Fostering Sustainable Operations in a Natural Resource Management Agency: Insights from the Field

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ABSTRACT

Sustainable operations (SO; operating in an environmentally, economically, and socially sustainable manner) is consistent with the environmental stewardship mission of natural resource management organizations. This study sought to examine SO practices in the daily work lives of US Forest Service employees, including those primarily stationed in the office and in the field. The purpose was to identify influences on these behaviors such that organizations can more effectively promote them. We surveyed a random sample of employees within a region and research station of the US Forest Service (n = 451) regarding SO behaviors, barriers, and facilitators to SO, and perspectives on SO. Consistent with the Proenvironmental Behavior Change Model (Burn, S.M. and P.L. Winters. 2008, A behavioral intervention tool for recreation managers, *Park Sci.* 31[1]:5–15), social norms, attitudes, setting design, knowledge and information, and habit were all important influences on SO behaviors, with social norms, attitudes, and habits the strongest influences. Recommendations for promoting SO are provided.

Keywords: sustainable operations, environmentally responsible actions, Proenvironmental Behavior Change Model, successful implementation

Organizational "greening," or operating in an environmentally sustainable manner, is consistent with the environmental stewardship mission of natural resource management organizations. Sustainable operations (SO) include improving energy efficiency, water conservation, waste diversion/recycling, purchasing environmentally preferable products, and reducing transportation-related environmental impacts through fleet management (USDA 2007). Considerations of SO incorporate social and environmental impacts, as well as economic concerns (Newton and Harte 1997, Etzion 2007).

SO is a key concern of the US Department of Agriculture. Presidential Executive Order (E.O.) 13423 requires that ". . . Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically, and fiscally sound . . . and sustainable manner" (Office of the Federal Environmental Executive 2007). SO goals and strategies are outlined by the US Forest Service (2008) and include an annual SO summit, an SO council, an annual environmental footprint report, membership in the US Environmental Protection Agency's climate leaders program, and facilitation of place-based SO teams.

These USDA initiatives are an effort to incorporate SO into the organization's culture. Many scholars believe that successful SO efforts require a shift in organizational culture such that organizational values are consistent with greening (Fineman 1997). For example, George and Fussel (2000) describe the process of greening of an organization as organizational "sensemaking," where collective and individual identities are transformed to include green practices. This cultural shift requires both environmental concern and viewing environmental issues as opportunities for organizational develop-

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ment and growth (Sharma 2000, Jiang and Bansal 2003).

Successful corporate greening also involves systematic organizational responses through formalization (policies are in place and emphasized), professionalization (assignment of greening roles and responsibilities to individuals and units), and strong organizational leadership (involvement of top management in greening efforts; Takahasi and Nakamura 2005). The most effective organizational environmental leaders use a transformational approach focused on trust building, collaboration, two-way communication practices, and willingness to grant responsibility to subordinates (Fernandez et al. 2006). Also important is line managers' support of employees' "eco-innovations" (creative sustainability solutions), where perceptions of lack of support impede eco-innovation even in the presence of green organizational policies (Ramus 2001).

Greening efforts clearly involve actors at all organizational levels (Howard-Grenville 2006) and understanding individual values and actions is important to promoting large-scale changes in environmental responsibility (Stern 2008). However, most published studies have focused on organizational, industrial, and institutional levels of analysis (Bansal and Gao 2006). This study informs an understanding of organizational greening and SO from the employee perspective. Employee behavior is especially important to organizational greening because it constitutes daily organizational practices. We surveyed employees within a region and research station of the US Forest Service regarding SO behaviors, barriers and facilitators to SO, and perspectives on SO practices.

Our examination is guided by the Pro-environmental Behavior Change Model (PBCM; Burn 2007, Burn and Winter 2008). The model identifies five influences (social norms, attitudes, setting design, knowledge/information, and habits) on SO behaviors. Corresponding barriers and facilitators to desired action are embedded in each of these influences.

The first PBCM influence is social norms. Research provides strong evidence that social norms may promote or discourage proenvironmental behavior (Schultz 1998, Winter and Koger 2004, Cialdini et al. 2006). In work settings, norms can be conveyed through written and spoken messages, observing others' actions, and physical evidence of others' actions. This suggests that agency and worksite cultures clearly and consistently condone sustainable activities to increase SO behaviors.

The second PBCM influence is attitudes. Competing attitudes and values such as inconvenience and cost may override pro-environmental attitudes, especially when no direct personal benefit is expected and pro-environmental attitudes are weak (Cottrell and Graefe 1997). For example, cost containment concerns might interfere with green purchasing behavior. Likewise, a desire for convenience may inhibit vehicle sharing programs. This suggests that organizations educate to strengthen positive SO attitudes, link SO behavior to important attitudes and values, and eliminate competition between desired and undesired behaviors by reducing the costs or inconvenience of desired behaviors.

A third PBCM influence is setting design. People inclined toward SO behaviors may not practice them if the physical and organizational setting does not support them, and those disinclined to SO behaviors will practice them if setting features make it easy and effortless. For example, recycling is much more likely if receptacles are present in the immediate work area (Geller et al. 1982). This influence suggests that SO behaviors are more likely with supportive procedures and policies, technology or equipment changes, and modifications of the physical worksite.

The fourth behavioral influence is information and knowledge. Some people lack an awareness of how their behavior affects the environment or how to perform SO behaviors (Frick et al. 2004). The information and knowledge influence suggests that employees must be knowledgeable about the need for specific SO behaviors as well as how to accomplish them.

The fifth behavioral influence is habit (Oskamp 1991). Habits provide an economy of thought and action because we simply do as we have always done with little reflection. Because they are entrenched and automatic, habits can be difficult to change even when we learn they are environmentally unsustainable. Change is made more difficult when habitual behaviors arise out of convenience (Winter and Koger 2004). Habit may significantly affect SO behaviors to the extent that old behavioral habits (and standard operating procedures) must consciously be discarded and new habits formed. This may require repeated reminders and incentives.

Our employee survey results are examined in light of the PBCM to determine how the five influences affect SO. Study findings are used to make recommendations to further SO in the agency.

Methods

Sample and Respondents

A random sample of 8,582 employees within one regional area of the US Forest Service was selected from an online directory. Of these, 8,180 were linked to the region, 402 to the station. The desired number of respondents from within the research station and region was determined, and then the proportions of respondents to be selected from each location (lab or forest) were set. Proportions were based on overall distribution of station and region employees in the initial database. A random-number generating program was then used to draw the final sample of 1,709 names.

The overall response rate was 26% (n = 451), including 24% of regional employees and 33% of station employees. Past surveys of agency employees yielded similar low response rates because of respondents' limited time, disregarded e-mails, and inaccurate e-mail addresses (see, e.g., Winter et al. 2008 and Wilson et al. 2009). Some reports suggest a lower response rate in studies that employ an e-mail contact with a web-based survey link (see, e.g., Kaplowitz et al. 2004); however, the database constructed for this study was drawn from an e-mail contact system. Gathering of mailing addresses would have increased costs in database construction and mailing would have further added to distribution expense and burden. Findings reported here regarding importance of SO and practice of actions are similar to recently gathered information from a national survey of agency recreation managers (unpublished data on file with first author).

Respondents were almost equally distributed by gender (46% male and 49% female). They averaged 14.7 years working in the geographic region (range, less than 1 year to 41 years), and 16.6 years working in the agency (range, less than 1 year to 42 years).

Survey

The survey was constructed and placed on a Web service. It included several items on SO behaviors (measured as proportion of opportunity where action was taken). Many of the actions could be performed in an office setting. These were grouped according to waste reduction measures (e.g., reuse of scrap paper for note taking), energy conservation measures (e.g., turning off lights

when leaving the office for an extended period), recycling practices (e.g., paper and paper-based products), and green purchasing (percent of purchases). A pair of items queried fleet-related strategies that were supported and or practiced including a reservation/sharing system and downsizing or using a hybrid vehicle. Responsibility for SO was examined through five items (personal and professional responsibility, agency and personal competing responsibilities, and public expectation for SO) rated on a scale of 1–5 in which 1 = strongly agree and 5 = strongly disagree. This scale was also used to rate eight potential barriers to SO and five items measuring perceived commitment and support for SO. A list of 15 SO influences were rated for their importance to successful implementation of SO (5-point scale, 1 = very important and 5 = very unimportant). Consideration given to environmental impact of individual actions was rated on a 5-point scale (1 = several times throughout the day and 5 = not at all). A series of open-ended items further explored SO practices. Years of employment within the agency and other demographics were also measured.

Procedure

An e-mailed letter from region and station leadership describing the survey and approval to use agency time went out to all region and station employees 1 week in advance of the survey. The randomly selected employees then received a message describing the survey and inviting participation via a link to the survey site (an "opt out" link was also provided). Up to two reminder e-mail messages were sent to those who had not completed the survey or opted out. As a response incentive the final reminder message announced a random prize drawing for those who completed the survey before the closing date (winners received items of nominal value with an SO theme, e.g., Woodsy Owl water bottles).

Results

SO Actions

Respondents used a scale from 0 to 100 to indicate the proportion of time they performed 27 actions out of the times the opportunity arose. Five actions were marked as "not applicable" by approximately one-fourth or more of the respondents (ranged from 24 to 49%) and were excluded from further analysis. These actions represented behaviors dependent on availability of resources or job functions outside of the respondents' tasks including recycle glass (24%), mixed waste recycling in a desk-side container (34%), use routing slips for review of documents (41%), reuse field materials (48%), and gather rainwater/runoff for watering (49%). The remaining 22 items were considered applicable by the majority of respondents. To facilitate further analyses, missing responses and "not applicable" in this set of 22 items were recoded as "0."

Table 1. Frequency of 22 sustainable operations (SO) actions reported by respondents (n = 451).

Action	M^a	SD	Mode
Turn off lights when leaving the office for the day or extended periods	89.6	24.5	100
Turn off water when not in immediate use	86.1	29.6	100
Recycle paper and paper-based products	83.4	26.9	100
Edit documents on the computer before printing	77.9	28.5	100
Reuse file folders	77.9	31.3	100
Turn off electrical equipment when leaving the office for the day or extended periods	74.6	35.1	100
Recycle plastic	70.6	39.1	100
Use e-mail or physical bulletin boards for memos and announcements	70.5	35.8	100
Turn off computers when leaving for the day or extended periods	69.6	38.1	100
Read documents on the computer without printing	67.3	25.8	50
Recycle batteries	65.1	44.0	100
Make double-sided copies	59.5	34.6	50
Design documents to conserve paper when/if printed	55.1	39.8	0
Reuse scrap paper for taking notes	54.8	32.6	50
Print double-sided	53.1	38.0	0
Reuse packaging materials (e.g., Styrofoam peanuts)	52.6	41.5	0
Recycle printer cartridges	50.7	47.7	0
Unplug chargers for electrical devices when not in use	43.9	43.6	0
Reuse envelopes and/or diskette mailers	38.4	37.4	0
Unplug electrical equipment when leaving the office for the day or extended periods	34.0	40.1	0
Recycle technologically-based waste such as diskettes and CDs	21.5	34.6	0
Reuse single-sided paper in a printer for drafts	19.4	29.7	0
SO score	59.8	15.9	51.6

[a] Rated on a scale from 0 to 100, representing the proportion of opportunity when action was taken.

The majority (15 of the 22 actions) were conducted most of the time (50% or more), suggesting that respondents engaged in a number of SO practices (Table 1). Examples of frequently taken actions (75% of the time or more) included turning off lights when leaving the office for an extended period, turning off water when not in use, recycling paper and paper products, editing documents on computer before printing, and reuse of file folders. A SO action score (SO score) was created from the average; the resulting score was then used in subsequent analyses (Table 1).

Social Norms

A commitment from station and regional leadership was viewed as important to SO (see Table 2); and respondents agreed that station and regional leadership are supportive of SO (Table 3). In addition, the SO score was related to perceived support from leadership (Table 3), such that those who agreed leadership was supportive tended to report practicing SO actions more often.

In addition to leadership support for SO in general, perceived leadership support for green purchasing was assessed. When asked if green purchasing (e.g., purchasing high post-consumer content paper products) was encouraged by their employer, most agreed (M = 2.5; SD = 1.0). Overall, green purchases were made about one-third of the time (34%), but of those who strongly agreed their employer encouraged green purchases, 48% of purchases were green compared with 15% of those who strongly disagreed.

Also rated as important to successful implementation of SO by the majority of respondents were more commitment from folks "on the ground," coworker support, and people to motivate and drive changes (see Table 2). One respondent noted, "Operational sustainability starts with the individuals not with the organization." Respon-

dents agreed that most of their coworkers were supportive of SO (Table 3), and ratings of coworker support were related to the SO score (Table 3). Belief in coworker support was associated with greater frequency of SO actions.

Public support (a normative influence outside of the agency) was also deemed important to successful SO implementation (Table 2). Most respondents tended to agreed that the public expects SO within the US Forest Service (Table 3); and there was a small but significant association between agreement and SO scores (Table 3). Overall, respondents perceived leader, coworker, and public norms to support SO and these perceptions were linked to SO actions.

Attitudes

Employees strongly agreed they had a personal, as well as a professional, responsibility to behave proenvironmentally whenever possible (Table 3). Respondents also expressed a personal commitment to practicing proenvironmental behaviors (Table 3), suggesting attitudes in line with the SO score. SO actions were positively related to personal responsibility, commitment, and professional responsibility (Table 3).

Attitudes competing with SO behaviors were relatively weak in comparison. Many disagreed that they had more pressing professional responsibilities than practicing SO, and that the agency had more pressing responsibilities (Table 3). Although pressing professional responsibility was not significantly related to the SO score, believing the agency had more pressing responsibilities than SO was associated with fewer SO practices (Table 3). Comments indicated that focusing on SO might be misdirected in a time of decreasing staffs, budget concerns, and structural redesign.

Most respondents disagreed with the statement, "I don't have the time to worry about green practices" and "I think most green practices are costly" (Table 3). However, these competing attitudes were significantly related to the SO score (Table 3), suggesting that time and cost barriers may impair SO actions.

Responses also suggest that for a small percentage of employees, competing attitudes may influence SO in regard to fleet management, including vehicle sharing and downsizing of vehicles or use of hybrids. More than one-tenth expressed opposition to a reservation/sharing system for vehicles (11%) and downsizing or using hybrids (16%). These individuals expressed concerns about competing schedules, inconvenience, or a lack of fit with their specific job functions. In particular, those who worked on field crews or had fire assignments cited multiple concerns related to both fleet management strategies. In sum, supporting and competing attitudes were related to SO practices, with supporting attitudes associated with increased frequency and competing attitudes with decreased frequency.

Table 2. Importance of influences in successful implementation of sustainable operations.

	Percent very/ somewhat important[a]	M^b	SD	n
Practical systems put in place by staff on-the-job	85	1.6	0.8	436
Commitment from station and regional leadership	85	1.6	0.8	436
A better understanding of the environmental benefits or costs of current practices	77	1.8	0.9	433
More commitment from folks "on the ground"	76	1.9	0.9	434
Support from my coworkers	75	1.9	0.9	433
Policies or procedures to guide us	75	1.9	1.0	434
More information about how to do this	74	1.9	1.0	434
Large funding sources to cover big ticket items (e.g., conversions to solar power)	70	1.9	1.1	432
Knowing what the costs and savings are to the Forest Service	71	2.0	1.0	436
A website with information that I can use	68	2.1	1.0	433
Public support	68	2.1	0.9	432
Small grants to cover local proposals (e.g., microgrants)	64	2.1	1.0	432
People to motivate and drive changes (e.g., sustainability champions)	62	2.2	1.1	435
Reminders in the workplace, such as posters or stickers	62	2.3	1.0	436
Rewards for doing "the right thing" not "feel good" feedback	55	2.4	1.2	435

[a] Percent selecting a 1 or 2 on the 5-point scale.
[b] Rated on a 1-to-5 scale in which 1 = very important and 5 = very unimportant.

Table 3. Ratings of influences in workplace and correlation with sustainable operations score.

Item	M^a	SD	r	Sig.
I have a personal responsibility to behave pro-environmentally whenever possible	1.5	0.8	−0.31	<0.001
I have a professional responsibility to behave pro-environmentally whenever possible	1.5	0.7	−0.26	<0.001
I am personally committed to practicing proenvironmental behaviors	1.9	0.8	−0.32	<0.001
The public expects sustainable operations within the Forest Service	1.9	1.0	−0.10	<0.05
Most of my coworkers are supportive of sustainable operations	2.3	0.9	−0.23	<0.001
Station and regional leadership are supportive of sustainable practices	2.4	1.0	−0.18	<0.001
Many green practices are impossible or impractical in my location	3.3	1.1	0.10	<0.05
I think most green practices are costly	3.7	1.0	0.15	<0.01
My agency has more pressing responsibilities and concerns than sustainable operations	3.7	1.2	0.10	<0.05
I have more pressing professional responsibilities than practicing sustainable operations	3.8	1.1	0.08	NS
I'm not in the habit of considering sustainability and proenvironmental behaviors in my day-to-day work	3.9	1.0	0.32	<0.001
I don't have the time to worry about green practices	4.0	0.8	0.18	<0.001
I could recycle but I forget to	4.1	0.9	0.24	<0.001
I don't know what you mean by sustainable operations	4.1	1.0	0.19	<0.001

[a] Rated on a 1-to-5 scale where 1 = strongly agree and 5 = strongly disagree.

Setting Design

Results supported the notion that the organizational setting is an important SO influence. The vast majority of respondents believed that practical systems put in place by staff on-the-job were important

to the successful implementation of SO (Table 2).

Policies and procedures supportive of SO were viewed as important to the majority (Table 2) and a few made comments suggesting that these should be required throughout the agency. (e.g., "Make the movement a national program where all levels of management are forced to make it part of their duties rather than optional. If told to do it they just "might" comply.") Others emphasized that policies are ineffective unless they are enforced, e.g., "It is my understanding that there is an executive order requiring that we use recycled paper in our printers and copiers. In 5 years on this forest I have seen recycled paper available in the copier room only one time. Publicize the executive order to forest leadership and make them responsible for following up to check for compliance."

Settings also support SO behaviors through funding and most respondents (Table 2) viewed large funding sources to cover big ticket items as important. Comments pointed to the need for additional funding to advance SO: ". . . Our buildings are notoriously energy-inefficient, but funds are not available to upgrade HVAC or replace windows"; and "We have many old (over 10 years) fridges/freezer that are using way too much energy and need to be replaced; however, I am told there is no money for things like that." Small grants to cover local SO proposals were also viewed as important (Table 2).

Setting design can deter SO actions. More than one-third of respondents (41%) indicated that recycling programs for most, if not all the items, asked about in the survey were unavailable at their work location (rated on a scale of 1–5, where 1 = completely true and 5 = completely untrue). SO score was positively related to program availability ($r = 0.16$; $P = 0.001$). Although respondents were largely neutral in regard to the item suggesting that many green practices are impossible or impractical at their location (Table 3), agreement was associated with fewer SO actions (Table 3).

Knowledge and Information

Our respondents largely disagreed with the statement "I don't know what you mean by sustainable operations" (Table 3). However, there was a significant relationship between this item and SO score (Table 3), indicating that knowledge about SO was associated with greater frequency of SO actions.

Information about how to implement SO was viewed as important by most respondents and a majority rated "a better understanding of the environmental benefits or costs of current practices" as an important SO influence (Table 2). Knowing costs and savings to the agency of SO was also viewed as important by a majority (Table 2). One open-ended comment suggested this information could offset negative attitudes: "The main challenge is getting a lot of people who don't care or have bad attitudes to get on board and make an effort. Most of the systems are in place somewhere on the district, but no one really knows how much money or waste we save or what good comes from the effort."

Most respondents agreed that a website containing information about SO was important to successful implementation of SO (Table 2). Open-ended comments affirmed this and included, ". . . A website with listed products made from recycled items, cost comparison and the ability to make up those additional expenditures of funds may help. . . ." Another wrote, "Better web resources identifying sources of products that lead to sustainability/conservation (especially when designing facilities and specifying for contracts)."

Habit

About one-third of respondents were in the habit of considering the environmental impact of their actions either daily (33%) or several times throughout the day (32%). Furthermore, this consideration was positively associated with SO behaviors ($r = -0.28$; $P < 0.001$). Most disagreed with, "I'm not in the habit of considering sustainability and proenvironmental behaviors in my day to day work," as well as with, "I could recycle but I forget to" (Table 3); but agreement was associated with lower SO scores (Table 3).

The PBCM suggests that reminders (prompts) and incentives help people develop new habits. A majority of respondents agreed that workplace reminders influence successful SO implementation; and more than one-half agreed that incentives were an important influence (Table 2). One respondent said, "I do feel the minimum is being done in the office but it could be improved slightly by signage or competitive 'rewards' by department. . . . " Another said, "We recycle at my workstation but it could use a lot more employee awareness and 'pep' programs. I think the rewards program is a good idea and gets people involved."

Prediction of SO Score from PBCM Influences

Throughout the results section we have reported significant relationships between PBCM influences and the SO score. To test the relative contribution of each influence to the overall score, as well as the ability to predict the SO score from these influences, we conducted regression analysis. To ease analysis, reduce inter-item correlation concerns, and to improve power by reducing the number of independent variables, we created several new variables. The original variables, the newly created variables derived from the mean of combined items, and reliabilities are presented in Table 4.

In the regression analysis a significant portion of the variance was accounted for ($R^2 = 0.23$) using norms, attitudes, setting design, knowledge/information, and habits (Table 5) as predictor variables. The significant individual contributors were supporting habits, competing habits, supporting attitudes, and part of competing attitudes. In sum, it appears that the PBCM influences help us understand variations in SO actions.

Discussion

This project sought to examine SO practices in the daily work lives of US Forest Service employees. The purpose was to identify influences on these behaviors such that organizations can more effectively promote them. Results supported our hypothesis that as predicted by the PBCM, social norms, attitudes, setting design, knowledge and information, and habit are important influences on SO behaviors.

Social norms appeared as one of the most important SO influences. Most respondents agreed that station and regional leadership, coworkers, and the public support SO and these beliefs were positively related to SO behaviors. The PBCM suggests that social norms supportive of SO behavior be promoted by making people aware of others' support (e.g., sharing survey data such as that reported here that clearly indicates others' support) and using role models. Managers and employees with strong beliefs regarding SO should remind others of the importance of SO and serve as role models. These steps would show normative support for greening (as indicated by Schultz 1998,

Table 4. Original questions, groupings by proenvironmental behavior change model (PBCM) influences and reliabilities of scales.

PBCM influence and original items	Cronbach's α
Agency norms	0.73
Station and regional leadership are supportive of sustainable practices	
Most of my coworkers are supportive of sustainable operations	
External norms	—[a]
The public expects sustainable operations within the Forest Service	
Supporting attitudes	0.79
I have a personal responsibility to behave proenvironmentally whenever possible	
I have a professional responsibility to behave proenvironmentally whenever possible	
I am personally committed to practicing proenvironmental behaviors	
Competing attitudes set a	0.88
I have more pressing professional responsibilities than practicing sustainable operations	
My agency has more pressing responsibilities and concerns than sustainable operations	
Competing attitudes set b	0.68
I don't have the time to worry about green practices	
I think most green practices are costly	
Setting design a	—
Programs to recycle most if not all of the items listed above are not available at my work location	
Setting design b	—
Many green practices are impossible or impractical in my location	
Knowledge	—
I don't know what you mean by sustainable operations	
Supporting habit	—
In your daily work routine, how often do you consider the environmental impact of your actions?	
Competing habits	0.63
I'm not in the habit of considering sustainability and proenvironmental behaviors in my day to day work	
I could recycle but I forget to	

[a] Indicates single-item measure without Cronbach's α reliability to report.

Table 5. Regression results predicting sustainable operations score from behavior change model influences.

Predictor	B	SE	β	t	Sig.
Agency norms	−1.615	0.861	−0.092	−1.876	0.061
External norms	1.426	0.737	0.098	1.936	0.054
Supporting attitudes	−3.857	1.353	−0.175	−2.850	0.005**
Competing attitudes a	0.622	0.652	0.050	0.954	0.341
Competing attitudes b	−2.387	1.133	−0.141	−2.107	0.036*
Setting design a	0.200	0.472	0.021	0.425	0.671
Setting design b	0.493	0.697	0.039	0.708	0.479
Knowledge	0.382	0.807	0.026	0.474	0.636
Supporting habit	−2.745	0.724	−0.216	−3.789	<0.001***
Competing habits	3.578	1.185	0.199	3.019	0.003**

* Significant at $P < 0.05$; ** significant at $P < 0.01$; *** significant at $P < 0.001$.

Winter and Koger 2004, and Cialdini et al. 2006).

Another important influence was attitudes. Our respondents expressed attitudes consistent with SO, strongly agreeing that SO was a personal and professional responsibility to which they were committed. Although attitudes competing with SO behaviors were not held by the majority, approximately one-third perceived cost and inconvenience to be barriers. The PBCM suggests that sustainable behavior may be promoted by connecting specific desired behaviors to general attitudes. For example, employees can be reminded that a particular SO behavior is consistent with their agreement that SO is important. The PBCM also recommends the use of public commitments to stimulate people to behave more consistently with their attitudes. These commitments can be verbal or written "pledges" to perform the desired behavior. Finally, PBCM suggests that we reduce the influence of competing attitudes or motives. For example, anything we can do to reduce the cost or inconvenience of SO behaviors should help. Can we find inexpensive green products? Can we develop a system whereby sharing vehicles is convenient?

Organizational policies and procedures and resources allocated to SO efforts are all ways the organizational setting can support SO; all were viewed by our respondents as important SO influences. Calls for SO actions from high levels in the organization may be of limited effect if organizational and physical work settings do not support them. The PBCM suggests that we identify the setting features that interfere with SO behaviors and remove these barriers if possible or, alternatively, determine what setting features could be added to the setting to facilitate desired SO behaviors (in keeping with the findings of Geller et al. 1982). In short, what policies and procedures need to be developed and enforced to support SO behaviors? What new equipment or technologies would help and how can we fund these? How can we modify the physical worksite, for example, by providing each employee with a recycling receptacle?

Our results supported the expectation that employees must be knowledgeable about the need for specific SO behaviors as well as how to accomplish them. Respondents agreed that understanding the environmental costs and benefits of current practices as well as agency costs and savings was important to motivate SO. They also agreed there is a need for specific information on how to implement desired SO behaviors such as how to identify green hotels. Open-ended comments suggested that some need more information about benefits before they will be "sold" on SO. The PBCM suggests that we first identify knowledge deficits and then create interventions that actively involve participants, present credible information and effectiveness knowledge, and include specific behavioral recommendations. Respondents agreed that an SO website would be useful, and specific information on vendors and green hotels would be helpful to SO. Others suggested including SO information in employee orientation and training programs. Any such program should provide basic systems knowledge (what SO involves and what problems are involved), procedural or action-based knowledge (how to perform SO behaviors), and effectiveness or outcomes knowledge (the effect these actions have and benefits derived; Frick et al. 2004). This would address knowledge and information gaps and communicate organizational norms consistent with greening.

The study findings suggest that some employees may need assistance in developing SO habits and that workplace reminders and incentives are important SO influences. To help develop new habits, the PBCM recommends frequent verbal reminders and written reminders (prompts) at locations

where desired behaviors take place (as suggested by the work of Oskamp 1991, and Winter and Koger 2004). For example, signs that remind employees to use double-sided copying can be placed near copy machines. PBCM suggests that incentives such as nominal prizes and awards of leave may also help develop new habits. Praise and acknowledgment can also serve to reinforce new habits. They also indicated a perception that old habits contrary to SO should be addressed.

Conclusions

Greening culture change is underway as evidenced by SO initiatives and policies at high levels of the organization and responses to the US Forest Service survey. Such support is helpful and necessary for organizational greening but may be insufficient in the absence of line managers' and coworker support and a supportive "local" work environment. Our results suggest specific ways in which progress can be furthered based on the PBCM. These include emphasizing the support of organizational leaders, coworkers, and the public for SO; developing local policies and procedures to support SO behaviors; providing supportive equipment, technologies, and funding; offering information about benefits of SO behaviors; education and training that provides specifics on how to accomplish SO behaviors (providing the requisite information to develop the necessary knowledge); and frequent verbal and written reminders to help employees develop new habits. These principles transcend our survey findings and are in keeping with the PBCM. Findings help further our understanding of organizational greening efforts and approaches to further SO within natural resource management organizations that may be facilitated by application of the PBCM.

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