

Ecosystem Services (ES) Modeling

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Our Company

- New Forests Inc. in DC
 - head office in Sydney, Australia
- Offices in Malaysia and San Francisco
- Manage funds and assets worth 250M\$
- Advisory services for ES
- Investments are
 - Environmentally and socially responsible
 - in carbon, biodiversity, water, forestry

My role at New Forests Inc.

- Responsible for all modeling:
 - Ecosystems
 - Project financials
 - Portfolio
- Involved in:
 - Policy
 - Ethics and Governance

Plan of the talk

- What is a model?
- What is the role of ES modeling?
- Looking back: ES models in the past
- Current approach in Eco-finance
- The future of ES modeling
- Policy imperatives
- Questions

What is a model?



Magritte

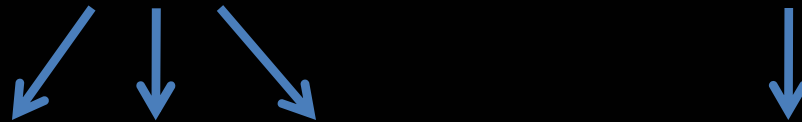
What is a model?



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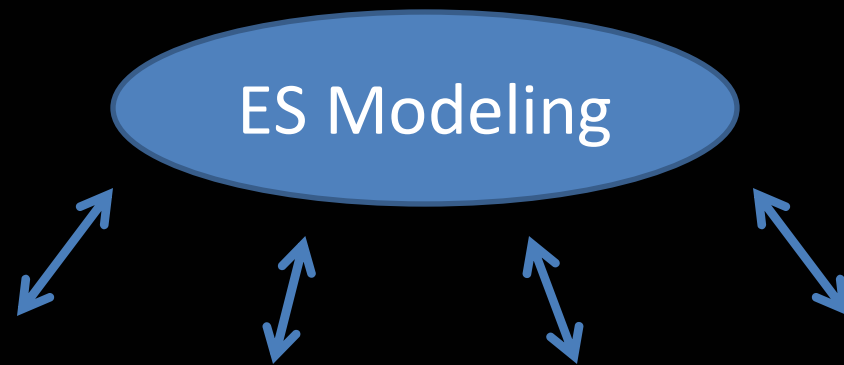
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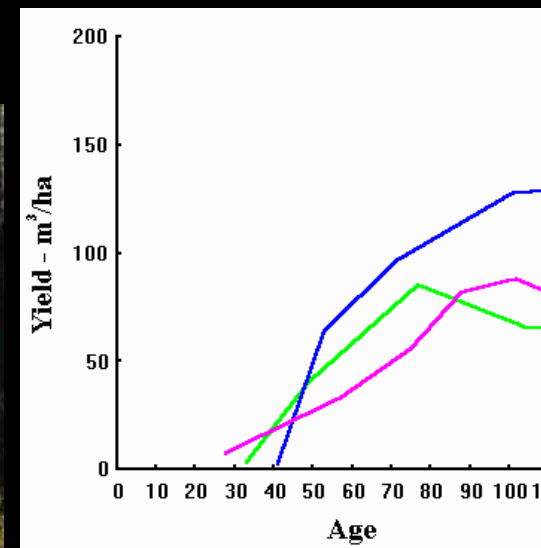
- Can be very simple:
 - regression equation: $y = a + bx$
- Or very complex
 - no limit on complexity!

What is the role of ES modeling?



Looking back: ES models in the past

- Growth and yield

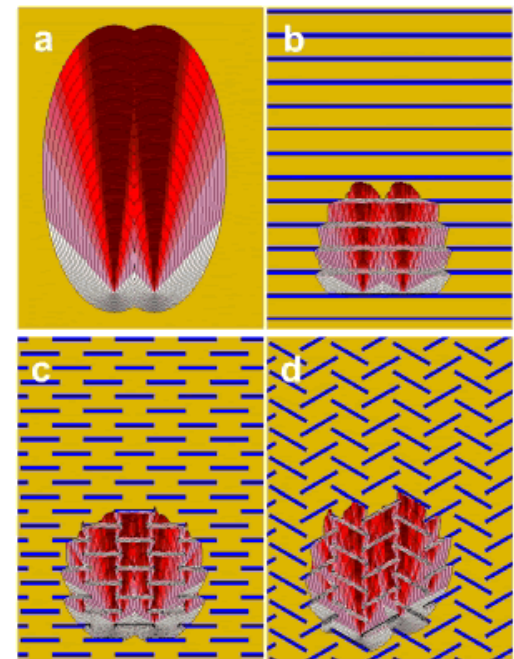
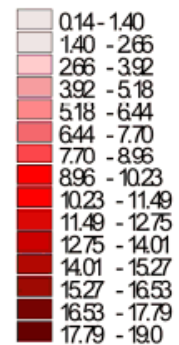


Looking back: ES models in the past

- Growth and yield
- Fire modeling

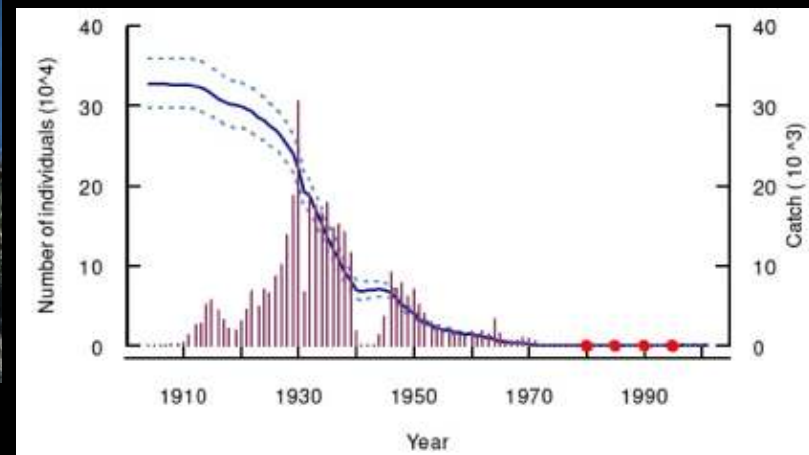


Fire Spread Rate (m min^{-1})



Looking back: ES models in the past

- Growth and yield
- Fire modeling
- Wildlife population models



Looking back: ES models in the past

- Growth and yield
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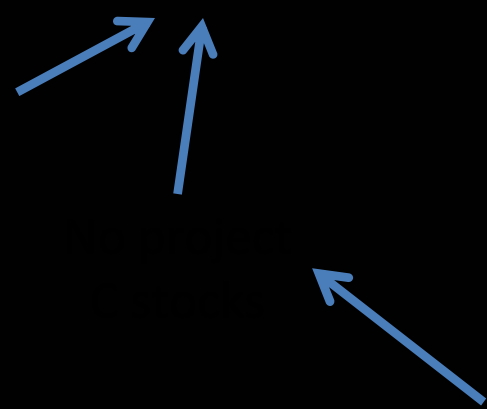
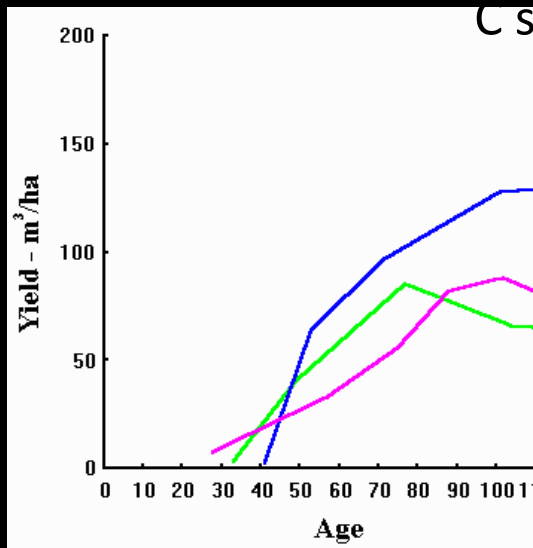
- Problem:
 - single purpose models
 - very disciplinary

Current approach in Eco-finance

- Model ecosystem service: predict yield
 - timber
 - carbon
 - biodiversity
 - water
- Model financials
 - based on yields
 - set-up financial structure

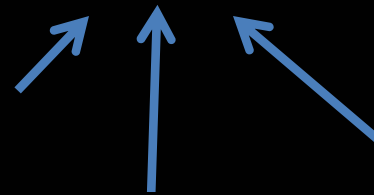
Current approach in Eco-finance

- Predict yield of ES
 - e.g., REDD carbon



Current approach in Eco-finance

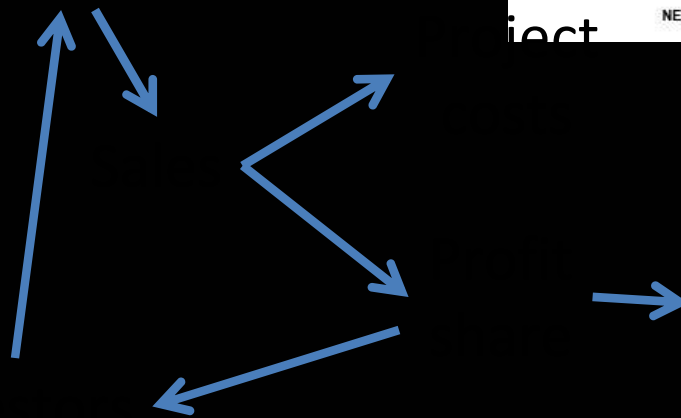
- Predict yield of ES
 - e.g., wetlands



Current approach in Eco-finance

- Predict yield of ES
- Financials

COSTS (£m)	Stg 2 Bid	SSC Setup		SSC Operations & improvement								Total over 10 years	
	FY05/06	FY06/07	FY07/08	FY08/09	FY09/10	FY10/11	FY11/12	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	£(m)
Stage 2 bid preparation:	0.350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.350
SSC Setup & Operations:	0.000	3.750	2.850	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	0.787	12.896
Project Costs (External):	0.000	1.900	1.900	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	4.200
Project Costs (Internal):	0.000	0.800	1.700	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	0.180	3.940
Overall Costs (£m) :	0.350	6.450	6.450	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	1.017	21.386
BENEFITS (£m)													
Finance and Procurement													
Sourcing Savings	0.000	0.000	0.670	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.844	0.422	6.997
Budget Monitoring	0.000	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.125	2.125
Purchase to Pay	0.000	0.000	0.851	0.819	0.819	0.819	0.819	0.819	0.819	0.819	0.819	0.409	6.792
Sales to Collection	0.000	0.000	0.350	0.563	0.563	0.563	0.563	0.563	0.563	0.563	0.563	0.260	4.548
HR													
Payroll improvements in service return	0.000	0.000	0.000	0.324	0.324	0.324	0.324	0.324	0.324	0.324	0.324	0.162	2.429
HR Generic savings in Services	0.000	0.000	0.451	0.874	0.874	0.912	0.912	0.912	0.912	0.912	0.912	0.456	7.214
Systems													
Replacement of legacy systems	0.000	0.000	0.127	0.127	0.127	0.127	0.127	0.127	0.127	0.127	0.127	0.063	1.079
Improvement in Maintenance contract	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.075	0.075	0.075	0.075	0.038	0.338
Overall Benefits (£m) :	0.000	0.000	2.499	3.800	3.800	3.837	3.912	3.912	3.912	3.912	3.912	1.935	31.521
NET BENEFIT (£m) :	-0.350	-6.450	-3.951	2.783	2.783	2.820	2.895	2.895	2.895	2.895	2.895	0.918	10.135



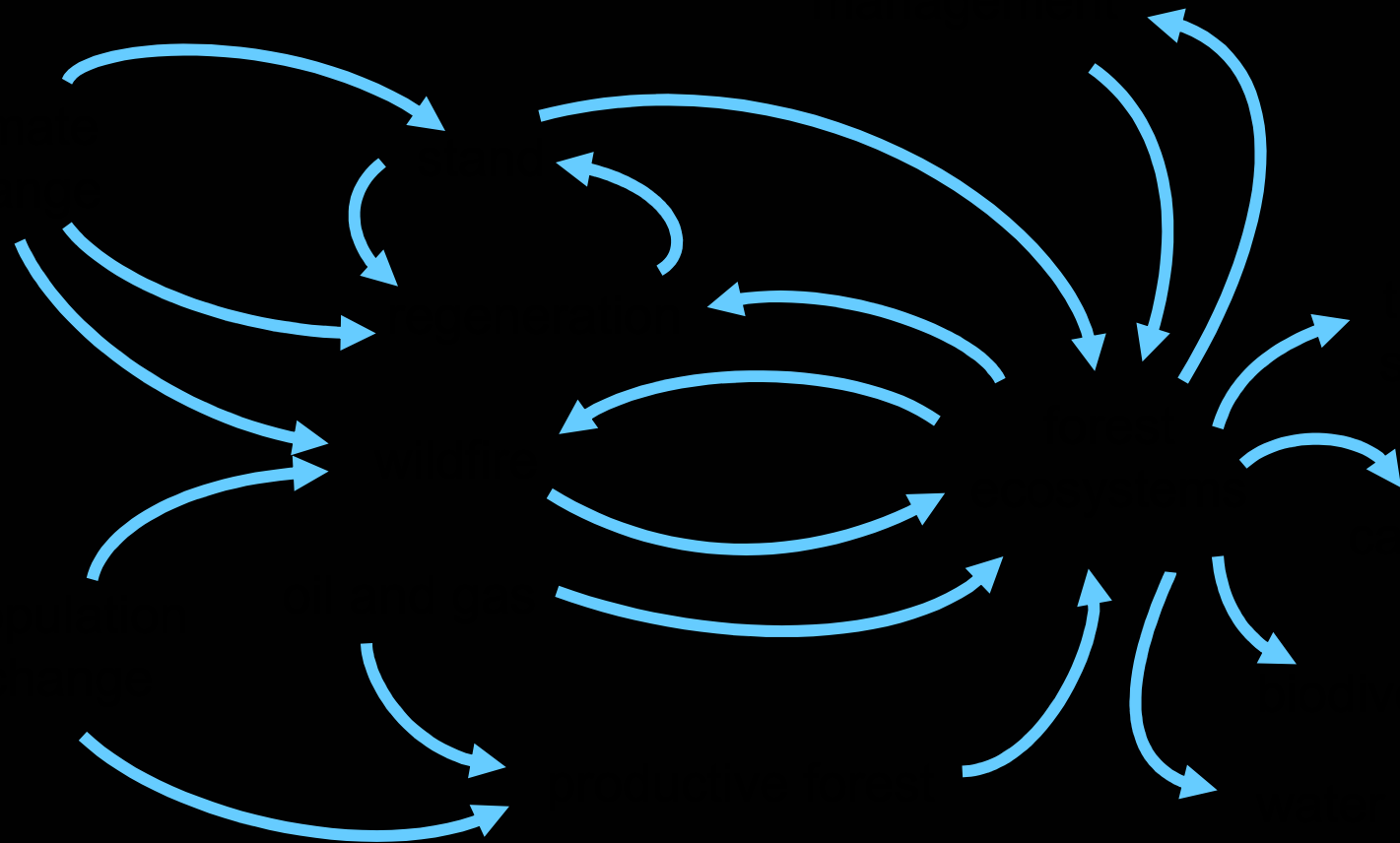
The future of ES modeling



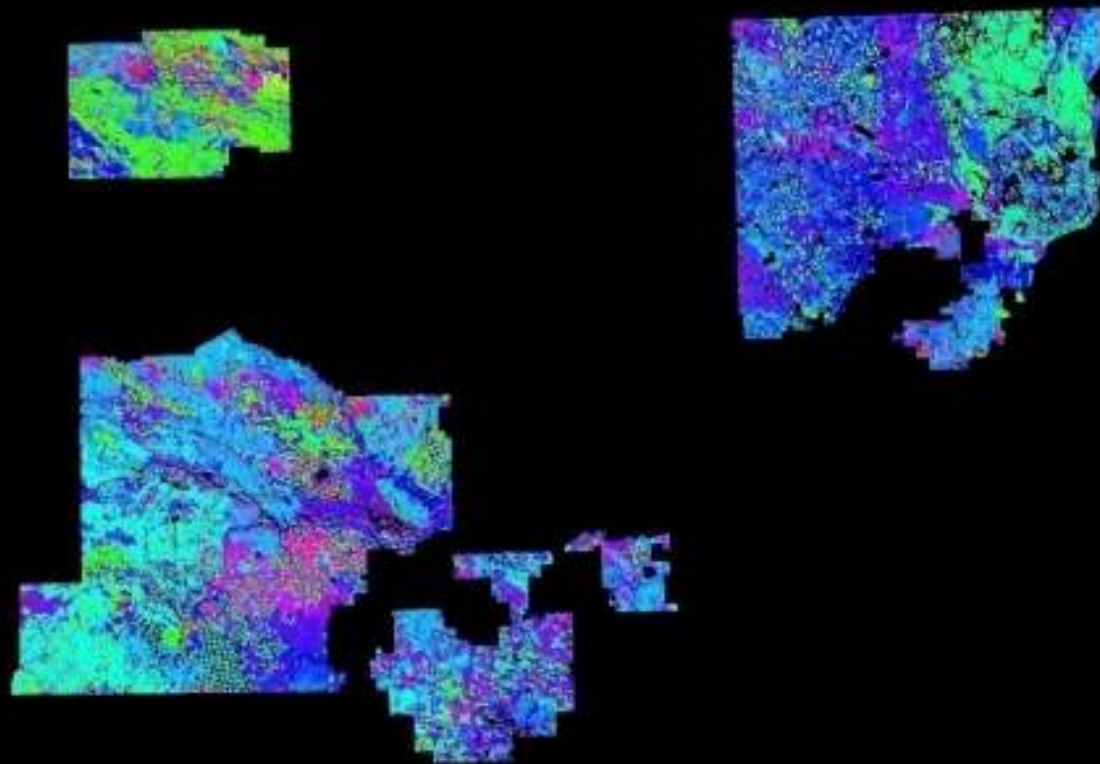
The future of ES modeling

- Multiple-use integrated socio-economic-ecosystem models
 - Ecosystems have many uses
 - Many fields involved
 - hydrology, soil science, wildlife biology, forestry
 - Projects must be socially acceptable
 - Solutions must be viable
 - Policy must ensure markets benefit society
 - present and future generations
 - our survival depends on ecosystems

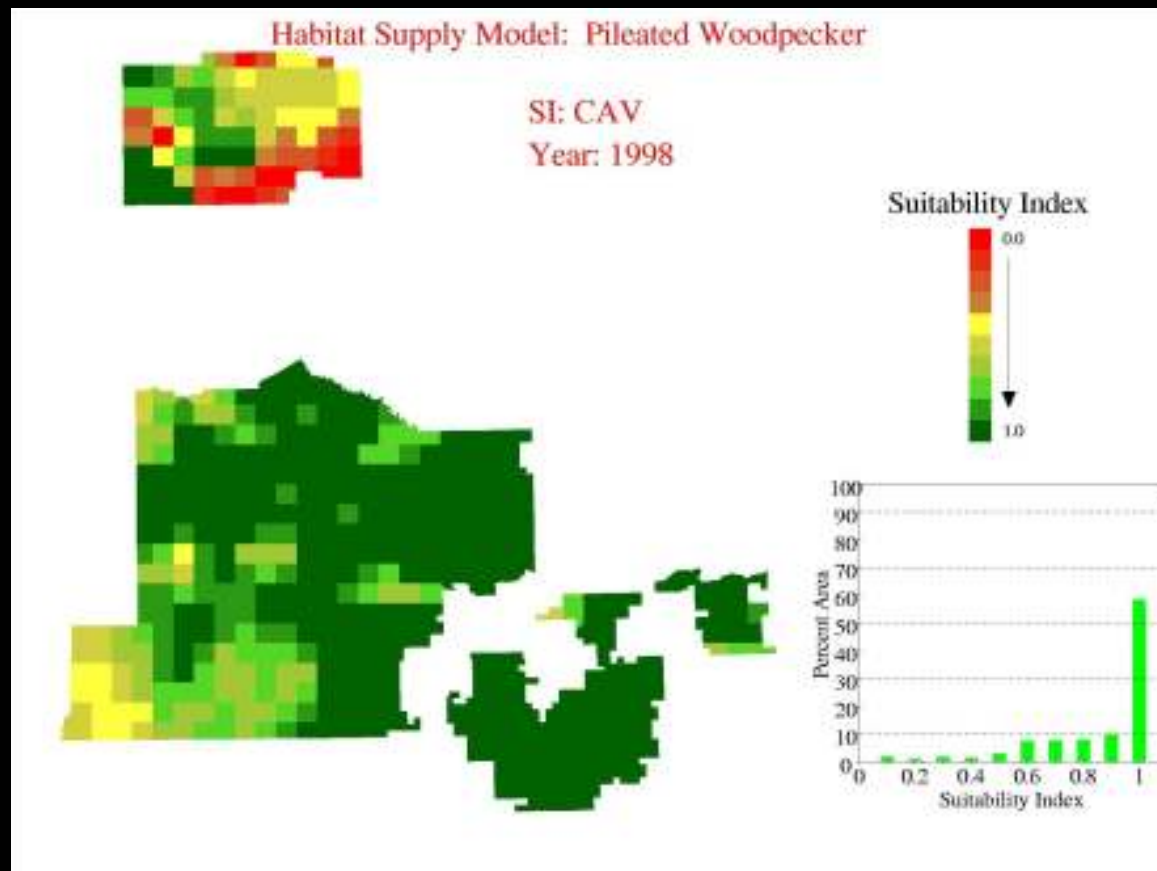
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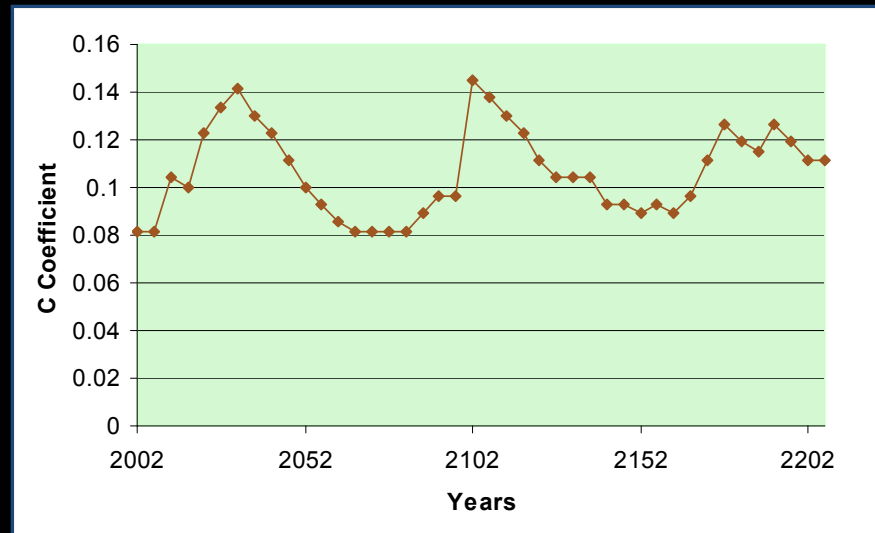
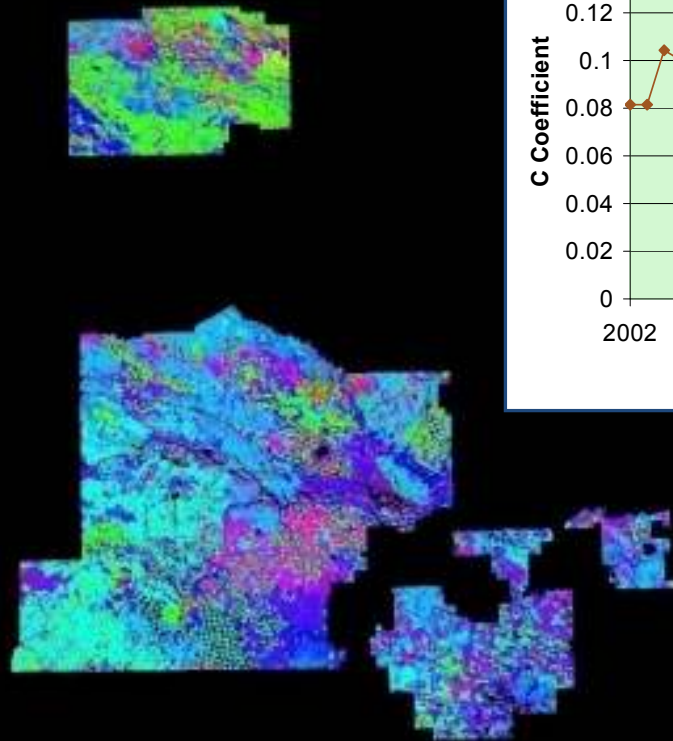
The future of ES modeling



The future of ES modeling



The future of ES modeling



Policy imperatives

- Markets depend on regulatory framework
 - mechanisms to internalize externalities
 - in the U.S.
 - wetlands: Clean Water Act
 - biodiversity: Endangered Species Act
 - carbon: Cap and trade legislation

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Malua Biobank Background

- MWHCB protects 34,000 hectares of previously logged forest
- Partnership between EPF and Sabah Government
- Launched in 2008



Malua Biobank Background

- Buffer between virgin lowland tropical rainforest and plantations
- Highest concentrations of orangutans
- Also:
 - Clouded leopards
 - pygmy elephants
 - over 300 bird species



- 8 p
- R fo c
- V fo e
- A g e
- 1 a

