Applied Geography 91 (2018) 55–69

Contents lists available at ScienceDirect

Applied Geography

journal homepage: www.elsevier.com/locate/apgeog

Grassroots innovations for sustainability in the United States: A spatial analysis

Emily Nicolosi[a,*], Richard Medina[a], Giuseppe Feola[b]

[a] University of Utah, Department of Geography, 332 S 1400 E, RM. 217, Salt Lake City, UT, 84112, USA
[b] Department of Geography and Environmental Science, University of Reading, Whiteknights – PO Box 227, RG66AB, Reading, United Kingdom

ARTICLE INFO

Keywords:
Grassroots innovations
Sustainability
GIS
Spatial autocorrelation
Socio-economic data

ABSTRACT

In response to unsustainable dominant systems of production and consumption, grassroots innovations for sustainability (GIs) experiment with new forms of sustainable living. A wide variety of GIs have emerged recently addressing a range of possible solutions, from new systems of provision and economic forms, to social organization and housing. The main motivation of this research is to better understand what place-based conditions may facilitate the emergence of GIs, as a whole, and amongst different types. Using county-level data, we find that i) the demographic, political, and spatial contexts in which GIs emerge differ significantly from US averages and to some extent vary amongst the types of GIs, and ii) the spatial distribution of GIs across the United States is uneven.

1. Introduction

The growing threat of climate change coupled with alienation from the culture of capitalism is driving new forms of social movements. Networks of activists are coming together to construct alternative systems of production and consumption grounded in new ecological and social values. A growing body of research takes aim at these movements, labelled by some scholars as “grassroots innovations for sustainability” (Seyfang & Smith, 2007). Transnational networks that circulate generic information about grassroots innovations enable activists across the globe to access these blueprints for sustainability. Within communities, dedicated activists apply information to local circumstances, experimenting and adapting them to place-specific contexts (Nicolosi & Feola, 2016).

In contrast to conventional innovations, grassroots innovations (GIs) are bottom-up solutions that act in response to the unsustainability of mainstream systems and have the potential to contribute to systemic change. GIs have both technical (technological) and social (institutions, knowledge, values, culture) dimensions. They differ from conventional innovation in that they unbound to capitalist profit-seeking; they are radical, *socio*-technical innovations that often rely on volunteers and common ownership (Seyfang & Longhurst, 2016). As such, GIs are often overlooked by policymakers, and formal science, technology, and innovation studies (Smith, Fressoli, Abrol, Around, & Ely, 2017). GIs are driven by the fundamental view that the systems responsible for creating social and environmental problems cannot be relied upon for solutions. Instead, GIs contend that radical new ways of living, playing, and working must take hold in order to achieve radical sustainability. Grassroots innovations for sustainability come in many forms; seven broad categories are identified by the authors at the time of writing (see Table 1).

Previous work on GIs has paid particular attention to the challenges facing such projects, the importance of networking, learning, and intermediaries for success, and their diffusion potential (Hossain, 2016). It has also been suggested that GIs emerge in ‘unconventional settings’ (Smith et al., 2017), in politically liberal areas (Feola & Butt, 2017), and that they are supported by a spatially proximate density of similar projects and corresponding progressive culture (Bailey, Hopkins, & Wilson, 2010; Longhurst, 2015). However, to date no analysis has comprehensively explored the place-based conditions that might support GI emergence, although it has been highlighted as a ripe arena for future research (Ornetzeder & Rohracher, 2013).

As such, we explore the spatiality of grassroots innovations for sustainability and several place-based factors they may contribute to their development in the United States, an understudied location. We pose three interrelated questions: i) what constitutes favorable condi-

* Corresponding author.
E-mail address: Emily.Nicolosi@utah.edu (E. Nicolosi).

https://doi.org/10.1016/j.apgeog.2017.12.024
Received 17 May 2017; Received in revised form 8 December 2017; Accepted 23 December 2017

Table 1
Types and examples of grassroots innovations for sustainability with key references.

General grassroots innovation category	Examples	Key references
Alternative agriculture and provision	Community gardens, permaculture (guilds*), local food, organic gardening cooperatives, farmer's markets, vacant lot gardeners, guerilla gardeners	Ferguson & Lovell, 2015; Kirwan, Ilbery, Maye, & Carey, 2013; Smith, 2006
Alternative housing	Eco-housing, co-housing*, ecovillages, low impact development (LID)	Boyer, 2015; Ferguson & Lovell, 2015; Hines, 2005; Meltzer, 2005; Pickerill & Maxey, 2009; Seyfang, 2010; Smith, 2007
Alternative transportation	Bicycle cooperatives*, critical mass rides, bike messengers, sustainable biodiesel and biofuel cooperatives, straight vegetable oil (SVO)	Carlsson, 2008; Ulmanen et al., 2009
Alternative economies	Community currency*, *gift circles*, time banks, Local Exchange Trading Systems	Collom, 2005, 2011; Seyfang & Longhurst, 2013a, 2013b, 2016
Community enterprises and collectivities	Recycling social enterprises, community-owned renewable energy, cooperatives, *seed libraries*,*, DIY technology, makerspaces	Charter & Kellier, 2014; Hargreaves et al., 2013; Hopkins, 2011; Seyfang, Park, & Smith, 2013; Seyfang, Hielscher, Hargreaves, Martiskainen, & Smith, 2014; Smith, Hielscher, Dickel, Soderberg, & van Oost, 2013
Digital commons	Open-source technology and software	Carlsson, 2008; Kostakis et al., 2016; Smith et al., 2016; Smith et al., 2013
Alternative culture and art	Burner culture	Carlsson, 2008; Kozinets, 2002

*innovation included in this study. *Italics* represent grassroots innovation areas where there is a notable dearth of research.

tions for the development of grassroots innovations for sustainability, ii) how do these conditions unfold across space in the US, and iii) what differences might be found in these conditions among the different types of grassroots innovations. In so doing, we first explore the character of GIs in greater depth, including the seven identified categories of GIs and the specific types of GIs examined in this study. Next, we review the literature on the place-based conditions that facilitate GI emergence and development. Three categories of place-based preconditions that support GIs that have been discussed in the literature, from which we derive our three hypotheses. We then test these hypotheses by spatially analyzing socio-demographic and political affiliation data on the US county (a political division of a US state) level that conjunct with GI presence. We conclude with practical and theoretical implications as well as directions for future research.

1.1. Background on grassroots innovations for sustainability

The most widely accepted and referenced definition of grassroots innovations for sustainability (GIs) developed from a collaboration between Gill Seyfang and Adrian Smith. Seyfang and Smith (2007) define GIs as, “networks of activists and organizations generating novel bottom-up solutions for sustainable development and sustainable consumption; solutions that respond to the local situation and the interests and values of the communities involved” (Seyfang & Smith, 2007, p. 585). While it may be argued that GIs are primarily a phenomenon of advanced capitalist countries because they are in large part a response to hyper-consumption and the unsustainability of neocapitalist economic systems, some argue that they are not exclusive to the so-called ‘developed’ nations (Gupta, 2012; Smith et al., 2017).

Grassroots innovations for sustainability come in many forms and cover the gambit of what is needed for human survival and flourishing. The authors identify seven general categories of GIs with several subcategories or types of each. The examples of subcategories given here correspond to the innovations analyzed in this study, which were selected based on the availability of applicable data (see Table 1).

First, alternative agriculture and provisioning projects are community-based efforts to grow local and often organic food. A growing movement in alternative agriculture is permaculture, developed in the late 1970s in Australia, but now a global phenomenon that approaches food-producing systems as human-natural ecosystems and is often promoted by permaculture guilds, or groups of permaculture practitioners who discuss and practice permaculture applied to specific locations (Ferguson & Lovell, 2015; Mollison, 1988; Smith, 2007). Alternative agricultural projects in general appear to be on the rise: organic agricultural acreage is increasing at an annual rate of 15% in the United States (USDA, 2016a).

Second, alternative housing projects have origins in the communal movement of the 1960s, and today have many forms that are generally united in their aim towards ecologically and socially responsible housing (Hines, 2005). Cohousing communities are clusters of private attached or single family homes around shared space, such as a common house (with kitchen/dining areas), recreational space, and outdoor space (including open space and gardens) (Meltzer, 2005). Ecovillages are communal housing projects designed to minimize ecological impact, and may be centered around a variety of themes (e.g. spiritual, secular, high or low tech, income-sharing) (Boyer, 2015; Liftin, 2013). Online intermediaries such as the Fellowship for Intentional Community (*ic.org*) have helped alternative housing projects across the globe share information and gain traction in recent decades (Boyer, 2015).

Third, alternative transportation from a grassroots innovations perspective refers to community-based promotion and experimentation with transportation that is not dependent on fossil fuels. The example used in this case study is bicycle collectives (*bikecollective.org/wiki*), which provide free or low-cost access to bikes and education around bike maintenance (Arnold, 2012).

Fourth, community enterprises and collectivities are community-owned and run businesses and non-for-profits (respectively) that contribute to a common social and environmental good (Hargreaves, Hielscher, Seyfang, & Smith, 2013; Vickers, 2010). The example pursued in this research is seed libraries, which notably have been met with a dearth of academic research although they are a very interesting example of grassroots innovations. Seed libraries are similar to the concept of a book library: individuals can obtain seeds that are typically heirloom and locally-adapted in exchange for a return of seeds at the end of the growing season (Helicke, 2015). The Seed Library Network (*seedlibraries.org*) is an online intermediary and repository for seed library information; a recent book (Conner, 2015) also gives instructions for how to start your own seed library. While seeds have been shared throughout human history, the concept of a seed library is a relatively new phenomenon (Helicke, 2015).

Fifth, alternative economic projects in general aim to achieve social