

THE FULL MONTY



REVEALING THE ENVIRONMENTAL AND SOCIAL COSTS AND BENEFITS OF AGRICULTURE

HEATHER TALLIS

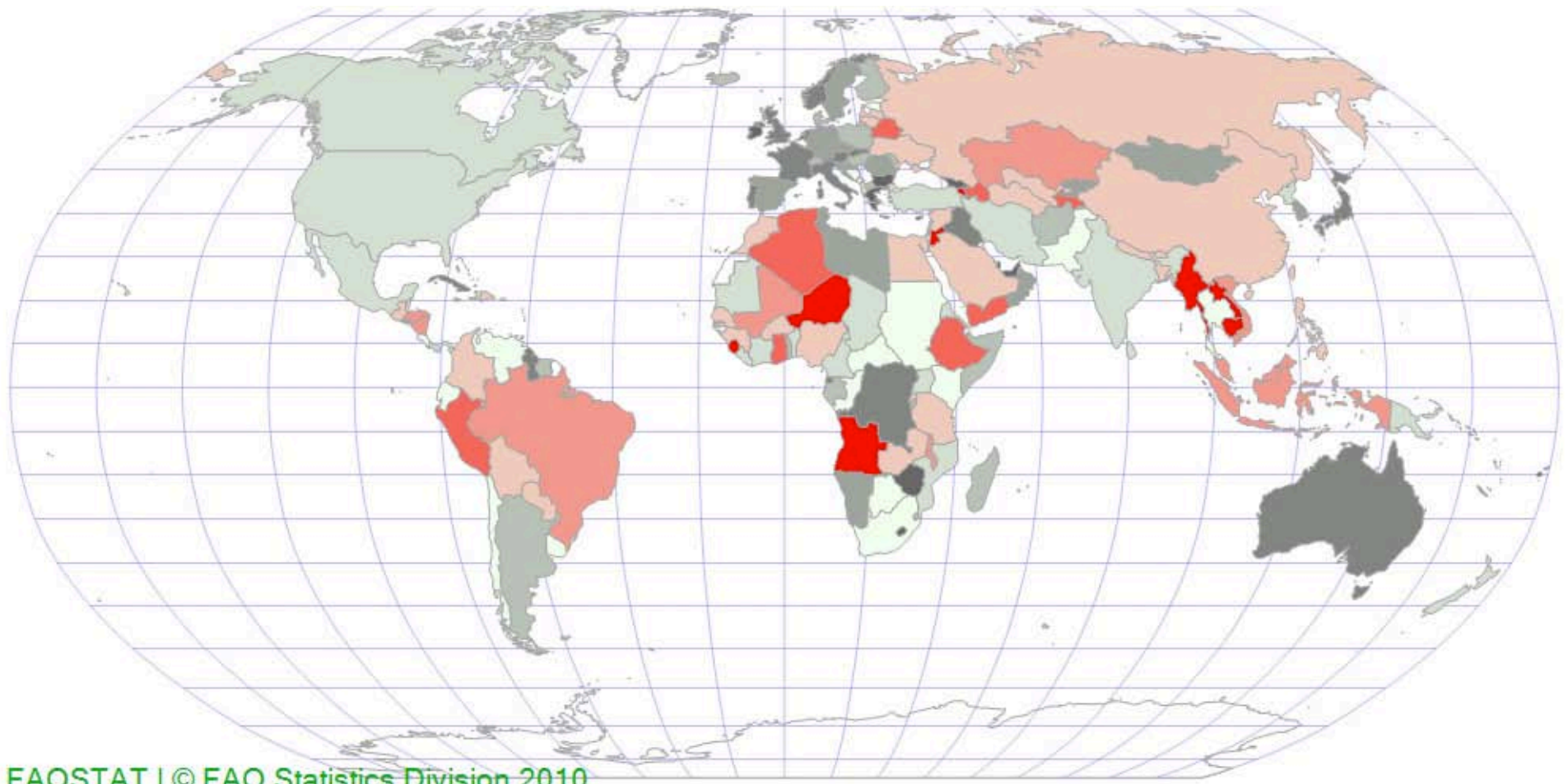
Agricultural Production

An aerial photograph showing three combine harvesters moving through a vast, green cornfield. The harvesters are positioned in a diagonal line, leaving distinct tracks in the rows of crops. The field extends to the horizon, creating a strong sense of depth and scale.

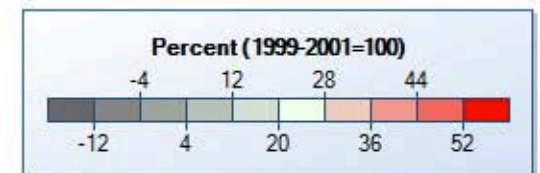
\$3.6 trillion globally in 2010

~40% global land area

Agricultural Production



% Growth in Agricultural Production 1999-2009



This is a good thing, right?



If you like *dust storms*



If you like *dead zones*

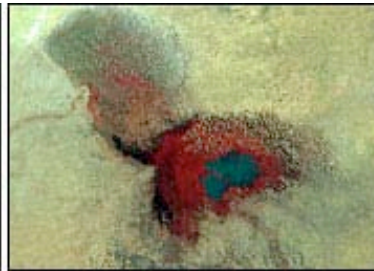
Fertilizer = 8,500+ square miles of dead space in the Gulf of Mexico



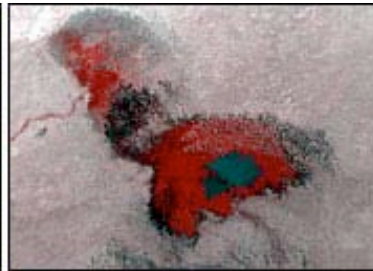
Or if you *don't* like *water*



1973



1987

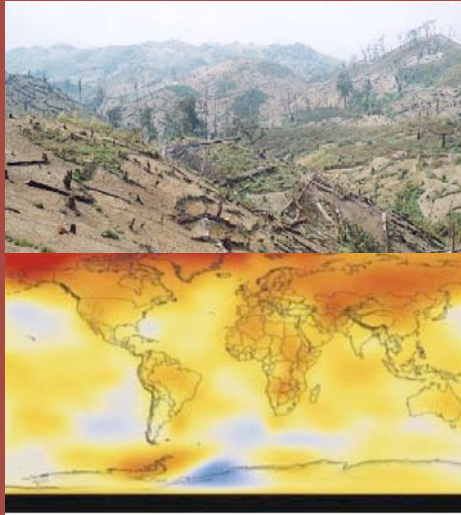


1997

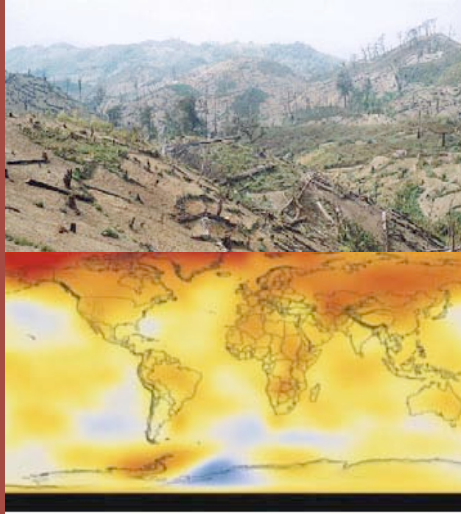


2001

The Full Monty: Ag production comes with tradeoffs



Ecosystem Services



Ecosystem Services

Ecosystem services are the goods and services people receive from nature.

Clean water
Timber
Food (crops, fish)
Fuel

Flood mitigation
Storm protection
Disease control
Climate regulation

Recreation
Cultural or spiritual
Livelihoods
Existence value



Ecosystem Services

Current decisions only account for *some*
We need to account for them all!

Clean water
Timber
Food (crops, fish)
Fuel

Flood mitigation
Storm protection
Disease control
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Recreation
Cultural or spiritual
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Agriculture Needs to Keep Growing

Feed 9 billion people in 2050

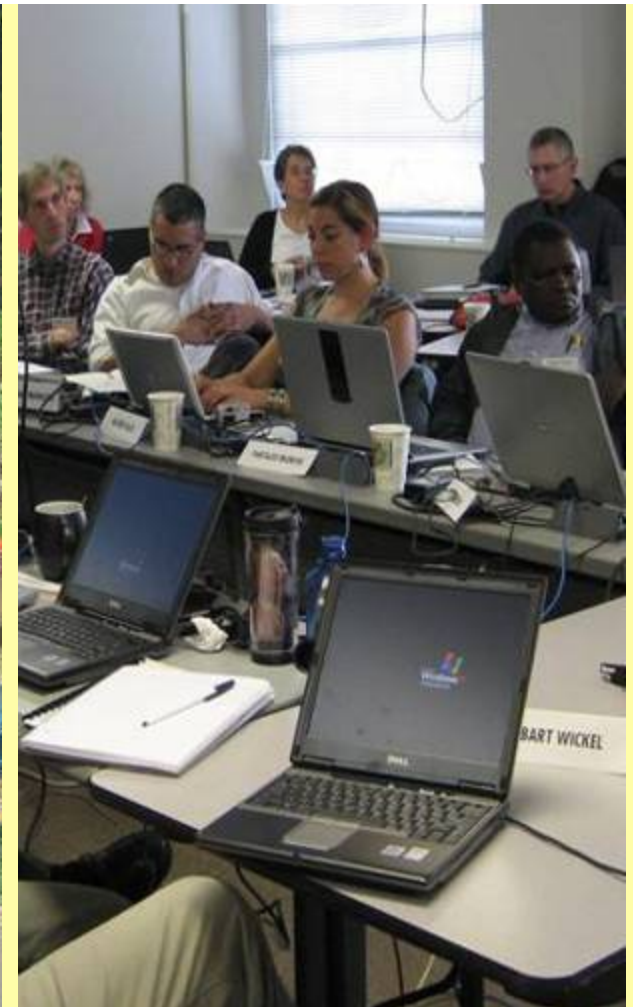


Agriculture Needs to Keep Growing

Can we fill the yield gap *while maintaining*
clean drinking water
climate regulation
hydropower production
flood regulation
carbon sequestration
and other services?



The Natural Capital Project



Free Software

natural
capital
PROJECT

InVEST Tier 1 Tools



Steve Polasky, Erik Nelson, Guillermo Mendoza, Driss Ennaanay, Stacie Wolny, Heather Tallis, Marc Conte, Jim Regetz, Peter Kareiva, Taylor Ricketts, Gretchen Daily, Mary Ruckelshaus, Anne Guerry, Katie Arkema, Greg Guannel, Jodie Little, Chong Ki Kim, Mike Papenfus, Apollo Qi, Nasser Olwero, Nirmal Bhagabati, Robin Naidoo, Eric Lonsdorf, Kai Chan, Rebecca Shaw, Dick Cameron, Neil Burgess, Andrew Balmford

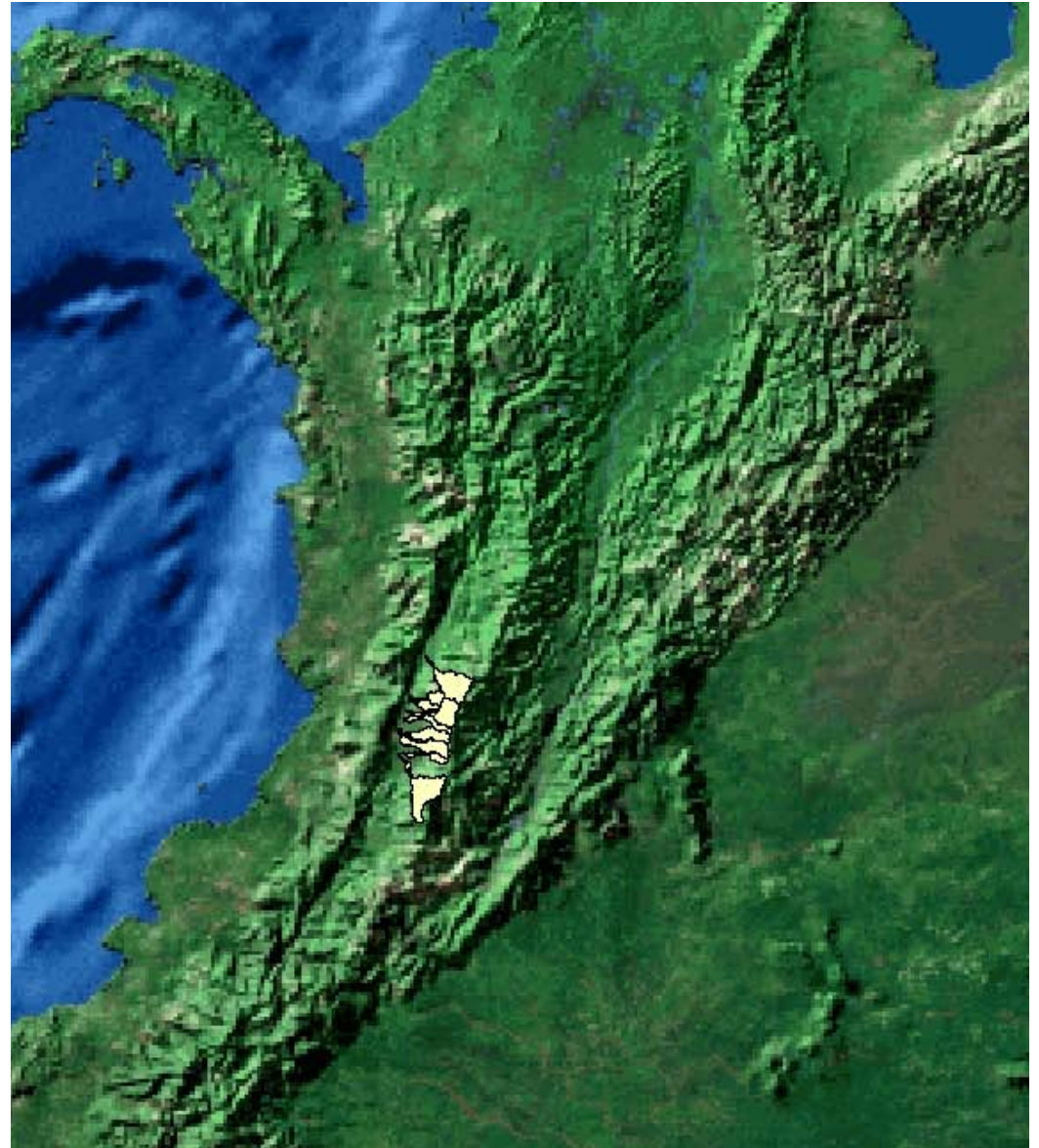
InVEST

Map, quantify and value multiple ecosystem services



Example: Colombia

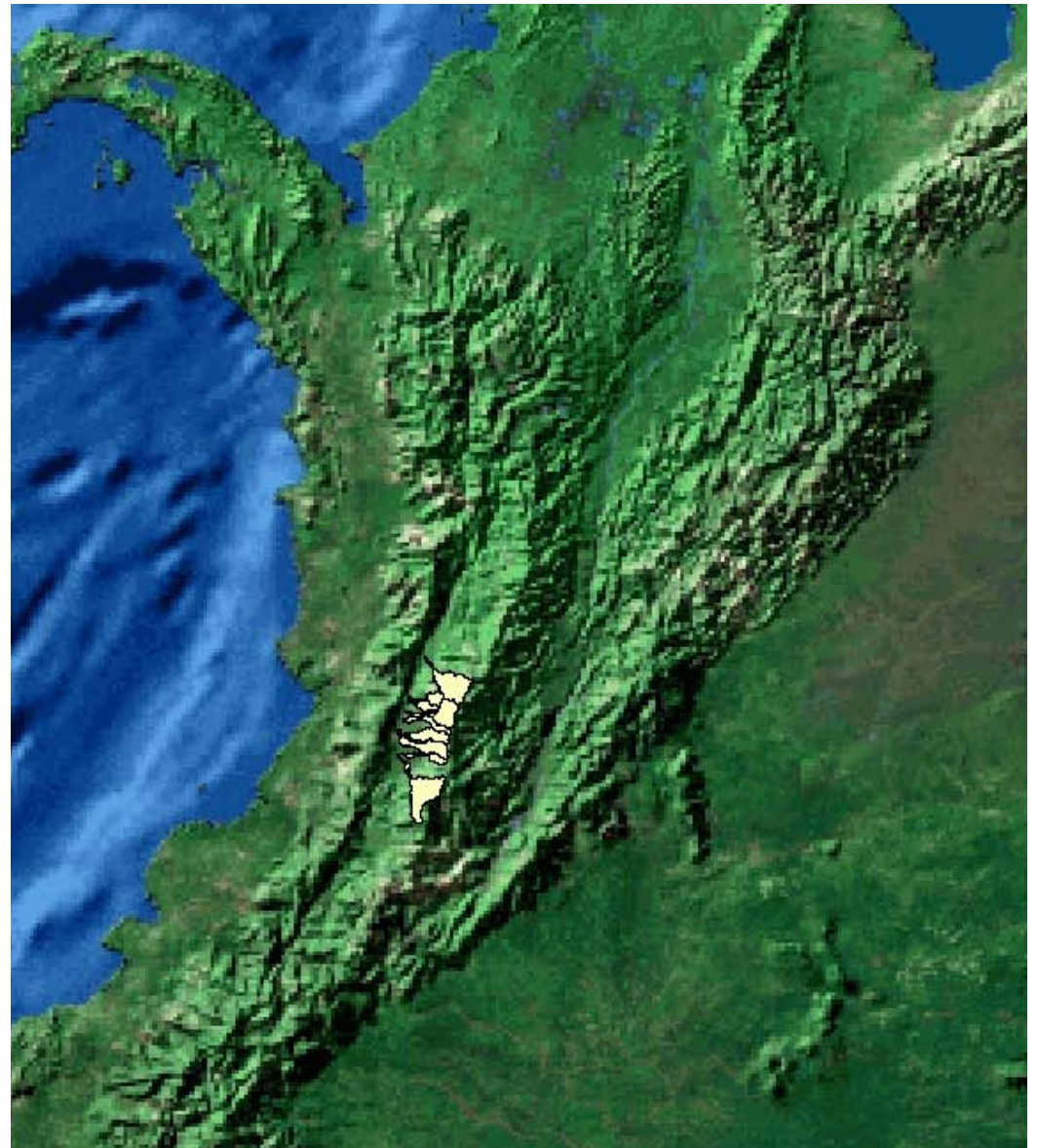
How can we get the most **beef** and **sugarcane** from the Northern Andes region of Colombia?



InVEST

How can we get the most **beef** and **sugarcane** from the Northern Andes region of Colombia?

Connected by other ecosystem services:
water yield
erosion control









Water Fund

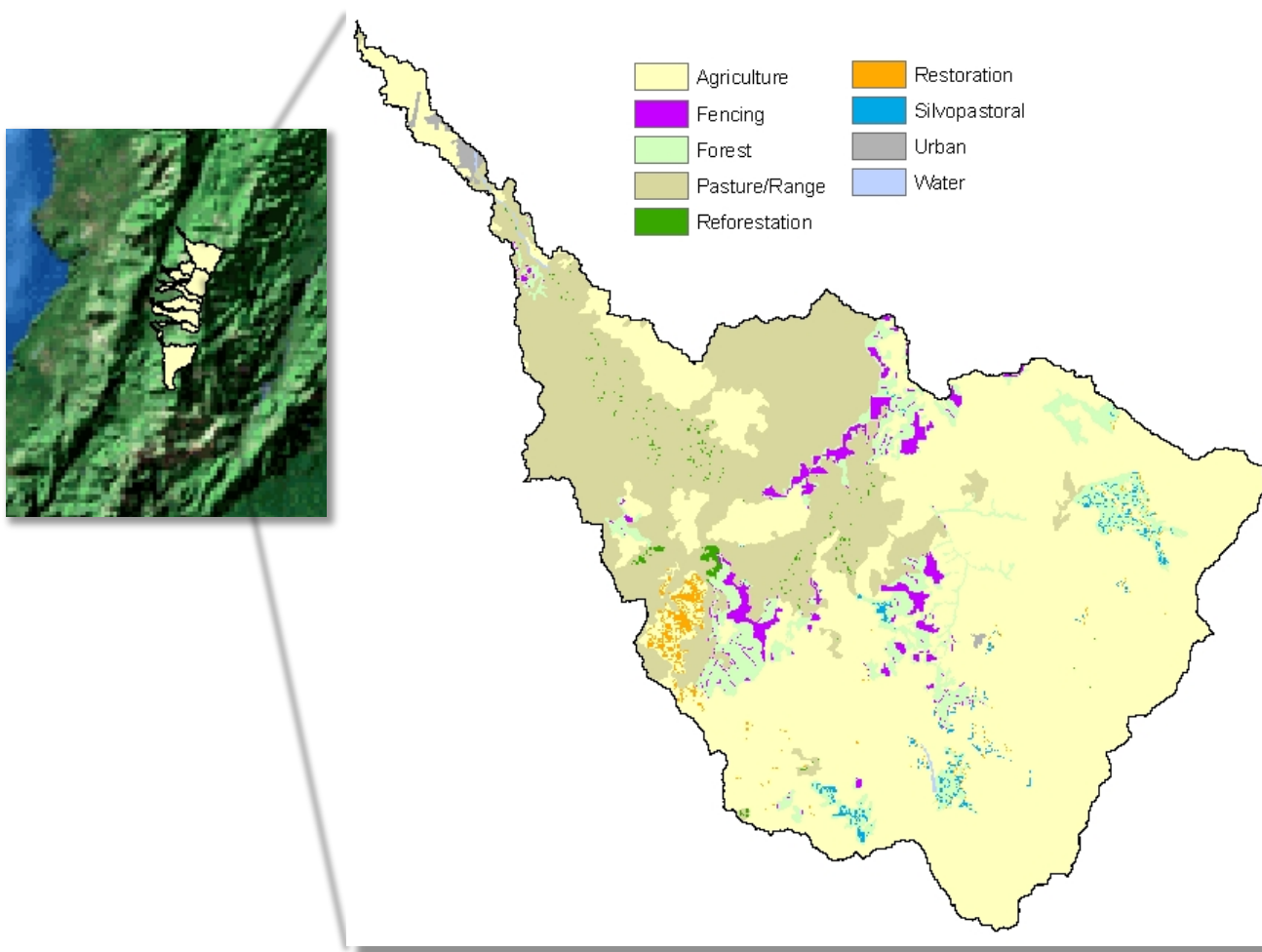
Sugarcane growers and water municipalities pay ranchers to change their practices

Maintain consistent water flows necessary for drinking water, agriculture and biodiversity through a coordinated strategy.



Water Fund

Tulua River Watershed



Take Home Message

More beef production is good for beef, but not for water supply, erosion control or sugarcane

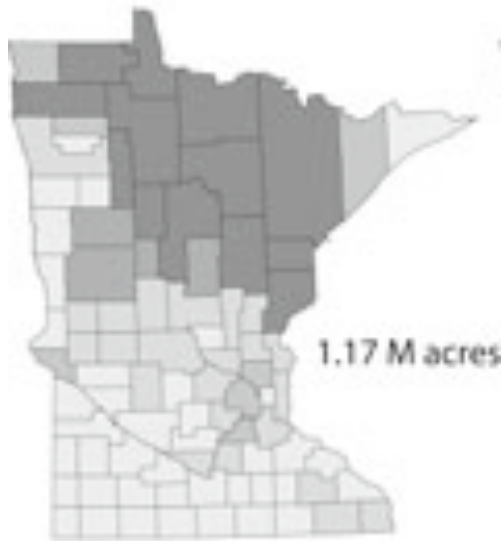
Example: Minnesota

Was agricultural expansion in the 1990's worth it?

Would more agricultural expansion be worth the social and environmental costs in carbon and water quality?

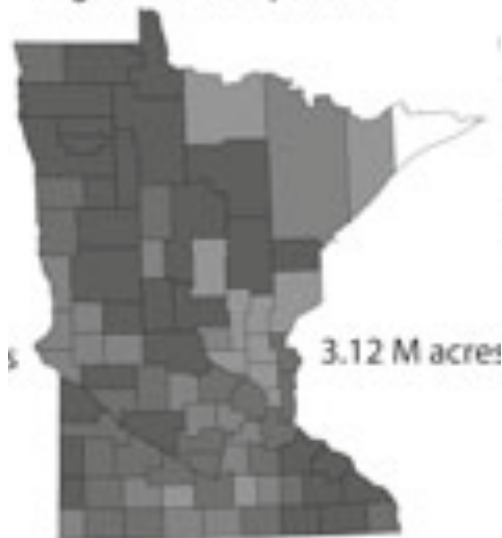


Example: Minnesota



1.17 M acres

Agricultural Expansion

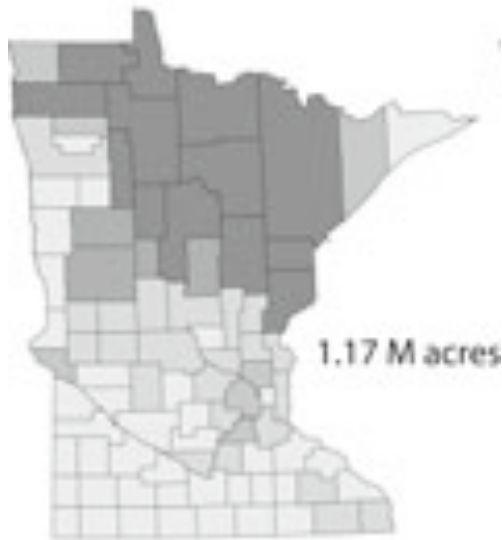


3.12 M acres

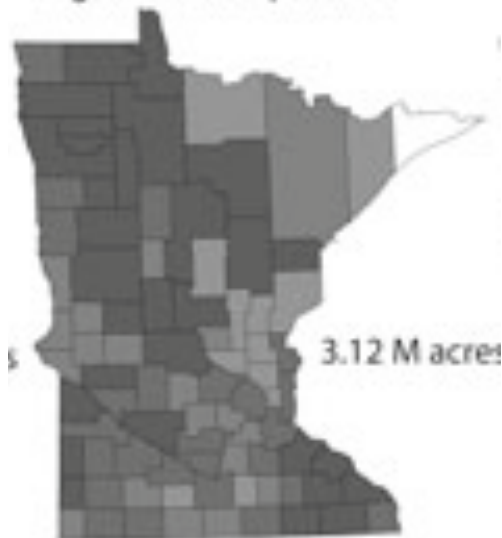
Actual agricultural expansion 1992-2001

Predicted further expansion,
primarily biofuels

Example: Minnesota



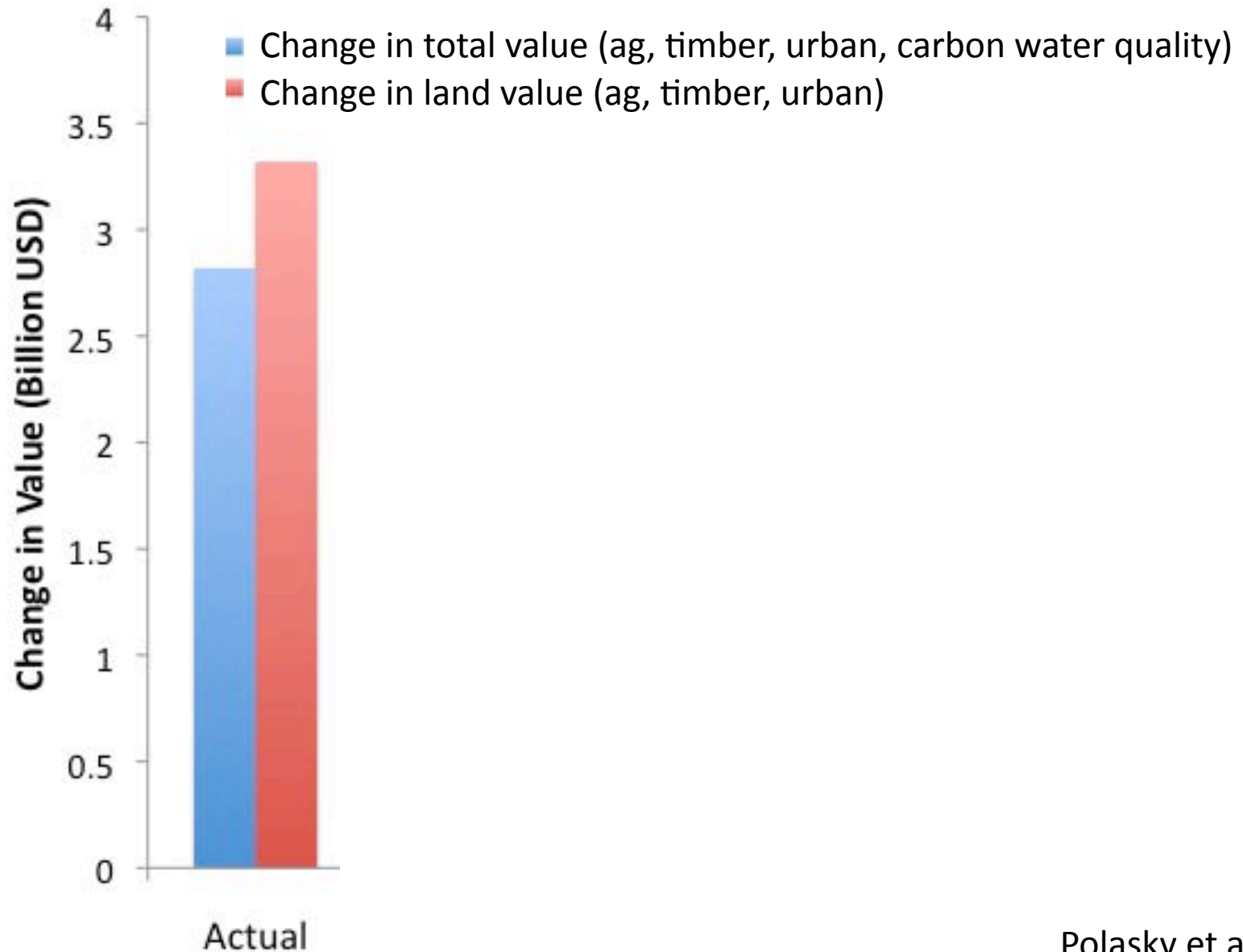
Agricultural Expansion



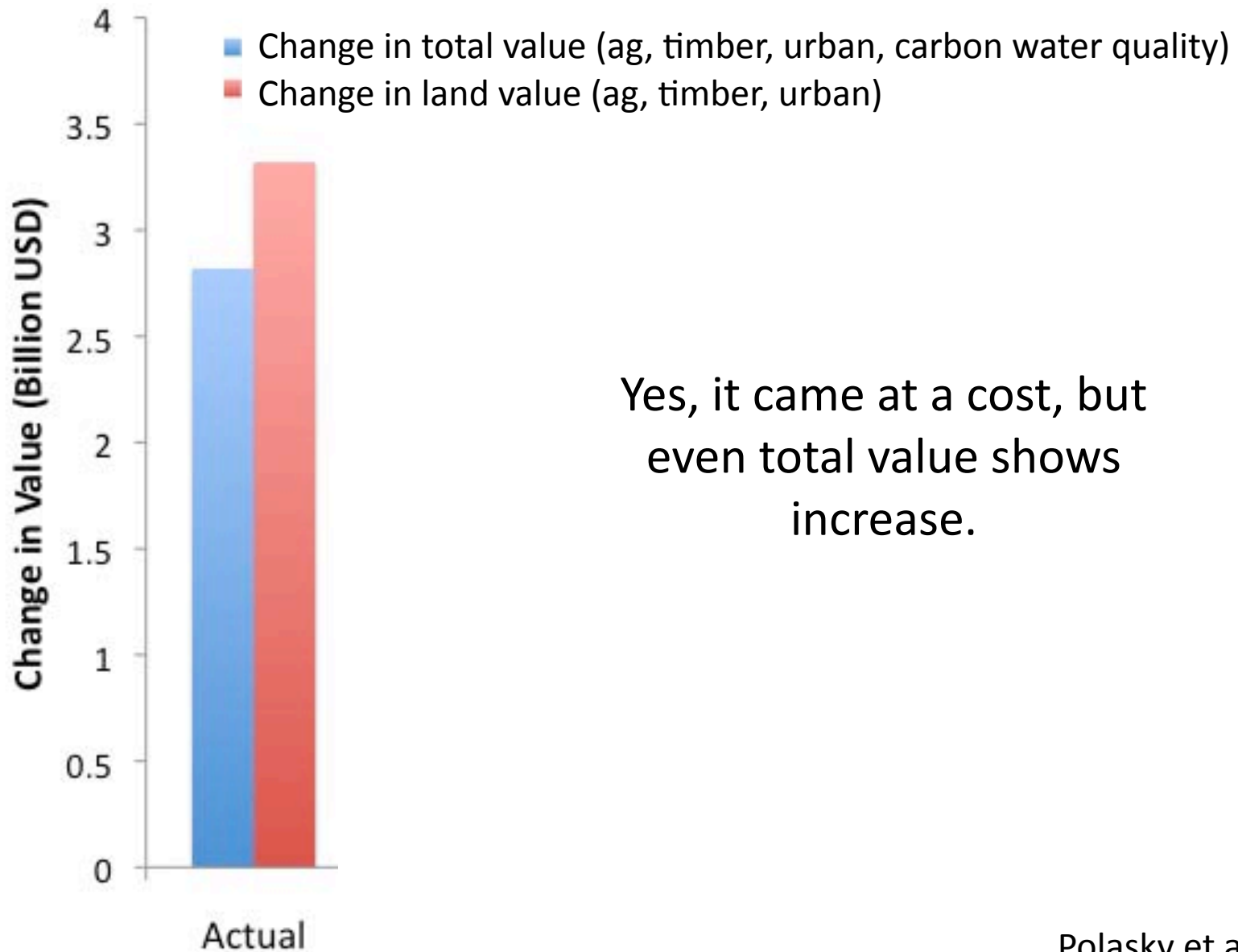
How much did each landscape provide in:

- Agriculture revenues
- Timber revenues
- Rural residential revenues
- Carbon sequestration revenues
- Avoided water treatment costs

Did past expansion come at a cost?

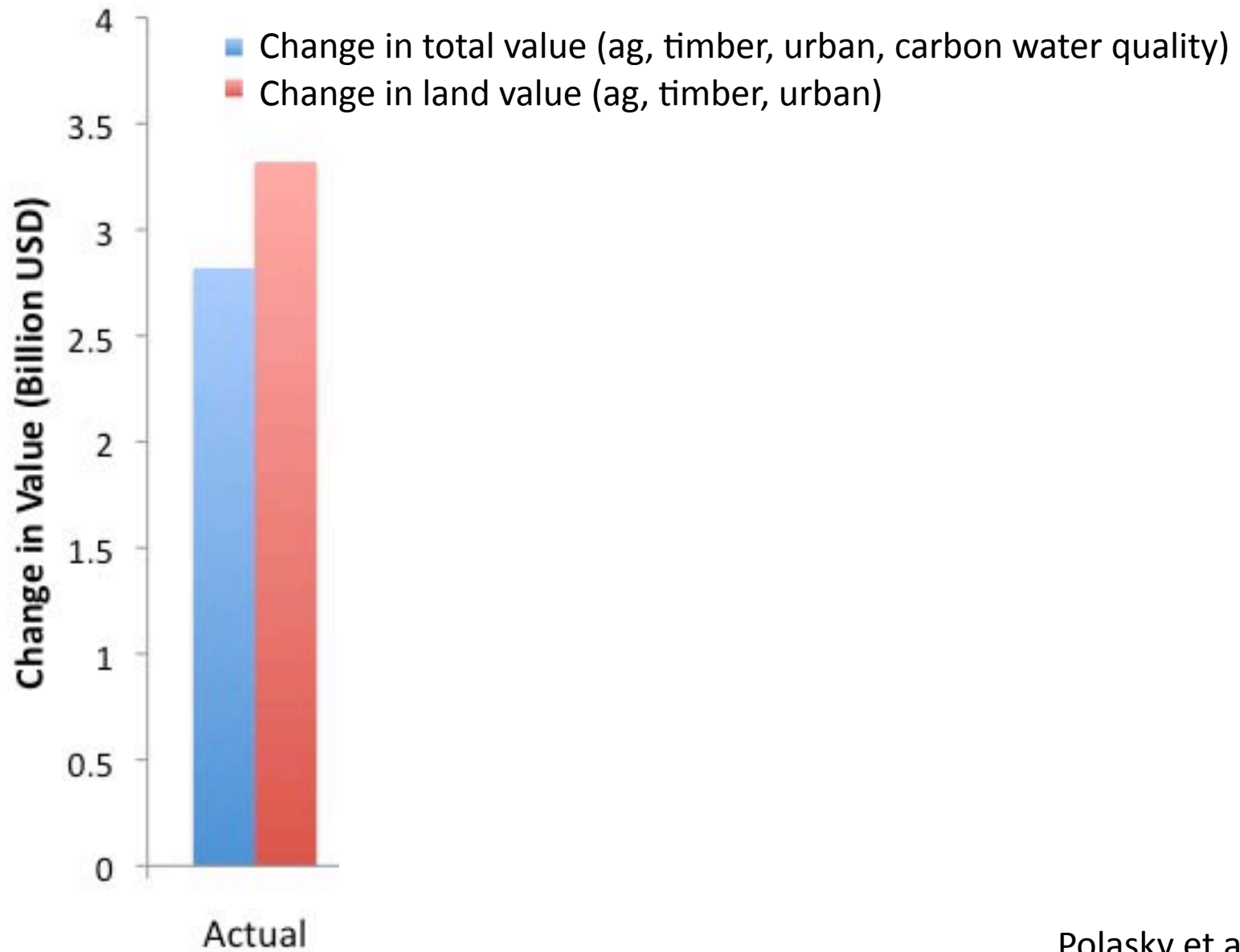


Did past expansion come at a cost?

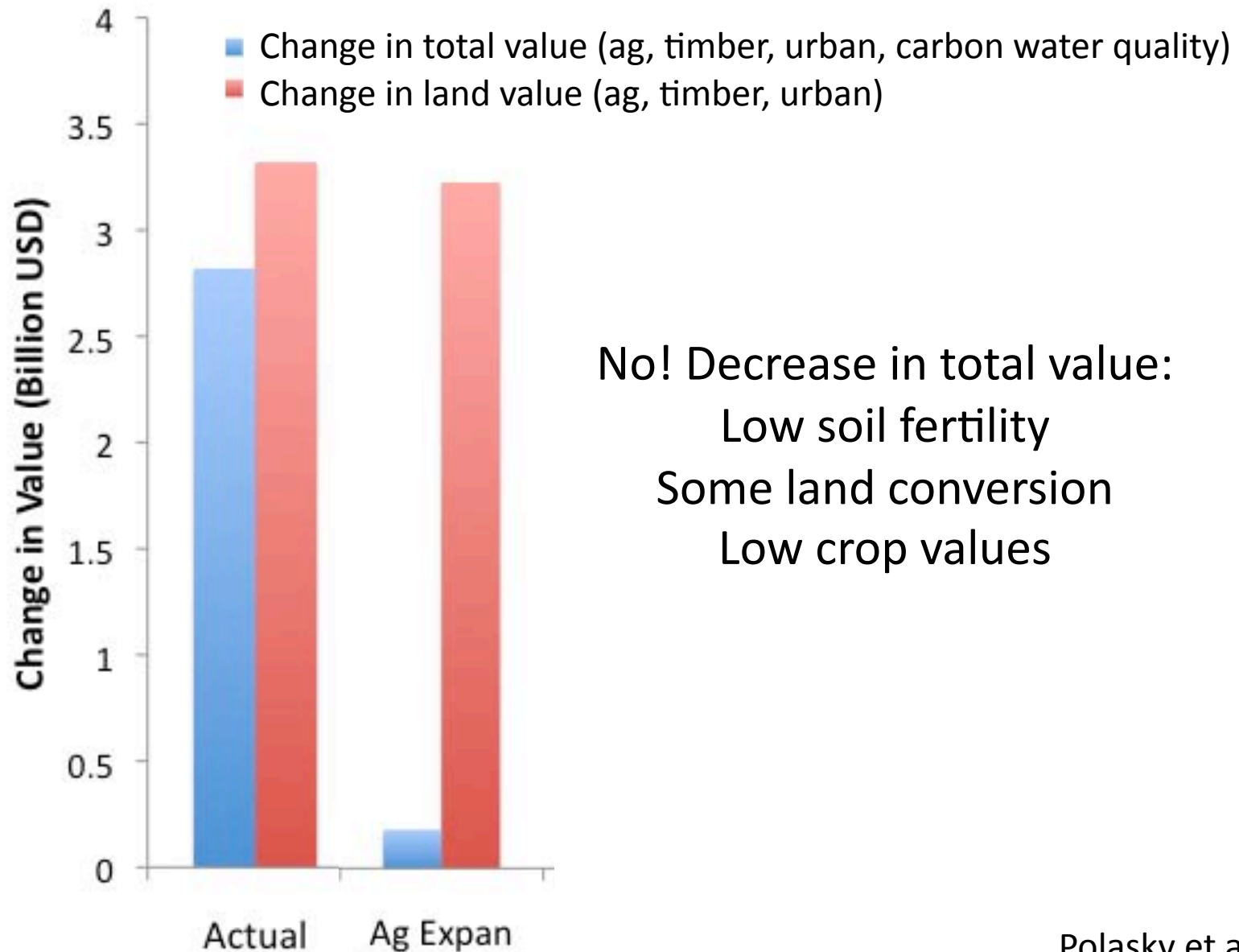


Yes, it came at a cost, but even total value shows increase.

Would further expansion be worth it?



Would further expansion be worth it?



No! Decrease in total value:
Low soil fertility
Some land conversion
Low crop values

Revealing costs and benefits

THE FULL MONTY

