The real cost of acquiring lands for conservation

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QUESTION

What are the costs of buying land to protect it?

ABSTRACT

A critical part of conservation planning and spatial prioritization is accurately accounting for **spatial heterogeneity of costs**, especially acquisition costs. Studies have revealed that this could lead to large **efficiency savings**, but they have based this claim on methods of estimation prone to affect the spatial pattern of variation in costs.

Due to the **lack of data** regarding actual conservation costs faced by conservation organizations, a common approach is to rely on **more readily available proxies**, such as GDP per capita or agricultural land value. While these proxies can seem reasonable, the lack of mechanistic understanding of what determines actual conservation costs means that there is **a risk that such proxies do not preserve the underlying spatial signal of actual costs**.

The Data

Land acquisition deals made by The Nature Conservancy: the first nationwide database of spatially explicit costs associated with protected areas.

- 9300 with fee simple type ownership
- 8600 acquired since 1980

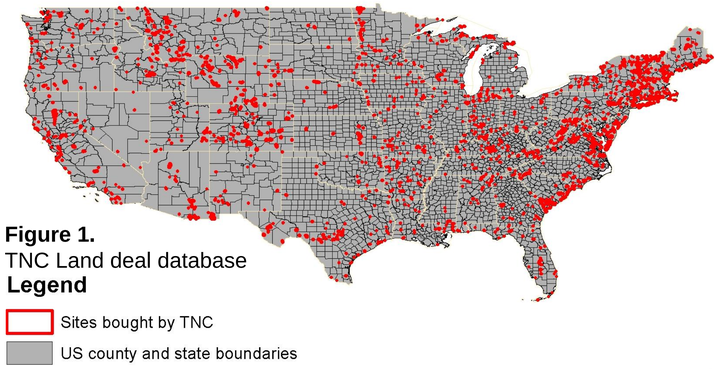

Figure 1.
TNC Land deal database

Agricultural land values as a proxy

There are reasons to doubt its accuracy when it comes to predict conservation costs.

- the **nature of land parcels targeted for conservation**
- the **dynamics of conservation land transactions**

Both could be very different compared to agricultural lands. The spatial pattern and the variation of one might not accurately reflect those of the other … let's see how it performs.

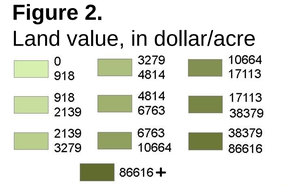

Figure 2.
Land value, in dollar/acre

So, how does agricultural land value perform?

Agricultural land value **used as sole proxy for acquisition costs returns inaccurate estimates of acquisition costs** that an organization such as TNC will actually face.

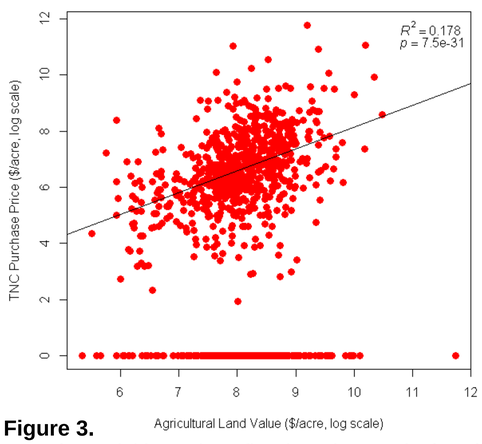

Figure 3.
Actual acquisition prices fitted against agricultural land value, county per county, across the US.

It does covary with acquisition prices but **it explains at best <20% of the observed spatial variation for these costs**.

Donations (partial or total) of land are observed across the whole range of agricultural land values. When total donations are included, the spatial variation of costs successfully accounted by agricultural land values decrease.

This suggests that **other parameters are necessary to account for the particular characteristics of land transactions made for conservation**.

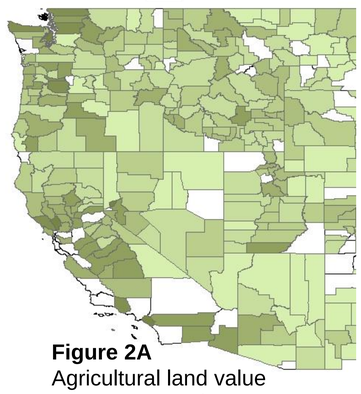

Figure 2A
Agricultural land value
USDA census data

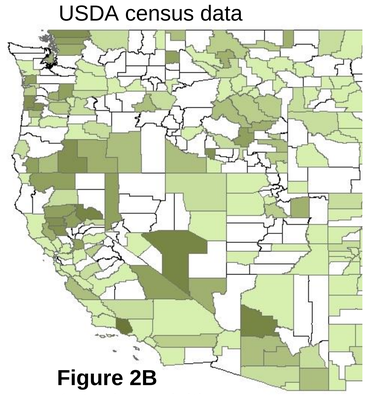

Figure 2B
Actual acquisition costs
TNC Database

TAKE HOME

The proxies we commonly use might be only weakly spatially correlated with actual cost faced by NGOs.

Agricultural land value significantly explains part of the cost variation, but other parameters are needed to make an accurate prediction.

WHAT NOW?

→ Describing the nationwide landscape of actual acquisition costs, as faced by NGOs, and identifying the factors behind their spatial distribution.

The Nature Conservancy

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