

Abstract

Keywords

1. Introduction

2. Ecosystem services

2.1. Pollination

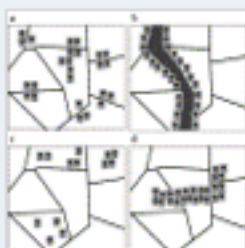
2.2. Hydrologic services

2.3. Carbon sequestration

3. Landscape designs

3.1. Locally supplied services

Table 1



3.2. Regionally supplied services

3.3. Globally supplied services

4. Incentives

4.1. Transaction costs

4.2. Assumptions

4.3. Cooperation bonus

Table 2



Abstract

Agricultural landscapes hold tremendous potential for producing a diverse stream of ecosystem services. Yet, because the spatial configuration of particular ecosystems is critical to the supply of many services, realizing this potential requires that farms be managed in a coordinated way across landscapes rather than as independent units. Under existing incentive programs, this level of coordination is typically neither required nor encouraged.

Here we explore how to achieve such coordination from an institutional perspective using voluntary incentives rather than regulation. We focus on three services operating at contrasting scales, from local to global: pollination, hydrologic services, and carbon sequestration. First, we briefly illustrate how agricultural practices can diminish or enhance their provision. Next, we show how all three services require coordinated, landscape-scale management because provision depends upon particular spatial configurations, of which we provide several stylized examples. Finally, based on these stylized configurations, we evaluate the relative merits of three incentive designs—the “cooperation bonus,” the “entrepreneur,” and the “ecosystem service district”—to promote cross-farm cooperation to enhance service provision.

All three incentive systems rely on rational self-interest, have cooperative configurations to promote ecosystem services across different scales, use tiered reward systems, and have a major voluntary element. They are distinct in certain key features. The cooperation bonus system rewards conservation even without cooperation but adds a bonus for cooperation. In the entrepreneur incentive, all tiers of reward are contingent upon cooperation. The ecosystem service district scheme is only partially voluntary and forces cooperation of all landowners once the district is formed. Our analysis of these heuristic alternatives integrates biophysical, economic, and institutional factors with the aim of addressing the suite of institutional barriers for landscape-scale management.

Keywords

Landscape design; Biodiversity; Ecosystem services; Economic incentives; Agriculture