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Trouble with Sense of Place in Working Landscapes

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Abstract: The sense of place (SOP) conceptual framework offers theoretical and empirical evidence that links peoples' multifaceted connections to place(s) to their engagement in pro-environmental and conservation behaviors. The bulk of this research has focused on peoples' connection to high-amenity places and landscapes. Recent research applies SOP in working landscapes—however, these studies encounter 'troubles' that include measurement challenges and mixed results in predicting statistical relationships with conservation outcome variables. As authors of some of these studies, we propose three opportunities and corresponding survey measures for developing meaningful SOP measures in future working landscapes research: 1) modify existing SOP dimensions and items to better capture working landscape dynamics; 2) address how scale may affect behavior and SOP dimensions; and 3) incorporate a conservation ethic dimension into the SOP framework in working lands.

1. Introduction

Solving environmental challenges requires action at multiple scales, especially working landscapes (Charnley et al. 2014). Researchers from diverse empirical and theoretical research traditions have spent decades trying to understand how to engage with and persuade individual actors to adopt a variety of conservation measures to mitigate these environmental challenges (Singh et al. 2018). In the context of working agricultural landscapes, research seeking to identify consistent drivers of behavioral change has been inconclusive (Knowler and Bradshaw 2007; Prokopy et al. 2008).

Recognizing this, recent research has sought new insights through exploration of whether and how an individuals' sense of place (SOP) may shape their conservation behavior (Authors removed), which we define broadly as the adoption of conservation strategies designed to address environmental challenges including soil loss and nonpoint source pollution (Sowa et al. 2016). Sense of place encompasses the affective, cognitive, and/or attitudinal relationships between people and places. It has been conceptualized as various combinations of several constituents, including attachment (the emotional bond between a person and place), meaning (the salient symbols associated with a place), dependence (the instrumental indispensability of a

place), identity (the degree to which a place is part of how a person sees themselves or wants to be seen by others), and satisfaction (the degree to which a person likes or dislikes a place) (Low and Altman 1992; Jorgensen and Stedman 2001).

Several studies have explored the specific question of whether SOP is a multidimensional construct comprising multiple aspects, identity, attachment, dependence, satisfaction, and meaning or whether each aspect is a separable component (Hummon 1992; Hidalgo and Hernandez 2001; Jorgensen and Stedman 2001; Williams and Vaske 1993). Scholars across diverse fields have been testing the measures associated with each of these dimensions, examining which items factor together into a single component, and which items appear to measure distinct or embedded concepts. Despite decades of research on this topic, no singular conceptualization of SOP prevails (Trentelman 2009), and no empirical study that we are aware of has measured all five dimensions together (see Table 1).

While SOP dimensions have been shown to correlate with environmental conservation behavior, including place-protective behavior (Cantrill and Senecah 2001), pro-environmental behavior (Stedman 2003), and environmentally responsible behavior change (Vaske and Kobrin 2001), most empirical research on SOP has occurred in high amenity landscapes (Brehm et al. 2004; Trentelman 2009). However, people's relationships with places are arguably different in amenity versus working landscapes. For instance, while amenity landscapes provide opportunities for leisure, tourism, and recreation, working lands provide ranchers, farmers, and other land managers opportunities to produce goods and services while providing environmental benefits in synergistic fashion (Plieninger et al. 2012).

Prior to writing this research note, several authors of this paper independently tested established SOP constructs as parts of larger empirical investigations into individuals' adoption of conservation behaviors in working landscapes (Authors). While we worked separately on these projects, we each saw SOP as a potentially useful lens to study conservation behavior on working lands. This is in line with several U.S. government land management agencies that recognize the importance of sense of place toward stewardship behaviors (e.g., U.S. EPA 2002; Beckley 2003). Though the contexts and findings from our respective research projects differed, we all encountered similar troubles with (1) validly operationalizing SOP constructs with individuals in working landscapes, and (2) uncovering evidence that traditional SOP measures meaningfully predict conservation attitudes and behaviors related to working lands. These 'troubles,' discussed below, led the authors of this research note to seek out one another, discuss challenges we encountered with studying SOP in working landscapes, compare notes, and synthesize the potential remedies shared here.

Our intent with this note is to draw on our own past work to structure a discussion of existing theory and propose possible theoretical and operational solutions to the troubles we encountered with studying SOP in working landscapes that can and should be tested in future research. Specifically, in this note we propose three ways to address these challenges in future research: 1) modify existing SOP dimensions and items to better capture working landscape dynamics; 2) address how scale may affect behavior and SOP dimensions; and 3) incorporate a conservation ethic dimension into the SOP framework in working lands.

In the section below, we draw together literature on conservation and working lands to make the case for advancing a research agenda for SOP in working landscapes. Next, we reflect on troubles encountered in our own prior SOP and working lands studies to highlight the need for improved understanding of SOP in working landscapes before discussing our suggested means for addressing these troubles in future research.

2. The case for a SOP in Working Landscapes Research Agenda

Our argument for improving understanding of SOP in working landscapes emerged from our collective struggle to marry applied questions, empirical data, and theoretical definitions of SOP. Working lands, as compared to amenity-rich and recreation landscapes, contribute disproportionately to ecological stressors, such as habitat loss, nonpoint-source water pollution, soil erosion, and climate change impacts (Tilman 1999), yet these are issues that can be addressed through improved and strategically implemented land management practices (Sowa et al. 2016). Since adoption of these practices is often the prerogative of individual landowners and operators, policies and programs designed to effectively address these ecological stressors rely on theoretical and empirical research into the social, physiological, and economic determinants of conservation practice adoption. Despite decades of research, most of which has focused on farmers, results so far have been mixed (Prokopy et al. 2008). Specifically, while several key variables have been shown to correlate with farm operators' conservation behavior—e.g. trust in agency professionals, information seeking tendencies, positive attitudes toward and awareness of programs, diverse agricultural systems, and an ideological orientation towards stewardship—none of these are consistently strong predictors (Prokopy et al. 2008). This suggests a need for better empirical measures capable of capturing the deeply interdependent relationships between social, economic, and environmental well-being experienced by farmers (Authors) and other working lands actors.

Given this applied and empirical need, SOP may provide one such suitable framework. SOP has emerged as a potentially attractive and holistic approach for understanding how people-place bonds may relate to behavior, with prior research demonstrating a correlation between SOP and some place-protective behaviors in amenity-rich, recreational landscapes (e.g. Jorgensen & Stedman 2006; Scannell and Gifford 2010; Vaske and Kobrin 2001). Improving our understanding of how SOP operates in working landscapes, therefore, could provide crucial insights into factors that motivate farmers and other working lands actors to adopt place-protective conservation practices that mitigate ecological challenges (Ardoin 2014; Scannell and Gifford 2010; Lincoln and Ardoin 2016).

While applying an SOP framework in working landscapes contexts may seem straightforward, we argue that important differences between working landscapes and amenity-rich landscapes (where SOP has been widely applied) may require broadening or modifying how SOP is conceptualized and operationalized. Table 1 briefly summarizes SOP theory and constructs that we argue researchers will need to rethink in future investigations of SOP in working landscapes. This argument rests on the premise that farmers and other working lands actors have relationships with their land that are, at least in part, qualitatively distinct from those in amenity lands contexts (Trentelman 2011). For example, amenity-rich lands provide recreationists, second-home owners, or absentee landowners with episodic or periodic opportunity for rest and recovery. And although farmers, ranchers, and others who own and/or manage those lands may

very well experience similar opportunities, they also experience those places more continuously and in accordance with their professional or livelihood needs (Plieninger et al. 2012).

Table 1. Existing Sense of Place measures and their applications

SOP Dimension	Definition	Commonly Used Measures	Examples of Geographic Places of Application
Place Attachment	The emotional bond between a person and place	I would be sorry to move from [this place]. I feel very attached to [this place]. I feel most “at home” when I am [in this place]. I am happiest [in this place]. I feel that I can really be myself [in this place].	Wilderness areas in Montana, USA (Williams et al., 1992), coastal Western Australia tourist communities (Kelly & Hosking, 2008) urban and rural communities, USA (Kasarda and Janowitz 1974)
Place Meaning	The salient symbols associated with a place	NA	Lake-rich northern Wisconsin, USA (Stedman, 2003; Jorgensen & Stedman, 2006) urban communities (Hummon 1992)
Place Dependence	The instrumental indispensability or irreplaceability of a place	[This place] is the best place for what I like to do. No other place can compare to [this place] for doing the things I like to do. I would not substitute any other area for doing the things I do [in this place]. The things I do here, I would enjoy just as much in another place.	Community parks and natural areas in Colorado, USA (Vaske and Kobrin, 2001), western Oregon, USA, recreation areas (White et al., 2008)
Place Identity	The degree to which a place is part of how a person sees themselves or wants to be seen by others	I identify strongly with [this place]. [This place] means a lot to me. [This place] says very little about who I am. I feel that I can really be myself [in this place]. [This place] reflects the type of person I am.	Cape Cod, Massachusetts, USA (Cuba & hummon, 1993), recreation areas in California and New England, USA (Kyle et al., 2004)
Place Satisfaction	The degree to which a person likes or dislikes a place	I am most satisfied [in this place].	Australian national parks (Ramkissoon, et al., 2013; Ramkissoon and Mavondo, 2015)

One consequence of this is that working landscape populations may experience social well-being, economic prosperity and environmental quality as more closely intertwined than in amenity places (Floress et al. 2017). Likewise, although the concept of agricultural landscapes’ multifunctionality suggests that multiple place meanings and values—e.g., landscape aesthetics, family/cultural history, and recreation—can coexist with that same landscape’s productive capacity, these meanings and values may not always be complementary or valued equally in individuals’ decision making (Bell 2010). Moreover, increasing rates of land tenancy among land operators who may own and operate additional land acreage (Jackson-Smith and Petrzela 2014) further complicates the conceptual and dimensional picture of SOP in working landscapes. Based on these substantial differences in place values and meanings across landscape types and the

“troubles” we have encountered in operationalizing SOP in working lands, described below, we argue for a reexamination of the conceptual definitions and measures of SOP and its components as they are manifest in working landscapes.

3. Troubles we encountered with examining SOP in working landscapes

The brief accounts given here focus on the troubles we encountered that formed the basis of our conversations with one another about the need for an improved SOP in working landscapes research agenda. Table 2 (supplementary material) provides an overview of explanatory and outcome variables examined in our earlier, separate research projects.

- Cross et al. (2011) surveyed agricultural landowners in Wyoming and Colorado to assess the relationship between three SOP scales—place identity measures drawn from existing literature and new place dependence and conservation ethic measures—and landowners’ (1) trust in land trusts and (2) placement of a conservation easement. Findings showed that economic dependence was not related to conservation ethic, mildly associated with place identity and negatively associated with conservation behavior, while the conservation ethic scale was highly correlated with place identity and showed a positive relationship with outcome variables. The insight here is that, in working landscapes, economic dependence is a distinct component of SOP that runs counter to other SOP dimensions in terms of their relationships with conservation outcome variables, whereas the conservation ethic scale aligns with how place attachment and identity relate to outcome variables.
- Mullendore et al. (2015) surveyed farmland owners in central Indiana to examine whether SOP correlated with operators’ (1) enrollment in government conservation programs and (2) adoption of soil and water conservation practices. Building from existing literature, nine SOP questions focused on three place dimensions—attachment, identity, and, in line with Authors (2011), dependence—in relation to the farmers’ productive land, marginal land, and the greater Midwestern landscape. Overall, there was a lack of internal consistency among the three dimensions as hypothesized, and neither the overall SOP construct or place dependence scale predicted conservation practice adoption or program enrollment as expected. All of these further underscores a need and opportunity to reconceptualize place dependence in relation to other SOP dimensions in working lands contexts.
- Ulrich-Schad et al. (2016) surveyed agricultural producers in northeastern Indiana to examine how SOP dimensions—revised measures developed through reflecting on the above study results and farmer interviews—related to attitudes about protecting water quality and adoption of conservation practices. Similar with the above studies, factor analysis revealed only two distinct SOP dimensions: dependence and attachment/identity. The attachment/identity component was positively associated with multiple attitudes about protecting water quality, while dependence was non-significant and negatively associated with one, which again emphasizes both the conceptual and empirical uniqueness of place dependence in working lands.

Table 2: Author’s working landscape survey SOP items, explanatory and outcome variables, and relationships

Survey Title and Study Specifics	Individual SOP Items Used in Scales	Explanatory Variable ¹	Outcome Variables	Relationship
<p><i>Wyoming and Colorado Agricultural Landowner Survey</i> Sample size: 4,935 N: 2270 Response rate: 46% (Cross et al. 2011)</p>	Personal history and identity closely tied to land My community is where I most belong Feel more myself here than anywhere Feel a spiritual connection to where I live	Place identity Scale	Trust in land trusts Placement of easement	Non-significant
	Land should be preserved for future generations Agriculture is part of historical character of community I have responsibility to conserve nature I manage land to maximize benefit to my community Important to be a good steward Natural amenities should be preserved for future generations	Conservation ethic Scale	Local land needs protection from non-agricultural uses Trust in land trusts Placement of easement	Positive
	Family’s livelihood depends on economic productivity of land My future livelihood depends on having flexible land use Financial well-being conflicts with plans for conservation	Place dependence Scale	Local land needs protection from non-agricultural uses Trust in land trusts Placement of easement	Negative
	<i>See below three rows</i>	SOP Scale (includes identity, attachment, and dependence items)	Conservation program enrollment Adoption of conservation tillage Adoption of buffers Adoption of grassed waterways	Non-significant
<p><i>Great Bend of the Wabash River Watershed Survey</i> Sample size: 680 N: 346 Response rate: 51% (Mullendore et al. 2015)</p>	The way I manage my productive land says a lot about who I am The non-farming activities I pursue on my land (such as hunting, hiking, camping) say a lot about who I am Living in the rural Midwest says a lot about who I am	Place identity Scale	Conservation program enrollment Adoption of buffers Adoption of grassed waterways	Positive

	I plan to continue living on my land as long as I can make money from it I would miss the woodlots, fencerows, and waterways on my property if I moved away If I move in the future, I will try to stay within the rural Midwest	Place attachment Scale	Adoption of conservation tillage	Positive
			Adoption of buffers Adoption of grassed waterways	Negative
	The crop and pasture land on my property provides value I can't obtain elsewhere The woodlots, fencerows, and waterways on my property provide value I can't obtain elsewhere The rural Midwest natural resources provide value I can't obtain elsewhere	Place dependence Scale	Conservation program enrollment Adoption of conservation tillage Adoption of buffers Adoption of grassed waterways	Non-significant
<i>Western Lake Erie Basin Survey</i> <i>Sample size: 1,309</i> <i>N: 652</i> <i>Response rate: 50%</i> <i>(Ulrich-Schad et al. 2016)</i>	I feel a strong sense of attachment to the land I farm It is important to me to take care of the land I farm for future generations I feel happiest when I am at my farm My farm is an important part of who I am I identify strongly with the land I farm	Place attachment/identity Scale	Believes they have a personal responsibility to protect water quality Believes using BMPs on farms improves water quality Believes farm management impacts water quality Adoption of a two-stage ditch	Positive
			Adoption of 5 separate BMPs (cover crops, conservation tillage, buffers, controlled drainage, nutrient management plan, conservation plan)	Non-significant
	No other place can compare to this area for the farming I do (dependence) Farming in another place would not be better As far as I am concerned, there are not more ideal places to farm	Place dependence Scale	Believes using BMPs on farms improves water quality	Negative
			Believes they have a personal responsibility to protect water quality Believes farm management impacts water quality Adoption of 6 separate BMPs (cover crops, conservation tillage, buffers, two-stage ditches, controlled drainage, nutrient management plan, conservation plan)	Non-significant
<i>Landowner Perceptions on</i>	My land is the best place for doing the recreational activities I enjoy the most	Amenity SOP Scale	Landowner support for bioenergy crop production in their community	Non-significant

<p><i>Energy Crops Survey</i> <i>Sample size: 2,794</i> <i>N: 907</i> <i>Response rate: 32.5%</i> <i>(Eaton et al. 2018)</i></p>	<p>My land is my favorite place to be I feel happiest when I am pursuing recreational opportunities on my land</p>		<p>Landowner willingness to grow bioenergy crops on their land</p>	
	<p>My land says a lot about who I am My personal history and identity are closely tied to my land My land is my favorite place to be My family's livelihood depends on the economic productivity of our land I feel happiest when working on my land</p>	<p>Livelihood SOP Scale</p>	<p>Landowner support for bioenergy crop production in their community Landowner willingness to grow bioenergy crops on their land</p>	<p>Non-significant</p>
	<p>My land is fragile and in need of protection My land is a resource for making a living My land should only be used to provide benefits for myself or family My land should be used to help solve global environmental problems</p>	<p>My land is fragile and in need of protection (Single item)</p>	<p>Landowner willingness to grow bioenergy crops on their land Landowner support for bioenergy crop production in their community</p>	<p>Positive</p>
		<p>My land is a resource for making a living (Single item)</p>	<p>Landowner willingness to grow bioenergy crops on their land Landowner support for bioenergy crop production in their community</p>	<p>Non-significant</p>
		<p>My land should only be used to provide benefits for myself or my family (Single item)</p>	<p>Landowner willingness to grow bioenergy crops on their land</p>	<p>Negative</p>
		<p>My land should be used to help solve global environmental problems (Single item)</p>	<p>Landowner willingness to grow bioenergy crops on their land</p>	<p>Positive</p>

- Eaton et al. (2018) surveyed farm and non-farm land owners in mixed-use landscapes in New York, Ohio, and Pennsylvania to study whether SOP relates to (1) support for and (2) willingness to grow perennial grasses on their marginal agricultural land for the purpose of energy crop production. Drawing from Authors (removed), the authors included SOP measures representing the more commonly used measures on place identity, attachment, and dependence—with the latter operationalized with both existing dependence items (see Table 2) as well as a livelihood construct—and encountered two SOP ‘troubles.’ First, place dependence items factored with SOP items related to one’s livelihood (e.g., “I feel happiest when working on my land”), where amenity and recreation items (e.g., “My land is the best place for doing the recreational activities I enjoy the most”) also factored together, resulting in two rather than the three dimensions we hypothesized. Second, neither factor was a statistically significant predictor of the outcome variables in regression analyses. However, conservation ethic items—e.g., “my land is fragile and in need of protection”—showed significant relationships with outcome variables, further underscoring an opportunity for reevaluating the SOP framework in working lands contexts.

Through author discussions comparing this earlier research described above and in Table 2, we came to recognize three patterns. First, our statistical analyses showed place dependence, when classically operationalized (see Table 1) to assess the relative irreplaceability of a place did not factor out as a unique SOP item as we hypothesized, and as existing SOP literature in amenity-rich landscapes suggests (e.g., Jorgensen and Stedman 2001). One explanation is that existing conceptualizations of place dependence fail to integrate the nuance of farmers’ and other working lands actors’ economic and livelihood relationships to *place* in a single SOP dimension (i.e. dependence). Moreover, when economic/livelihood dependence was treated as a separate dimension of SOP, our studies described above observed a negative association between dependence and other core SOP dimensions. One way to approach this trouble in future research may be to either take a more expansive view of place dependence and/or more thoroughly explore the empirical and theoretical viability of an economic/livelihood dimension as a distinct component of SOP.

Second, we see an opportunity to conceptualize and operationalize a conservation ethic construct in conjunction with SOP and conservation behavior in future research. Although SOP measures used in our earlier studies showed mixed results with conservation attitude and behavior related outcome variables, conservation ethic scales and measures showed positive relationships with those outcome variables. However, despite these promising results, the theoretical and conceptual relations across SOP and conservation ethic remain under explored in our earlier work.

Third, while conservation ethic is a dimension we feel strongly about exploring in tandem with future research on SOP as a means to better understand motivations for conservation behavior, the measures we included in our earlier studies were spatially “flat” in that they ignored questions of scale. For example, none of our studies captured the spatial variation of respective dimensions of people’s SOP. Likewise, our studies did not measure the spatial comparisons of whom people feel responsible to (e.g. family members vs. downstream communities) or tease

apart individuals' beliefs about where they feel the benefits of their actions might accrue (e.g. on-farm vs. off-farm)—a need echoed in recent research that found increased adoption of conservation behaviors is possible by increasing farmer's belief in the effectiveness of those practices (Wilson et al. 2018).

But perhaps our broadly observed gap between SOP and conservation behavior points to something bigger. Although SOP has been shown in several studies to be positively associated with various pro-environmental and/or place-protective behaviors, to our knowledge none of SOP's multidisciplinary origins suggest that SOP was conceptualized as a predictive behavioral framework. If this is indeed the case, it raises the possibility that additional constructs (e.g. conservation ethic) may be needed, in conjunction with SOP, to more adequately explain behavior. To be clear, we are not suggesting that research investigating the relationships between SOP and environmental behavior are inappropriate. Rather, regardless of the amenity-vs.-working landscape context, we echo Lewicka's (2011) argument that more theoretical work is needed to conceptualize how SOP can or ought to operate as part of a broader and more holistic behavioral model (e.g. Reasoned Action Approach).

Below we offer three approaches we see as helpful for addressing these troubles in future SOP working landscapes research.

4. Opportunities for improving future sense of place research in working landscapes

Modify existing SOP dimensions and items to better capture working landscape dynamics

The literature on landscapes as *place* suggests that farmers and other working lands actors ascribe rural landscape meanings that reflect an interplay of biophysical and social construction processes (Greider and Garkovich 1994). Similarly, our earlier studies suggest that current SOP measures could be strengthened in working lands contexts by further conceptualizing and operationalizing the dependence dimension, possibly including distinguishing between economic dependence and livelihood/lifestyle dependence. For instance, in addition to emotional attachment, farmers are economically dependent on their working lands (Nielsen-Pincus et al. 2010)—thus traditional measures of place dependence are problematic in that they fail to measure distinctions across lifestyle and livelihood dependence (Abrams and Bliss 2013), and current livelihood versus future sustainability concerns.

Consider the predominance of recreation themes in Williams and Vaske's (2003 p. 831) definition of place attachment: "functional attachment is embodied in the area's physical characteristics (e.g., accessible rock-climbing routes, collectable non-timber forest products, or navigable whitewater rapids), and may increase when the place is close enough to allow for frequent visitation." This definition is reflected in existing SOP items for place dependence, such as the following taken from Jorgensen and Stedman (2006): "For doing the things that I enjoy the most, no other place can compare to [X place]." When applied to farmers in working landscapes, this wording may in itself be inadequate for capturing the indispensability of one's working lands. While indeed farming may be what one enjoys the most, to better account for the multifunctionality of working lands contexts as discussed above, we may also need place dependence items that inquire into whether one sees the land they farm as the best place to farm, ranch, or pursue other economic intentions. For Williams and Vaske (2003), place dependence is

related to a specific goal, but not necessarily an economic nor recreation goal—as the literature on working lands reviewed above suggests, both are likely important for working lands actors, and while both ought to be examined, our earlier studies suggest a need for improved measures for economic dependence.

Table 3: Existing and working landscape SOP survey items

SOP dimension	Existing SOP items	Proposed working landscape SOP items
Place Attachment	I feel happiest when I am at [X place] (Stedman 2003) [X place] is my favorite place to be (Stedman 2003) Variations on above used in (Jorgensen and Stedman 2006)	When I think of home, I think of the land I farm I feel happiest when I am on the land I farm The land I farm is my favorite place to be I would feel out of place farming anywhere else
Place Identity (physical)	[X place] reflects the type of person I am (Stedman 2003) Variations on above used in (Jorgensen and Stedman 2006)	The land I farm is an important part of who I am My personal history is closely tied to the land I farm Even if I were no longer farming, the land I farm will always be a part of who I am
Social Identity	I have an extensive network of family and/or friends here (Lincoln and Ardoin 2016) The lifestyle in this area generally reflects my beliefs and values (Lincoln and Ardoin 2016) Most of my friends are, in some way, connected to my life here (Lincoln and Ardoin 2016)	It is important to me that the land I farm stay in my family Farmers in the area where I farm generally have beliefs and values similar to mine The friendships I have developed through farming activities in the area where I farm are important to me
Economic Dependence	I have a good job here (Lincoln and Ardoin 2016)	There aren't many job opportunities available to me other than farming The land I farm is important to my economic well-being The characteristics of the land I farm (soil type, topography, etc.) are largely responsible for my success as a farmer
Place Dependence (physical)	[X place] is the best place for doing the things that I enjoy the most (Jorgensen and Stedman 2006) For doing the things that I enjoy the most, no other place can compare to [X place] (Jorgensen and Stedman 2006)	If I could farm anywhere in the world, it would be the land I farm now Even though there might be better places to farm, I would rather farm in the area where I farm than anywhere else

Table 3 encompasses several dimensions of SOP: place attachment, place identity (physical and social), and place dependence (physical and social). The table includes SOP dimensions, existing SOP items, and our proposed working landscape SOP items. Although there is an abundance of sense of place literature, in the Existing SOP items column we cite what are arguably “original” sense of place items as related to the landscape scale.

This all suggests dimensions of working lands SOP could be built out of the concept of place dependence as functional attachment, but that there is a need for measures appropriate for measuring the forestry, farming, ranching or other working land functional attachments. Some of our previous studies (above) found economic dependence functions independently from attachment and identity. We believe our earlier projects point to a need for better measures of place dependence within a working landscape SOP framework, the underlying question being: what are the economic dimensions of place dependence, and do these differ in working versus

amenity lands contexts? In Table 3 we provide a comparison of existing and proposed working landscape SOP measures that aim to better reflect SOP dimensions such as place dependence for working lands contexts.

Consider spatial scale

Since most SOP studies consider only a single spatial scale of *place* (e.g. home, neighborhood, community, city, region, etc.) (Lewicka, 2011), relatively few studies—particularly those that also capture SOP’s relationship to behavioral outcomes—include measures intended to compare how SOP and its constituent dimensions vary across scale (see Devine-Wright & Batel (2017) for a study of SOP that includes scalar dimensions). As discussed above our earlier projects also ignored scale. Despite this relative dearth in the literature, SOP is undoubtedly connected with spatial scale. Likewise, the environmental phenomena (e.g. non-point source water pollution) linked to conservation behaviors are similarly scale-oriented (e.g., local, regional, and national level impacts). These scalar dimensions have measurement implications, may help explain some of the mixed results between SOP and conservation behaviors discussed earlier, and represent an opportunity for future research on SOP and conservation. For example, farmers may express varying levels of intensity for SOP and conservation ethic dimensions with respect to the land they farm, their watershed, their state, or their region (e.g. the Midwest) (cf. Hidalgo and Hernandez 2001). Further, while conservation behaviors may be implemented at one spatial scale (e.g. a field or farm), the benefits or other impacts associated with that behavior, as well as farmers’ sense of obligation to whom to provide those benefits and sense of efficacy for where benefits might accrue likely span multiple spatial scales. We propose that understanding where and to what degree SOP and conservation behaviors overlap spatially is essential for understanding the broader SOP-conservation behavior relationship. We encourage future research in this domain to more explicitly tease out the spatial and scalar relationships between people-place bonds and conservation behaviors in question. Table 4 (supplementary material) provides an operational definition for conservation ethic (see below) that includes scalar dimensions.

Add a conservation ethic dimension to SOP

While SOP measures across our earlier, separate studies showed mixed results in terms of their relationship with conservation-related outcome variables, in reflecting on these studies now as a group, we found that in some of these studies SOP correlated with variables measuring respondents’ sense of responsibility to protect their land. For instance, (Authors) found a positive relationship between place identity and agreement with “Local land needs protection from non-agricultural uses,” whereas (Authors) found that a place identity/attachment scale had a positive relationship with beliefs in personal responsibility to protect water quality. In looking across these studies now, we also noted that (Authors) found land meaning items (e.g., “Land should be preserved for future generations”) included along with existing SOP items loaded together in a principal component analysis, while in (Authors), land meaning items (e.g., “My land is fragile and in need of protection”) had statistically significant relationships with attitude and behavior outcome variables.

In sum, in looking back on our earlier separate work, a comparison of these studies suggests that: (1) measures for SOP show significant and positive relationships with conservation ethic items when used as outcome variables; and (2) measures for a conservation ethic included in two of

our studies showed positive relationships with conservation attitude and behavior outcome variables. And while research on farmer’ and other working lands actors’ conservation behavior has increasingly examined conservation or stewardship ethics as motivating factors (e.g. Burnett et al. 2018; McGuire et al. 2013; McGuire et al. 2015; Reimer et al. 2012; Roesch-McNally et al. 2017; Roesch-McNally et al. 2018; Ryan et al. 2003; Vaske et al., 2018; Yoshida et al. 2017), researchers are just beginning to employ conservation ethic measures together with SOP measures in amenity and working landscape contexts. The positive relationships uncovered between conservation ethic and other SOP dimensions in our recent work suggests that bringing measures of conservation ethics together with SOP could be fruitful in advancing understanding of motivations of conservation attitudes and behavior.

Table 4: Conservation ethic operational definition

Social Responsibilities (Social Norm)	Social Responsibilities (Intention)	Responsibility to Nature (Belief)	Responsibility to Nature (Intention)
_____ would expect me to conserve soil and water resources on the land I farm.	I conserve natural resources on my land to provide benefits for _____	I believe conservation practices on my land are beneficial for _____	I conserve natural resources on my land to provide benefits for _____
Previous generations of my family	Previous generations of my family	My land	My land
Future generations of my family	Future generations of my family	The area where I farm	The area where I farm
Myself	Myself	My watershed	My watershed
My immediate family	My immediate family	My state	My state
My neighbors	My neighbors	My region	My region
People in the area where I farm	People in the area where I farm	The country	The country
People in my watershed	People in my watershed	The planet earth	The planet earth
Everyone on planet earth	Everyone on planet earth		
Future generations of all people	Future generations of all people		

4-point Likert scales – (agree-disagree)

These promising findings, however, underscore the need for more fully conceptualizing and operationalizing conservation ethic as a construct in working landscapes research on SOP and conservation behaviors. We readily acknowledge that a conservation ethic construct may be insufficient by itself to predict conservation behavior. Likewise, since SOP was not explicitly developed to be used a predictive variable in behavioral models, it is perhaps unsurprising that, in our prior research described in Section 3 above, we were not able to consistently observe a relationship between established SOP dimensions and various behavioral outcome variables. Although we are compelled by the possibility that a conservation ethic construct could enhance

the behavior-predicting power of an SOP framework retooled for working landscapes, important questions remain, including how both constructs fit into a broader and more holistic behavioral framework.

In light of this, one possible starting point—which again keeps the multifunctionality of working lands in focus—could be broadly conceptualizing a conservation ethic as a person’s sense of responsibility and efficacy for managing their land in ways that improve the well-being of people and nature. As Table 4 outlines (supplementary material), we suggest operationalizing conservation ethic in terms of a person’s sense of (1) social responsibility (norms and intentions) and (2) responsibility to nature (beliefs and intentions)—four dimensions in all. Survey items could then assess strength of agreement for stewardship sensibilities across a range of scales of social groups and places. We suggest such a construct would borrow from elements of Vaske et al.’s (2018) Leopoldian land ethic—which found strong relationships between individual farmers’ support for a “land ethic” and their orientation towards domination, mutualism, property rights, and responsibility towards the land—and Walton and Jones’s (2018) ecological identity scale, which highlights the importance of differentiating between personal-, role-, and group-based nuances of an ecological identity when attempting to predict behavior.

5. Conclusion

Through this research note, we argue that SOP measures typically used in amenity-rich and recreational landscapes become ‘troublesome’ when applied to working landscape populations. This trouble may stem from the multifaceted relationships these populations have with their working lands, much of which entails emotional and economic dependence. We further posit the importance of conservation ethic—a person’s sense of responsibility for managing their land in ways that improve the well-being of people and nature—in correlating with conservation behaviors, with spatial scale of attachment, dependence, and environmental consequences only further complicating SOP measures.

We propose three opportunities to develop more meaningful and informative SOP measures in working landscapes: 1) modify existing SOP dimensions and items to better capture working landscape dynamics; 2) address how scale may affect behavior and SOP dimensions; and 3) incorporate a conservation ethic dimension into the SOP framework in working lands. As next steps, future theoretical and empirical research should explore whether and how SOP and a conservation ethic construct fit into a more coherent behavioral model for understanding determinants of conservation behavior in working landscapes.

As we continue to test the efficacy of these new and modified SOP measurements, we invite the readers of this journal to join us in utilizing these new constructs and in a broader conversation tuned to improving a research agenda for SOP in working landscapes. And while this note has highlighted survey and quantitative measures as means for pursuing this agenda, and foregrounded individuals’ motivations and behaviors, in practice individuals are never fully autonomous. We therefore encourage others to pursue this research agenda through diverse methods including qualitative, ethnographic, and comparative research designs that can further explore complex relationships across people and working landscapes.

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