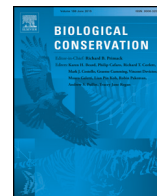




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Trusting land to volunteers: How and why land trusts involve volunteers in ecological monitoring

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ABSTRACT

Land trusts play an increasingly important role in conservation both in terms of the magnitude of conservation activities in which they participate and the total proportion of all conservation that they represent. Making informed conservation management decisions and local community engagement are two critical problems facing operators of locally-owned protected areas including those managed by land trusts. Engaging volunteers for critical management needs, such as collecting ecological data, is one way to overcome the challenge of managing and monitoring resources as a small organization. Partnering with volunteers can also help achieve other conservation goals including educational outreach and increasing public support. Land trusts that engage in volunteer-based monitoring (VBM) provide an opportunity to study how citizen science activities can contribute to conservation in practice. We surveyed land trust organizations across the United States to learn about their VBM programs. We received survey responses 332 organization, 133 of which maintain VBM programs. We found that the majority of land trusts with VBM programs are small organizations with less than ten employees (79.1%), few volunteers (50.4% with <10 volunteers, 87.2% with <50 volunteers), and little funding dedicated to the volunteer management (70.9% with <\$1000 annually). Volunteers collect data on a wide variety of monitoring targets including vertebrate, invertebrate, and plant species, as well as water, soil and air quality measurements. Volunteers also engage in many different stages of the monitoring process including data collection, entry and analysis, and even dissemination of results. While increasing civic engagement and educational outreach were reported as the most important motivations for land trusts to engage in VBM, organizations reported that increasing civic engagement is the most difficult benefit to achieve. These results have implications for how land trusts can use citizen science and other participatory approaches to engage volunteers for conservation actions and increase public engagement. This study also shows that scientists interested in citizen science may engage with land trusts to learn about the potential for citizen science to improve conservation management.

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1. Introduction

The number and scope of citizen science programs, and the peer-reviewed journal publications that result from them, have exploded in recent years (Bonney et al., 2009). Resource agencies and local land managers increasingly use and solicit volunteer or “citizen scientist” collected data for natural resource management (Conrad and Daoust, 2008; Schmeller et al., 2009). For local organizations and agencies, citizen science for conservation can help to achieve multiple goals, including providing new scientific insights and data needed to inform management while also engaging people with nature (Shirk et al., 2011). Potential benefits of citizen science programs for conservation

organizations include providing a low-cost option for data collection (Gollan et al., 2012), encouraging collaboration to build social capital within local communities (Jordan et al., 2012), and leveraging scientific and natural history expertise of volunteers (Conrad and Daoust, 2008). However, potential barriers include difficulty in maintaining volunteer interest, lack of capacity for volunteer training and supervision, and data fragmentation (Conrad and Daoust, 2008; Cooper et al., 2012). The question of when, why and how to engage volunteers to help inventory and monitor natural resources for conservation is a common one for land managers turning to citizen science.

Land trusts, which are non-governmental organizations that conserve land by negotiating conservation easements and/or purchasing land, represent an important subset of conservation-focused land management organizations (Brewer, 2003). The number of land trusts in the United States has drastically increased since the 1980s (Chang, 2011).

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By 2011, there were over 1700 land trusts operating in the United States (Chang, 2011). While the primary activity of land trusts was negotiating conservation easements (Rissman et al., 2007), many are now holding land in fee-title. State and local land trusts in the United States have increased their fee-title land holdings from 455 thousand hectares in 2001 to 868 thousand hectares in 2010, at an annual growth rate of 7.4% (Chang, 2011). This value strictly refers to land owned by land trusts, and not land that land trusts help place under easement or purchase and then reconvey to other owners. Owning reserves requires that these land trusts manage their natural resources and monitor progress toward stated objectives of that management. This combination of numerous small organizations, with common needs in terms of monitoring, creates an opportunity for intentional design of citizen science that fills both data and engagement needs (Shirk et al., 2011).

Many small conservation organizations, including land trusts, draw upon local volunteers to conduct some or all of their monitoring activities (Conrad and Hilchey, 2011). The majority of land trust in the United States are small organization, with a few exceptions. As of 2010, land trusts in the United States had over 136 thousand active volunteers, representing a 70% increase in volunteers from 2005 to 2010 (Chang, 2011). As a form of citizen science, volunteer-based monitoring (VBM) programs involve non-professionally trained members of the public in monitoring activities including data collection and analysis in collaboration with professionally-trained scientists (Shirk et al., 2011). Within the larger context of citizen science programs focused on conservation, we wondered how extensively VBM programs are employed by land trusts, for what purposes, and what role this particular kind of citizen science plays in achieving the goals for these conservation organizations. We do not consider monitoring for compliance with conservation easement terms on lands not owned by land trusts because this monitoring does not usually involve the collection of ecological data and therefore does not qualify as citizen science.

Monitoring often represents a significant investment for a land trust. As of 2011, land trusts collectively spent close to \$170 million per year in monitoring and stewardship activities, representing a doubled annual investment since 2006 (Chang, 2011). Monitoring is a challenge across a wide spectrum of non-governmental organizations (NGOs) engaged in land management (Muir, 2010). We anticipate that monitoring is particularly difficult for land trusts because they are typically organizations with limited resources and few staff.

Partnering with volunteers to conduct monitoring is a means for land trusts to meet some of these resource needs and engage with the communities in which they operate. As land trusts begin to own and manage more land, their public visibility as conservation actors increases. Public outreach and engagement has become an important goal for many land trusts (Land Trust Alliance, 2002). Land trusts often require public assistance to achieve critical management actions in terms financial and political support (Brewer, 2003) as well as direct participation in natural resource management through volunteer activities (Cooper et al., 2007). This need for social capital and community engagement is a key challenge for many community-based organizations focused on conservation (Press, 2002; Schwartz et al., 2002) and natural resource management (Fernandez-Gimenez et al., 2008). Hence, engaging volunteers in citizen science activities, such as ecological monitoring, provides an opportunity for land trusts to achieve multiple organizational goals simultaneously.

We present results from a survey that queried land trusts across the United States regarding their VBM programs. We used the results from this survey to address five questions in this study. (1) What organizational characteristics of land trusts are associated with participation in VBM programs? (2) What are the barriers that prevent some land trusts from forming VBM programs? (3) What are the goals and motivations for VBM programs? (4) What specific practices characterize VBM programs in land trusts? (5) How successful do land trusts perceive their VBM programs to be?

2. Materials and methods

2.1. Data collection

We developed an online survey to query how and why land trust organizations involve volunteers in ecological monitoring. We piloted the survey and solicited feedback with six land trust staff to ensure the questions were appropriate and elicited useful information. With help from the Land Trust Alliance (LTA), a national non-profit organization, we sent surveys to contact persons at the 1662 LTA member land trust organizations located in the United States. These accounted for >95% of all the land trust organizations in the United States according to the LTA. The survey was open from June 27 to August 27, 2012, with two reminder emails sent during that time.

All respondents were requested to answer basic information about their organizations including organization size, partnerships, and funding sources. We asked if they operate VBM programs, specifically defined as “activities in which volunteers are involved in the collection of ecologically-relevant data used to inform natural resource management.” For those with VBM programs, we asked the respondent to rate on a Likert-style 1–5 scale: (1) the importance of a list of potential goals of their VBM programs, (2) the factors that contribute to VBM program success, and (3) their evaluation of their current VBM program success. Organizations with VBM programs also answered a wide variety of questions regarding their VBM practices including those related to volunteer recruitment, volunteer training, communication with volunteers, and development of monitoring protocols (see supplemental materials to view the full survey). The organizations without VBM programs rated (1) the potential benefits that VBM programs could contribute to their organization and (2) the barriers to VBM program implementation.

2.2. Survey responses

We received 332 completed survey responses (20.0% response rate). An additional 144 organizations responded via email that they would not participate in the survey because they do not conduct ecological monitoring. While 155 organizations (46.7% of responses) reported having current VBM programs, 22 of these only do compliance monitoring which means volunteers only determined whether agreements set forth by conservation easements were honored and do not collect ecological data. These organizations were therefore treated as land trusts without VBM, resulting in a total of 133 active VBM programs in our study (40.1% of responses). In contrast, 164 (49.4% of responses) organizations reported that they have never had a VBM program. An additional 13 (3.9% of responses) organizations reported that they formerly had VBM programs. These responses were not included in this study.

2.3. Data analysis

All results describing the characteristics of land trust organizations and their VBM programs were reported as the percentage of total responses for each question. Most questions were optional, and there for the sample size varies by question. The sample size is reported for each result. The comparison of average scores for questions that respondents ranked on Likert-scales were made using the Tukey-Kramer method for multiple comparisons and unbalanced sample sizes. Significant differences between average scores were determined for $\alpha = 0.05$. To simplify the results on barriers to operating VBM programs experienced by land trusts without them, we combined positive responses (Agree and Strongly Agree) and negative responses (Disagree and Strongly Disagree). For other questions scored on a 1–5 Likert-scales we reported on the combined percentage of scores rated 4 and 5 to represent positive responses.

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