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Can incentives make a difference? Assessing the effects of policy tools for encouraging tree-planting on private lands



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A R T I C L E I N F O

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ABSTRACT

This study uses a mail survey of private landowners in the Midwest United States to understand the characteristics of owners who have planted trees or intend to plant trees in the future. The analysis examines what policy tools encourage owners to plant trees, and how policy tools operate across different ownership attributes to promote tree-planting on private lands. Logistic regression results suggest that cost-subsidizing policy tools, such as low-cost and free seedlings, significantly increase the odds of actual and planned reforestation when landowners consider them important for increasing forest cover. Individuals most likely to plant trees, when low-cost seedlings are available and important, are fairly recent (<5 years), college-educated owners who own small parcels (<4 ha) and use the land for recreation. Motivations to reforest were also shaped by owners' planning horizons, connection to the land, previous tree-planting experience, and peer influence. The study has relevance for the design of policy approaches that can encourage private forestation through provision of economic incentives and capacity to private landowners.

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1. Introduction

A major challenge in research on forest carbon sequestration relates to the potential of private lands to generate additional carbon sinks through reforestation, improved forest management, or conservation (Galik et al., 2013; Schirmer and Bull, 2014). In the United States, over half of all forest land is under private ownership and more than a third (35%) is owned by private individuals and families, collectively known as family forest owners (Butler, 2008). These individuals are key players because their actions can influence the amount of available forest land, its health, and capacity to provide environmental benefits (e.g. carbon sequestration, wildlife habitats) (Charnley et al., 2010). Research shows, however, that most forest owners have limited familiarity with carbon offset schemes or other forest conservation programs, and are generally unwilling to participate in them (Galik et al., 2013; Markowski-Lindsay et al., 2011). In this study, we focus on tree-planting

activities that can lead to forest area increase on private lands. Tree-planting can contribute to carbon sequestration with or without formally meeting the requirements of carbon offset schemes. The tree-planting choices of landowners have potential to generate in-situ environmental benefits (e.g. soil conservation), regional (e.g. water quality), and global benefits (e.g. climate mitigation), thus making local reforestation of significance at multiple scales (Fisher et al., 2009). Currently, there has been minimal work regarding the decisions and willingness of landowners to undertake tree-planting, as well as the policy tools that may encourage such activities.

Using a mail survey of private landowners in Indiana, we examine whether owners had previously undertaken tree-planting or were planning to undertake tree-planting in the future. The analysis addresses the questions: (i) What are the characteristics of landowners who have planted or intend to plant trees in the future? (ii) What policy tools are likely to encourage landowners to engage in tree-planting? and (iii) How do policy tools operate across different ownership attributes to promote tree-planting on private lands? Not every owner can plant or intends to plant trees on their property. Roughly one in five family forest owners in the US

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plant trees on their land (Butler, 2008). Ownership attributes are important predictors of forest owners' management decisions, including tree-planting (Fischer and Charnley, 2010; Majumdar et al., 2009). In this analysis we explore how different policy tools, together with ownership characteristics, relate to decisions and motivations to plant trees. We focus on the role of government cost-share programs, low-cost seedlings, and tax benefits as policy incentives important to past reforestation: and direct payments. free seedlings, and free technical assistance as incentives for promoting future reforestation. As used here, reforestation behavior refers to both past and planned tree-planting activities. It can be expected that policy tools influence reforestation behavior differentially for small and large parcel ownerships, and for recent and long-term owners (Zhang and Mehmood, 2001; Hardie and Parks, 1996). These variations are important because forest ownership both in the US and in Europe is changing, and there are more parcels of small size owned by a diverse and growing number of exurban forest owners (Fischer et al., 2010; Põllumäe et al., 2014; NFF, 2014). By focusing on variations in landowner tree-planting choices and responsiveness to policy tools, this study provides insights about the potential of policy tools to harness individual motivations to generate environmental benefits on private lands.

2. Private forest owners and policy tools to encourage reforestation

Research shows that private forest owners invest in their land and trees, and that this is largely driven by a commitment to nature protection and stewardship (Knoot et al., 2010; Ross-Davis et al., 2005). For many landowners, amenity values, recreation, family legacy, and investment are dominant reasons for owning forest land (Bengston et al., 2011; Daniels et al., 2010; Fischer and Charnley, 2010). Forest owners who value their land as a family legacy are likely to undertake or plan to undertake tree-planting because it allows them to pass both economic assets and cultural heritage to their children (Fischer and Charnley, 2010). Family legacy values are generally consistent with long-term investment activities, such as tree-planting. Additionally, forest owners who frequently use their land for recreation are likely to share a commitment to conservation, and therefore be more likely to engage in tree-planting.

Property residence is another indicator associated with a greater likelihood of engagement in forest management activities, such as planting and harvesting (Joshi and Arano, 2009; Conway et al., 2003). Prior experience with tree-planting and/or harvesting is also related to active management, and owners with such experiences may be more likely to undertake or plan to undertake treeplanting. Karppinen (2005) finds that former experience with reforestation was positively associated with intentions to reforest among Finnish forest owners. As well, tree-planting by friends, neighbors, and family members may influence landowners' reforestation choices. Information from trusted peers is shown to be often more important than advice from experts (Ruseva et al., 2014; Sagor and Becker, 2014).

The management choices of forest owners are also influenced by ownership characteristics and socio-demographics (age, education) (Majumdar et al., 2009; Beach et al., 2005). Parcel and forest ownership size reflect the physical capacity of the land to support different land use decisions (Frimpong et al., 2006). Property size was the most important factor influencing the management strategies of Swedish forest owners (Eggers et al., 2014). Larger ownerships are generally positively associated with active management, including thinning and harvesting (Beach et al., 2005). Ownership length (or tenure) is negatively associated with management for nontimber values, such as recreation and wildlife habitats (Joshi and Arano, 2009; Conway et al., 2003). Higher education and income have a positive relationship with reforestation, while age and retirement status are shown to have a negative effect (Fischer and Charnley, 2010; Joshi and Arano, 2009).

Studies also show that the availability of policy tools – federal, state, and local programs designed to influence the management choices of forest owners – is significantly associated with land-owner management behavior (Cubbage et al., 2007; Schaaf and Broussard, 2006; Serbruyns and Luyssaert, 2006; Beach et al., 2005). When properly designed, policy tools can facilitate extrinsic motivations by tapping into people's values and enabling the internalization of socially-beneficial behaviors, by providing incentives, capacity, learning, or symbolic rewards (Schneider and Ingram, 1990; Duesberg et al., 2014).

In private forestry, incentive tools rely on financial rewards, including cost-share programs, tax benefits, subsidies, and direct payments (Cubbage et al., 2007). Capacity tools provide information, knowledge, and resources, such as technical assistance and professional advice; and, learning tools engage landowners through educational workshops and interactions with professionals and peers (Schaaf and Broussard, 2006). A review of the empirical literature finds both technical assistance and government cost-share to be positively associated with reforestation practices (Beach et al., 2005). Zhang and Flick (2001) observe a positive relationship between reforestation and financial assistance programs, such as cost-share and tax-incentives. Kilgore et al. (2008) find that technical assistance was preferred over financial incentives among family forest owners.

This analysis focuses on cost-share, tax benefits, and direct payments as incentive tools, free technical assistance as a capacity tool, and low-cost and free seedlings as a hybrid between incentive and capacity tools. Educated and financially-motivated forest owners may be more likely to respond to incentive tools (Serbruyns and Luyssaert, 2006), while free technical assistance may be more effective with owners who are motivated and fairly well-informed (Schneider and Ingram, 1990). The provision of low-cost and free seedlings may be particularly advantageous, where owners are motivated but uncertainty exists about their endowments (e.g. parcel size), planning horizons, or land use preferences (Schneider and Ingram, 1990). In short, different policy tools have different effects depending on the context, values, and motivations of forest owners. Our analysis seeks to assess the appeal of different policy tools, and to understand how to better harness individual decisions and motivations to plant trees.

3. Methods

3.1. Study area

A random sample of private landowners was drawn from six counties in south-central Indiana, in the Midwest U.S. (Fig. 1). As one of four geographic regions in the U.S., the Midwest is known for its diverse topography, agricultural production alongside growing urbanization, and large temperate deciduous forests that underwent massive deforestation in the mid-19th century. Our study site in south-central Indiana is characterized by a mix of low hills, forest, pasture, and crop production. It is similar to other Midwestern areas experiencing residential expansion, declining agricultural land use, and peri-urban reforestation (Deller et al., 2001). Over the past century, forest area in the state of Indiana has grown from 6 to 20 percent of the state's area, with most of the regrowth occurring on small parcels owned by approximately 218,000 family forest owners (Woodall et al., 2011). Individuals own 83 percent (or 1.6 million hectares) of Indiana's forest lands (Woodall et al., 2011). The majority of them own parcels less than 40.5 ha in size and rely on Download English Version:

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