

Lost Opportunity Cost as a Form of Payments for Ecosystem Services

Abstract

Rangelands comprise the largest land mass in the state of California, providing forage for livestock, a marketable product. Rangelands also provide many ecosystem services such as habitat for threatened and endangered species, clean water and air, views, and carbon sequestration to name a few. Landowners typically do not receive any monetary reimbursement for their stewardship in providing these ecosystem services to the public. Markets for many of these services have been difficult to establish with limited ability to adequately monitor and measure services provided. At the same time, rangelands in some areas of the state have been experiencing rapid conversion to other, more profitable forms of agriculture such as almond and walnut orchards.

During this conversion to a higher value product, ecosystem services are being altered, and in some cases negatively affected. Connectivity of habitat for San Joaquin kit fox has been a concern with conversion on the westside of the San Joaquin Valley. Connectivity and proper functioning of vernal pool ecosystems is of concern on the eastside. Water supply has come into question as the conversion has led to pumping of ground water to irrigate the new crops. To prevent further conversion of rangelands and the loss of the services they provide, there needs to be a mechanism to identify and compensate landowners for the value of products and services being received from rangelands.

This paper looks at lost opportunity costs as a method for determining the value of Payment for Ecosystem Services (PES) for rangelands. PES can compensate landowners for the value of products and services they provide, making them more competitive financially to remain as large, unaltered land. Real estate values as well as University of California Cooperative Extension Cost Studies will be used to demonstrate the difference in value (lost opportunity cost) between the primary products of rangelands (livestock production) and the products of the converted rangelands (almond and walnut orchards). Lost opportunity costs will provide guidance for PES. If conversion is to be slowed or stopped to protect the ecosystem services rangelands provide, this dollar value should represent the value of PES to keep rangelands providing ecosystem services.

Lost Opportunity Costs

- The value of rangelands has steadily been increasing. Since 2004 there has been an increase in value by over **\$1,500 per acre** (California Chapter of American Society of Farm Managers and Rural Appraisers).
- Net return on a per acre basis:
 - Cow-calf pairs is **\$1.02** for a 300 head ranch, with a stocking rate of 12 acres per Animal Unit (2008 Beef Costs and Returns Study, UCCE)
 - Stocker cattle is **\$7.74** for a 300 head stocker operation, with a stocking rate of 12 acres per Animal Unit (2010 Sample Costs for Beef Cattle Yearlings/Stocker Production, UCCE)
 - Almonds in 2011 was **\$195.00** (2012 Almonds Costs and Returns Study, UCCE)
 - Walnuts in 2011 was **\$1,442.00** (2012 Walnut Costs and Returns Study, UCCE)

Simple economics is pushing conversion of rangelands in California's foothills to a permanent crop, typically almonds and walnuts. While orchards can provide some ecosystem

services, we lose many of the services that rangelands provide such as:

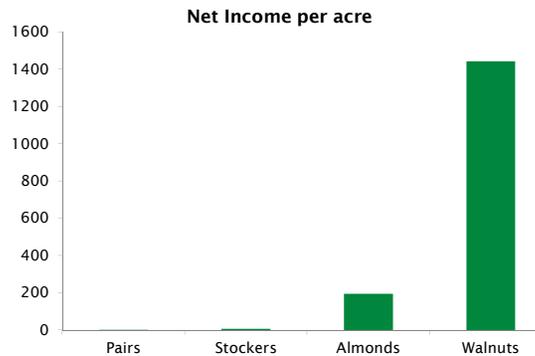
- Vernal Pools
- Habitat for many threatened and endangered species
- Ground Water recharge

Unless the financial gap between the different commodities can be closed, there will continue to be conversion. Discussion on how to value different ecosystem services should also consider a Lost Opportunity Cost as a simple formula to prevent more rangelands from being converted. Whether you can increase the California Tiger Salamander or the San Joaquin Kit Fox populations with different grazing management may be debated, we know services will decrease once conversion occurs. There is a large gap that needs to be bridged to prevent more rangelands from being converted.

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Difference in net profit for commodities becoming common on rangelands.



Stickers grazing on annual rangelands.



Rangelands actively being converted.



Trees planted on the hillside in the background, and ready to plant in the foreground.



Trees planted on the hillside and down to the creek's edge.

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