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How perceived gains and losses from nature trails affect trail management preferences

Branden B. Johnson*

Decision Research, Eugene, OR, USA

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ABSTRACT

The nature, sources, and effects of perceived impacts of nature trails have not been systematically studied. Neighbors of five New Jersey urban woods ($n = 293$) believed both households and ecosystems gained from trails there, beliefs associated with using other regional trails, seeing trails' fate as important, and trusting local government to manage trails. Judged losses correlated with low other-trail use and distrust. Biospheric altruism (considering decisions' effects on other species) increased perceived ecological gains *and* losses. Wanting more trails linked to seeing high gains and low losses, site unfamiliarity, other-trail use and high trust. Preferring a natural surface was associated with biospheric altruism and belief in trail-related ecological losses. Both generic and site-specific attitudes, and personal experience, explained trail-impact beliefs and preferred trail numbers and surfaces; a structural equation model had marginally good fit for salient variables, particularly household gains and desire to add trails (RMSEA = .07, CFI = .91).

1. Introduction

People gain from walking in natural areas, through increased well-being, feeling connected to nature, exercise, and socializing (e.g., Chad et al., 2005; Louv, 2005). Research has not systematically probed whether people recognize such personal gains from trail use, think local trails might create household losses (from trail use or to the home being near trails—e.g., attracting strangers to the neighborhood, noise, trash), believe trails and trail users might yield ecological gains or losses for the green area they traverse (e.g., motivation to conserve the area; trails cause erosion or plant damage), or reasons for these beliefs. Yet such beliefs can affect both motivation to use trails in neighboring green areas and preferences about trail numbers or designs, and thus actual gains and losses due to these trails (Olive & Marion, 2009). Given that local pro-environmental action is often more feasible and more motivating than global environmental action, and yet also may pose more challenging tradeoffs (e.g., changing my own trail use habits to protect the ecosystem), understanding beliefs about local impacts of common behaviors is critical to promoting protection of both natural and social ecosystems.

A survey of New Jersey neighbors of urban woods featuring varying numbers and conditions of trails allowed testing of a proposed model (Section 1.4) relating site-specific and generic attitudes, and site experience, to trail-impact beliefs. Most people in this study saw trails as beneficial for both households and the ecosystem, with belief in *household gains* due to neighboring trails significantly linked to interaction between the importance of trails' fate and importance of recreational use of the site, experience using *other trails* in the region, and *trust* in local government to manage trails' impacts appropriately. By contrast, belief in ecological damages due to trails was associated with low *trust* and high pro-environmental ideology. Desire to *add trails* in these woods occurred among neighbors who saw *ecosystem losses* as low, *household gains* as high, were less *familiar* with the site, trusted local government, and used other regional trails. Preference for a natural contour-following trail occurred among pro-environmental respondents who believed in *ecosystem losses* from green-area trails. The model had marginally good fit, with about a third of variance in both desire to *add trails* and belief in *household gains* being explained.

Most literature on perceived household and environmental impacts, and management preferences, concerns green areas rather than recreational trails within them, except for research on attitudes toward wilderness trails. A review of the relevant literatures precedes this study's hypotheses.

* Decision Research, 1201 Oak St., Ste. 200, Eugene, OR 97401, USA.
E-mail address: branden@decisionresearch.org.

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1.1. Household impacts

Personal impacts on the user of trails or green areas include *household gains* such as well-being, connection to nature, health, and physical activity (e.g., Chad et al., 2005; Fan, Das, & Chen, 2011; Groenewegen, Van den Berg, Maas, Verheij, & De Vries, 2012; Louv, 2005). People have reported restoration by being in or seeing green areas (e.g., Henwood & Pidgeon, 2001; Van den Berg, Hartig, & Staats, 2007). *Household losses* have included such user-disturbing conditions as litter, damage to trees and other plants, trail widening and erosion (e.g., Arnberger & Eder, 2011; Lynn & Brown, 2003; Shafer & Hammitt, 1995). Perceived trail impacts on the household other than on users are relatively little studied, such as fear of potential crime from trails bringing strangers into the neighborhood (e.g., Herzog & Rector, 2009).

1.2. Ecological impacts

Trail-based recreation sometimes offers *ecosystem gains* (e.g., on proportion of native plants, and plant cover and density–Patel & Rapport, 2000), but more often negative impacts (*ecosystem losses*) such as erosion, vegetation damage, litter, wildlife disturbance, or inadvertent importation of exotic plant species (e.g., Ferrarini, Rossi, Parolo, & Ferloni, 2008; George & Crooks, 2006; Marion & Leung, 2001; Miller, Knight, & Miller, 2001).

Few studies examine public perceptions of outdoor recreation's ecological impacts, much less from nature trails and nature-trail users specifically. People tend not to perceive environmental impacts of their own outdoor recreation activities (Eder & Arnberger, 2012; Magill, 1994; Priskin, 2003; Sterl, Brandenburg & Amberger, 2008; Van Winkle & MacKay, 2008), including on wilderness trails (Denstadli, Lindberg, & Vistad, 2010; Farrell, Hall, & White, 2001; Noe, Hammitt, & Bixler, 1997). The more people felt litter or plant damage hurt their experience of an urban green area trail, the less they admitted their own loss-yielding behavior, but almost half admitted to widening or eroding trails (Lynn & Brown, 2003). Trail users drastically under-estimated how closely they could approach large mammals without flushing them, and held other recreationists (e.g., mountain bikers or horseback riders rather than fellow hikers) responsible for disturbing wildlife (Taylor & Knight, 2003). Some recreationists assumed they do not affect wildlife because they did not see any animals (e.g., Lemelin & Wiersma, 2007; Sterl et al., 2008). Visitors rated trail use second to biking in (slightly) positive impacts on a scenic area; after receiving information about each activity's environmental impacts, ratings became negative, but their ranking of trail use as less damaging than other activities (camping, swimming, fishing, motor boating) endured. Trail users rated impacts less than did non-users (Chen, Chen, & Basman, 2009).

No study has examined perceptions of both ecological losses and gains of trails; while both perceived gains and damages to the trail user have been assessed, only crime has been studied as a perceived non-user impact on neighboring households.

1.3. Trail management preferences

Preferences for more or fewer trails, and for natural surfaces, are little studied in recreation-focused social science. Studies on preferences for trail extent tend to emphasize restrictions on trail access (e.g., Cahill, Marion, & Lawson, 2008) rather than whether to *add trails*. One exception looked at reactions to information about trail-user impacts on wildlife. Trail users supported penalties for chasing or intentionally stressing wildlife, and moderately supported closing trails during birthing season and rules on how close to approach wildlife. However, trail users largely opposed restricting numbers or location of trails, or trail uses, or requiring visitor education about recreational impacts on wildlife (Taylor & Knight, 2003).

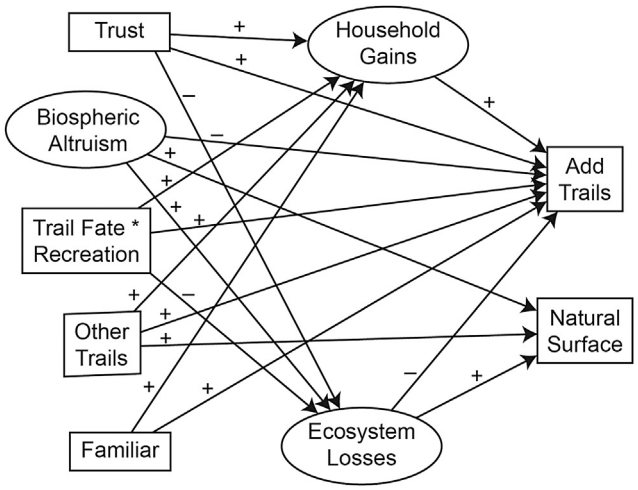

Fig. 1. Hypothesized antecedents of trail-impact beliefs and trail-management preferences.

On trail surface preferences, research has emphasized choices between non-natural surfaces (e.g., Arnberger & Eder, 2011: asphalt versus gravel), rather than the dirt, rocks and tree roots of interest here as a *natural surface* for green area trails. Resource managers may prefer to minimize trail impacts by hardening the surface (e.g., adding gravel, wood or pavement) rather than shift the trail to more pristine if more resilient routes within the natural area (Cahill et al., 2008). Yet such surfaces may dramatically alter if not diminish the walking experience, depending upon visitor goals and capabilities (Cahill et al., 2008): e.g., users at a high-use park site with more developed trails accepted trail hardening to reduce ecological impacts, while users of a more primitive site accepted limits to access but not hardening, even if some ecological impacts continued.

1.4. A proposed model for explaining impact beliefs and trail management preferences

This research explored a three-part model to explain people's beliefs about trail impacts, and influences on trail management. Fig. 1 shows the hypothesized model, using two trail management options to illustrate it: whether to add more trails than those already located in or on the perimeter of the green area, and whether trails should have a natural, contour-following surface (i.e., including rocks and tree roots). The three predictive components are beliefs about trail impacts[1]; local experience and attitudes; and generic pro-environment attitudes.

The first hypothesis is that

H1 People will want more trails (*add trails*) if they see *household gains* from such trails; *trust* local government to minimize negative impacts of trails on households and the ecosystem; feel recreational and esthetic use of the site (*recreation*), and what happens to its trails (*trail fate*), are both personally important;

[1] Fig. 1 omits household losses and ecological gains to increase legibility of the figure, and because in general perceived gains and perceived losses (e.g., risks of technologies and animals) are inversely correlated (e.g., Alhakami & Slovic, 1994; Finucane, Alhakami, Slovic, & Johnson, 2000; Zajac et al., 2012), so that one impact category can be left out for each affected entity without unduly omitting information.