



Appraisal of social-ecological innovation as an adaptive response by stakeholders to local conditions: Mapping stakeholder involvement in horticulture orientated green space management



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ARTICLE INFO

Article history:

Received 17 November 2015

Received in revised form 8 February 2016

Accepted 24 May 2016

Available online 24 May 2016

ABSTRACT

Urban areas are hubs of creativity and innovation providing fertile ground for novel responses to modern environmental challenges. Previous studies have attempted to conceptualise the ecological, social and political potential of social-ecological innovation in urban green space management. However, little work has been conducted on the social-ecological conditions influencing their occurrence and distribution. Further research is therefore necessary to demonstrate whether stakeholder stewardship of green resources contributes towards adaptive capacity in social-ecological systems. The research reported here explored the extent of organised social-ecological innovations in a continuous urban landscape comprising three adjoining metropolitan areas: Manchester, Salford and Trafford (UK). Examples of horticulture orientated organised social-ecological innovation were identified using a snowball-sampling method. Their distribution, explored with GIS and remote sensing technology, was found to be significantly associated with levels of both, social and ecological, deprivation. The study presented social-ecological innovation as an adaptive response to environmental stressors, conditioned by specific social and ecological parameters in the landscape. It therefore provides empirical support for social-ecological innovation as a valid ingredient contributing to resilience in adaptive social-ecological systems. Not only do such collective community-led elements of natural resource management warrant acknowledgement in urban green space planning, but their distribution and productivity may provide a valuable social-ecological laboratory for the study of polycentric governance and adaptive capacity in the urban environment.

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1. Introduction

Urbanisation has been presented as an environmental process which presents some of the greatest challenges to, but also offers some of the greatest opportunities for, the adaptive management of ecosystem services through innovative and adaptive natural resource governance (CBD, 2012). According to resilience thinking (Gunderson, 2000; Berkes et al., 2003; Walker et al., 2006), diverse social-ecological and innovator networks may hold some of the keys to future adaptive urban management (Armitage, 2005; Janssen et al., 2006; Cantner et al., 2010). Walker et al. (2004) suggested that the successful management of future changes within social-ecological systems is dependent on three important attributes: resilience, adaptability and transformability. They

described resilience as the ability of a system to undergo disturbance while maintaining its essential functions; adaptability as the ability of core actors within the system to influence resilience; and transformability as the capacity to assemble an essentially new system when the current one becomes untenable. The cycles of transformation and adaptation which underpin such close-knit social-ecological systems are described by the related concept of the adaptive cycle (Gunderson and Holling, 2002). A key element in the ability of systems to withstand, adapt to, or recover from internal and external environmental stresses is the capacity to adapt (Gunderson and Holling, 2002). Adaptation to change can take place at various stages in the adaptive cycle and at various scales within interrelated cycles operating at differential spatial and temporal scales (Holling et al., 2002a; Krasny and Tidball, 2015).

One means through which adaptive capacity may be increased in social-ecological systems is through polycentric approaches to resource management (Folke et al., 2005; Lebel et al., 2006) which can diversify available responses to environmental challenges

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(Elmqvist et al., 2003). The CBD (2012) report called for the appropriate decentralisation of natural resource management, a view shared by the authors of the Millennium Ecosystem Assessment (2005) as well as researchers who have studied the resilience of social-ecological systems (Ernstson et al., 2008; Shava et al., 2010; Krasny and Tidball, 2012; Colding and Barthel, 2013; Barthel et al., 2014).

Although the polycentric governance of green resources which promotes stakeholder engagement and local stewardship of ecosystem services has been promoted as an essential ingredient of adaptive capacity (Andersson et al., 2007; Ernstson et al., 2010; Biggs et al., 2012), much of the exploration into adaptive responses by communities to environmental stresses has focussed on those which have occurred in the wake of natural disasters (Gunderson, 2010; Tidball et al., 2010, 2014; Krasny and Tidball, 2015). Such work has primarily focussed on individual case studies of adaptive responses to disturbing events and environmental tipping points (Tidball et al., 2010; Tidball, 2012; Krasny and Tidball, 2012, 2015). These catastrophic events cause associated social-ecological systems to enter the *collapse* or (*release*) stage of the adaptive cycle (Holling et al., 2002b) and, as such, provide opportunities to evaluate, with hindsight, the resilience and vulnerability of such systems. They also permit an assessment of the range of innovative responses which emerge during the “back-loop” phase characterised by re-organisation and renewal (Carpenter and Brock, 2008). Post-disaster scenarios, due to their severity, naturally provoke widespread concern, scrutiny and opportunity for a diverse range of responses at local, regional and national levels of agency. Accordingly, such large-magnitude disturbances have provided valuable case studies towards an appreciation of social-ecological innovation and adaptation to change. It is true that radical community-led responses to urgent social-ecological challenges are vital to recovery and regeneration in post-disaster “red zones” (Okvat and Zautra, 2014; Tidball and Krasny, 2014). However, the building of social-ecological resilience, through a shift towards more polycentric forms of governance (Ernstson et al., 2010; Biggs et al., 2012), relies heavily on traits which emerge gradually and locally such as trust, sense of place and social capital (Ernstson et al., 2008; Krasny and Tidball, 2015). Nowhere are such qualities more relevant than in cities where they support responses to both the social and ecological challenges of urbanisation (Ernstson et al., 2010; Krasny and Tidball, 2015).

1.1. Social-ecological innovation in urban areas

The cumulative effect of relatively small environmental disturbances over time can be just as destructive as high-magnitude low-frequency events through the crossing of environmental thresholds and the formation of “broken places” (Krasny and Tidball, 2015). Such, often urban, areas are typified by social disinvestment and ecological degradation, conditions which can stimulate equally adaptive responses from local stakeholders (Okvat and Zautra, 2011). Given the “slow-burn” nature of such incremental social-ecological deprivation (Tidball et al., 2014), the responses exhibited by communities are likewise often localised, gradual and inconspicuous. However, it has been demonstrated that, for example, local small-scale civic-ecological responses to both social and environmental disinvestment can reap rewards not just locally (Krasny et al., 2014) but also through wider impacts on policy and decision-making at higher levels of governance (Folke et al., 2005; Ernstson et al., 2008).

Not only do cities appropriate vast ecological resources at local and global scales, but the distribution of those resources within the urban region, tend to echo familiar patterns of socio-economic inequality among the population demography (Haughton, 1999; Schweitzer and Stephenson, 2007). Urban areas exhibit high lev-

els of environmental inequality in terms of green space provision and, therefore, natural resources take on disproportionate cultural significance (UK NEA, 2011). Such a situation heightens the social-ecological tensions which may provide a rich context for examples of environmental engagement (Cattell, 2001).

Local social-ecological innovation, emerging from the broader civic ecology movement, has received increasing attention as an effective and desirable contribution to a decentralised approach to natural resource management, specifically in urban areas (Barthel et al., 2011; Colding and Barthel, 2013). Much attention has been paid in the literature to the potential gains stemming from the broad spectrum of practices classed as civic ecology in urban areas (Krasny and Tidball, 2012, 2015; Krasny et al., 2014), and to the benefits and organisational structures associated with community gardens (Wakefield et al., 2007; Pudup, 2008; Kingsley et al., 2009; Barthel et al., 2010; Okvat and Zautra, 2011). Furthermore, studies have demonstrated that social-ecological action is associated with increasing productivity of urban green space with user participation bearing a positive influence both in terms of levels of biodiversity (Dennis and James, 2016a) and ecosystem service provision (Dennis and James, 2016b). Innovative land-use and collective green space management in urban areas include, but are not limited to, community gardens, collectively managed allotments and farms, permaculture projects, forest gardens, pocket parks, and sites of environmental education and training. The majority of the research on such activity, however, has been of a qualitative nature and has adopted a largely conceptual stance in its appreciation of the emergence and impact of such approaches. For example, ethnographic studies investigating the views and goals of participants in social-ecological actor groups have succeeded in elucidating the motives which drive such engagement (Glover, 2004; Glover et al., 2005; Jones, 2005; Kingsley et al., 2009; Corrigan, 2011; Rosol, 2012; Green and Phillips, 2013). These studies have unpicked the genesis and organisational structure of collaborative groups involved in environmental stewardship and the importance of social-ecological networks at various levels of agency has been highlighted and promoted (Andersson et al., 2007; Ernstson et al., 2008; Biggs et al., 2010).

The presence and distribution of social-ecological innovation in the urban landscape, however, have hitherto been poorly understood (Janssen et al., 2006). Unless the extent of such practices in the urban landscape is contextualised, community-led stewardship of green space cannot be said to comprise a substantial or adaptive element in urban social-ecological systems. In order for social-ecological innovation to be confirmed as a valid contribution to adaptive capacity in the management of urban landscapes, it is necessary to demonstrate that such engagement occurs relative to local environmental conditions, as an adaptive response to local challenges. Furthermore, this needs to be done at the landscape scale so as to assess the occurrence of collaborative groups as a coherent body of innovation extant throughout the social-ecological system. Such an approach would confirm the contribution to adaptive capacity within systems by civic ecological intervention, something which has hitherto only been described through individually selected case studies (e.g. Holland, 2004; Kingsley et al., 2009; Patterson et al., 2010; Green and Phillips, 2013; Krasny and Tidball, 2015). Such studies, although insightful, fail to describe innovative stakeholder-led action as a coherent phenomenon exercising influence throughout landscapes and their associated social-ecological systems. A detailed, quantitative evaluation of the presence and distribution of social-ecological innovation in urban landscapes is, therefore, timely. Without this, it remains difficult to evaluate stakeholder-led natural resource management as being truly adaptive in nature. Addressing this gap in knowledge is important as, according to established criteria for effective social-ecological innovation (Olsson and Galaz, 2012), novel approaches to local

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