosystem Service Intermediaries



- **Buyers: *Ecosystem Service Districts***
 - > Overcome free riders
 - > Promote “bundling”
- **Sellers: *Conservation Districts***
 - > Opportunity to Serve as Market Promoters
 - Knowledge transfer
 - Technical assistance
 - Bundling



A	Carbon Storage	Pollination	Recreation	Water Storage	Flood Control	Forage Production	Bio-diversity
Carbon	1						
Pol'n	0.04	1					
Rec'n	0.19	-0.01	1				
H2O	0.58	0.02	0.27	1			
Flood	0.21	0.00	0.24	0.17	1		
Forage	-0.07	-0.05	-0.07	-0.12	0.04	1	
Biod'y	0.03	-0.01	0.12	0.10	0.02	-0.04	1
Averages Overall	0.16	0.00	0.12	0.17	0.11	-0.05	0.04
LEGEND	-0.2 - -0.1	-0.1 - 0	0 - 0.1	0.1 - 0.2	0.2 - 0.3	0.3 +	

B	Carbon Storage	Pollination	Recreation	Water Storage	Flood Control	Forage Production	Bio-diversity
Carbon	1						
Pol'n	1.40	1					
Rec'n	1.60	0.14	1				
H2O	1.82	0.91	1.54	1			
Flood	1.05	1.13	1.34	1.05	1		
Forage	0.85	0.13	1.81	0.95	1.17	1	
Biod'y	1.27	0.79	1.64	1.24	1.42	1.21	1
Averages Overall	1.29	0.53	1.05	1.21	1.19	0.81	1.23
LEGEND	<0.44	0.44 - 0.67	0.67 - 1	1 - 1.5	1.5 - 2.25	>2.25	

C	Carbon Storage	Pollination	Recreation	Water Storage	Flood Control	Forage Production	Bio-diversity
Carbon	100%						
Pol'n	32%	100%					
Rec'n	36%	2%	100%				
H2O	41%	15%	26%	100%			
Flood	24%	25%	30%	23%	100%		
Forage	26%	4%	55%	29%	36%	100%	
Biod'y	57%	35%	74%	56%	64%	54%	100%
Averages Overall	34%	13%	25%	29%	31%	26%	55%
LEGEND	<0.44	0.44 - 0.67	0.67 - 1	1 - 1.5	1.5 - 2.25	>2.25	



But Will This Really Help Protect Biodiversity?

Chan et al. (2005)



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Ecosystem Services Should Be the Goal



Enhanced

Crops
Livestock
Aquaculture
Carbon sequestration

Degraded

Capture fisheries
Wild foods
Wood fuel
Genetic resources
Biochemicals
Fresh Water
Air quality regulation
Regional & local climate
regulation
Erosion regulation
Water purification
Pest regulation
Pollination
Natural Hazard
regulation
Spiritual & religious
Aesthetic values

Mixed

Timber
Fiber
Water regulation
Disease regulation
Recreation & ecotourism

**Bottom Line:
60% of
Ecosystem
Services are
Degraded**