Material Values, Goals, and Water Use: Results from a Campus Residence Hall Survey

Kala J. Melchiori, Robyn K. Mallett, Aaron N. Durnbaugh and Hanh D. Pham

Abstract

The social sciences, psychology in particular, offer a growing body of research to address sustainability issues. We specifically turn to the psychological literature on values and goals to predict eco-friendly behavior. Material values, such as the desire to gain happiness from purchasing products, predict consumption behavior (Richins and Dawsons in J Consum Res 19(3):303–316, 1992). We test whether material values predict water use, and whether the relationship will be mediated through the competing goals to conserve resources and maintain personal comfort. Specifically, we hypothesize that people will use more natural resources when the goal for personal comfort outweighs the goal to conserve resources (Gaspar in Sustainability 5(7):2960–2975, 2013). 269 residence hall students completed an online survey that included the Material Values Scale, a conservation goal item, and a personal comfort goal item. Students also reported water use, including shower time and dish washing habits. As predicted, material values, the conservation goal, and the comfort goal independently predicted water use. However, only the personal comfort goal explained the relation between material values and water use. To increase the likelihood of behavior change, campus water conservation campaigns should try to activate the goal to conserve resources, like reminding students to shorten showers, while dissuading material values, possibly by emphasizing the value of experience over consumption.

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1 Introduction: Water Conservation

Access to potable, sanitary water is a present and mounting global concern. Over 11 % of people worldwide do not have access to sanitary drinking and bathing water, leading to approximately 3.5 million deaths each year (UNEP et al. 2010). Climate scientists estimate that the number of people living with water scarcity will double by 2025 if current trends continue, primarily because climate change will increase the salinity of ground water and cause greater variability in precipitation (Attari 2014). Conserving water will ensure there is enough potable, sanitary water for people, animals, and agriculture in the decades to come. Furthermore, water conservation helps to ensure that aquatic species that are sensitive to water temperature and depth will continue to thrive and keep our ecosystem in balance. Water conservation efforts are an essential step that individuals and institutions must take in the face of climate change, pollution, and a fast-growing world population.

The average person needs just over 13 gallons of water per day for food preparation and to maintain proper hydration, sanitation, and hygiene (Gleick 1996), yet the average United States (US) citizen uses 98 gallons of water per day (Kenny et al. 2009). Many US citizens are unaware of their water waste. On average, US citizens underestimate the water used in everyday activities by at least half (Attari 2014). Simple actions can make a dramatic decrease in water consumption, including decreased but strategic watering of lawns and gardens, shortening showers, and turning off faucets when not in use. However, even when people are aware of the importance of conservation and their water use habits, they still face psychological barriers to engaging in water conservation behavior (Gaspar et al. 2011). Given that individual change is essential for sustainability, it is paramount that the social sciences address ways to encourage water conservation behavior.

Universities and colleges continue to be at the vanguard for advancing sustainability initiatives. Through campus building plans, energy infrastructure, heating and lighting controls, and equipment and material selection, universities have numerous opportunities to engage in conservation action. However, while eco-friendly facets of college campuses can influence student behavior (Too and Bajracharya 2015; Watson et al. 2015), institutional strategies will only take us so far in addressing environmental sustainability. Social science, and specifically conservation psychology, has an important contribution to make in advancing eco-friendly behavior (Steg and Vlek 2008). Additionally, the young adults who inhabit higher education campuses are at an important time in their identity development (Krosnick and Alwin 1989). Students are in a unique position to incorporate eco-friendly aspects into their identity, which can shape behavior for a significant time after they leave the university setting.

1.1 Barriers to Eco-friendly Behavior

Environmentalism is a classic psychological *commons dilemma* whereby humans depend on a common resource (e.g., water, energy) which they are entitled to share with others (Hardin 1968). The fact that individuals profit from other's conservation whether or not they personally sacrifice for the greater good explains, in part, why few people consistently engage in eco-friendly behavior despite widespread support for environmentalism (Dunlap 2002). In a commons dilemma the group fares best when everyone cooperates, but individuals benefit by selfishly consuming as much of the resource as possible (Hardin 1968). Pro-social behaviors like eco-friendly or conservation behaviors operate against self-interest because they present many perceived costs and few immediate benefits. One must sacrifice income to purchase organic food or hybrid cars and one must sacrifice time and convenience to recycle and engage in environmental activism.

Once people understand why they should and how they can engage in eco-friendly behavior and are free from structural barriers, like the absence of a water meter in their home, they must overcome several psychological barriers that often lead to inaction (Gaspar et al. 2010). Gifford (2001) identifies 29 unique psychological "dragons of inaction." We consider four psychological "dragons" that may be especially likely to find a home on college campuses. First, we discuss *psychological distance*, as campuses generally are home to young adults who perceive future events differently than older adults. Second, *perceived costs* may be especially important for young adults, who may have less income to put towards eco-friendly actions. Third, young adults are particularly sensitive to *social norms*, and college campuses offer a unique social environment in which to form locally-based norms. Fourth, young adults may be especially open to exploring and shifting their personal *behavioral goals*.

Psychological distance. Many environmental issues are construed as temporally and geographically distant, especially when people live in relatively wealthy countries like the US. Even when people understand that environmental change is occurring, they often fail to change their behavior in absence of personal experience with extreme weather events (van der Linden 2014). Personal experience with the effects of climate change brings the phenomenon psychologically closer, inducing both negative affective reactions to and increased perception of the personal risk of climate change. As a result, feeling negative affect and perceiving personal risk after an adverse weather event should increase the likelihood of eco-friendly behavior. However, people living in most regions of the US are, at this time, less susceptible to extreme weather or other events that would decrease access to potable water and thus spur water conservation behavior.

Perceived costs. Rational-economic models of eco-friendly behavior suggest that people engage in behaviors that will save or earn them money (Froehlich et al. 2010). Therefore, people are more likely to engage in eco-friendly behavior if it costs them less than not engaging in the behavior (i.e., people will conserve water if they believe it will substantially reduce their water bill). Sunk costs also represent a barrier to eco-friendly behavior change (Gifford et al. 2011). For example, if

homeowners have spent a considerable amount in repairing an inefficient water heater over the years, they are unlikely to buy a new, efficient water heater because of their perceived investment in the older model, even if the new model would result in a net gain in future savings. However, there are other competing "benefits" besides water consumption that may outweigh the economic benefit, most notably personal comfort (Horhota et al. 2014). In the moment, people may not view saving a few cents as an economic necessity when weighted against enjoying a long, warm shower.

Social norms. Social norms also play a role in our decisions to engage in eco-friendly behavior. We actively perceive the behaviors of others and are more likely to engage in behaviors that seem typical and are encouraged by those around us (i.e., behaviors that are *normative*; Cialdini et al. 1990; Kallgren et al. 2000). We are particularly likely to follow and internalize the norms of people with whom we share group memberships (Hogg and Abrams 1988). It is not yet the social norm within the US to conserve resources. On the contrary, social norms may work against eco-friendly behavior. If people do not think others are changing their behavior to better the environment, they are likely to resentfully refuse to change their own behavior to avoid enabling "free-riders" (Gifford et al. 2011).

Recent research indicates that social norms based on one's political identity may have a strong influence on eco-friendly behavior (Bliuc et al. 2015). While Democrats are likely to believe climate change science and support eco-friendly behavior and legislation, Republicans are likely to discount climate change science and either dissuade or deprioritize eco-friendly behavior and legislation. College campuses, however, can attempt to localize appeals to social norms to school identity in order to encourage students to adopt campus-specific eco-friendly norms (Ferguson et al. 2011).

Conservation versus personal comfort goals. One important, but as yet untested, way to increase eco-friendly behavior is to promote conservation over personal comfort via behavioral goals. The economic and community benefits should influence people to engage in conservation, yet the personal effort, cost required, and the fear of "free-riders" leads people to prioritize personal comfort. In fact, Horhota and colleagues (2014) found that a desire for personal convenience was a top barrier to sustainable behavior for college students.

Appealing to the goals of conservation and personal comfort directly may be one way to overcome other psychological barriers to eco-friendly behavior, even without directly addressing the other barriers. For example, merely making one's responsibilities to their community and future generations salient (i.e., promoting conservation goals) while highlighting the nobility of personal sacrifice (i.e., working against personal comfort goals) may increase eco-friendly behaviors. As noted by Too and Bajracharya (2015), green product manufacturers are aware of the tendency for people to rely on personal and material comfort, and often appeal to environmental ideals in order to sell their eco-friendly products. Coupling direct appeals for conservation and against personal comfort with campaigns that target other barriers, like perceived costs or social norms, could strengthen the effectiveness of environmental educational campaigns.

1.2 Values and Eco-friendly Behavior

At times, making an eco-friendly choice requires a perceived sacrifice of convenience or comfort. For that reason, it is important to understand how psychological values promote eco-friendly options and push people to choose conservation of resources over comfort. Values inform our goals and underlie attitudes and behavior (Rokeach 1973). People typically act in ways that reflect their values (Oskamp and Schultz 2005) and are dissatisfied with themselves when they become aware that their behavior is inconsistent with their values (Rokeach 1971). The more people report being guided by a value, the more they believe it is normative or appropriate to engage in value-congruent behavior (Cialdini and Trost 1998). For example, as environmental values increase so does willingness to engage in eco-friendly behavior (Bamberg and Moser 2007; Karp 1996; Schultz et al. 2005; Stern 2000). Moreover, learning that one underperformed in a valued domain relative to peers creates negative affect and motivates one to change the problematic behavior (Collins 1996).

Most psychological research on eco-friendly behavior draws from Schwartz's (1992, 1994) work on values. Schwartz proposes that people's values fall somewhere along a dimension from self-enhancement to self-transcendence. Where people fall on that dimension reflects how much they prioritize their own interest versus the interest of others. People who value self-enhancement make choices that contribute to personal well-being and comfort whereas people who value self-transcendence make choices that contribute to the greater good, even if it comes at a personal cost. Psychological research suggests that self-enhancement values, or an egoistic value orientation, are very strong motivators and direct goals that maximize one's own interests and personal comfort, irrespective of others' goals (Stern et al. 1993). Egotistic value orientations are especially influential when people are not particularly concerned with the environment.

Egoistic orientations often promote material values, which revolve around the desire to gain happiness from and structure one's life around purchasable products (Richins 2004; Richins and Dawsons 1992). Material values are a reliable predictor of consumption behavior. When materialistic values become central to a person's worldview, well-being may suffer because it becomes increasingly more difficult to attain the experiences necessary to satisfy materialistic needs. An emphasis on material values conflicts with the desire to make the world a better place and with the desire to protect the environment (Schwartz 1996). Conserving resources requires that a community build and maintain trust that everyone is working toward the same goal, as opposed to forwarding each person's unique, materialistic goals.

Many western societies, including the US, are guided by competing values that encourage both self-enhancing and self-transcending behaviors (Schwartz 1992). Consequently, it is not always clear which set of values is in effect and what behaviors are the most appropriate at any given time. Norm Focus Theory (Cialdini et al. 1991) suggests that when a behavior is subject to competing norms, norms that are both important and salient are considered to be the appropriate standard of behavior.

Material values may come to the forefront in situations where people experience a threat to the fulfillment of basic psychological needs for autonomy and competence (Ryan and Deci 2000). If people do not feel like they are in control of their lives, they may focus on things they can control such as purchasing material goods. The transition to college is ripe with threats to autonomy and competence. Students often experience living on their own for the first time. Moreover, constant feedback in the form of assignments and tests may make students question competence. As a result, students may prioritize consumption and comfort over conservation.

Conservation behavior may only win out when the goal to conserve overpowers the goal of comfort. Goals are desired states, such as a behaviors or behavioral outcomes, which are rewarding to engage in or to attain (Dijksterhuis and Aarts 2010). People commonly have multiple goals at any point in time, which produces goal conflict. Often only one goal is implemented into behavior. The winning goal depends on personal priorities, and people often prioritize their own well-being (Stern et al. 1993). Even when people know how to act responsibly, their behavioral goal to conserve must outweigh their goal for personal comfort for them to engage in eco-friendly behavior (Gaspar 2013). Thus, even people who care strongly about the environment do not always act in ways that protect the environment; this is known as the *value-action gap* (Chaplin and Wyton 2014; Kollmuss and Agyeman 2002).

1.3 Campus Environmental Interventions

Campus sustainability initiatives can serve as real-life examples of sustainability leadership providing practice, experience, and daily reminders that sustainable alternatives are possible (Cortese and Hattan 2010; Erickson and Skoglund 2008). As campuses reach higher levels of structural environmental sustainability, an individual's effort to conserve resources becomes a more significant factor. In energy, water, transportation, and other key environmental areas, the top-down approach may reach the limit of its impact whereupon additional conservation goals cannot be met without user participation. At that point, it becomes necessary to design strategic, campus-level behavior change interventions that support and promote environmentally responsible decision making at the individual level. Residence halls, in particular, offer a unique opportunity to psychologically nudge individual students into engaging in conservation behavior (Shriberg 2000).

Individual level decisions are often made with incomplete or inaccurate information. Moreover, sustainability activities can be, or perceived to be, inconvenient or financially costly. In the case of financial decisions, there are often marketing, advertising and other social cues that actively work against conservation, efficiency, or otherwise beneficial behavior (Thaler and Sunstein 2008). For example, abundant, well-stocked display cases with colorful plastic bottles make buying bottled beverages attractive and easy, and the sporadic presence of water fountains with short, weak flows dissuade relying on water in a reusable container for hydration.

Campbell-Arvai et al. (2014) found that making meat-free meal options the default on dining hall menus significantly increased students who opted for a vegetarian meal. People rarely wish to exert additional effort, especially when doing so is seen as going against the norm. By making a meat-free meal seem like the normative, default choice on a residence hall dining menu, the researchers were able to nudge students' choices in a more sustainable direction. Such nudges make the sustainable choice easy and more traditional choices more difficult, though not impossible.

The literature on behavior-focused programs in the higher education setting is limited and has traditionally focused on energy use or general environmental awareness. There is evidence that students are receptive to campus environmental campaigns and are often willing to adopt eco-friendly behaviors (Parece et al. 2013). For example, campus efforts that featured feedback tools such as self-audits (Savageau 2013) and energy use dashboards (Bloodhart et al. 2013) show some promise for behavior change. A new generation of energy conservation technology are coming forth from companies such as Lucid (Mok 2015) and Opower (Allcott and Mullainathan 2010) which provide real-time feedback on consumption. Petersen et al. (2007) found that providing students in residence halls feedback on energy consumption and introducing competition between residence halls was effective at decreasing energy consumption. Unfortunately, institutions often do not have the infrastructure or resources to use real-time feedback technology, therefore evaluations of the efficacy of behavioral cues and reminders to targeted audiences are still needed.

College students are a promising population to target for behavioral change as they are often living on their own for the first time, developing new habits, behaviors, and defining their identity. Campuses already support students in determining their values and identity in a number of ways. Therefore it may be relatively easy to increase campus efforts to support eco-friendly identities and goals while dissuading values and goals that may be detrimental to eco-friendly behavior.

2 The Present Study

We hypothesize that material values predict water use, and that the relationship will be mediated through the competing goals to maintain personal comfort and conserve resources (see Fig. 1). Specifically, we predict that as people's endorsement of material values increases, so will their water use. However, the relationship between material values and water use will be explained by the goal for personal comfort and the goal to conserve resources. As material values increase, the personal comfort goal will increase but the conserve resources goal will decrease. In turn, as personal comfort goals increase, water use will increase, but as the conserve resources goal increases, water use will decrease. When both the personal comfort goal and the conserve resources goal are included in the statistical model, the predictive value of material values for water use should lower, demonstrating the typical mediation effect.

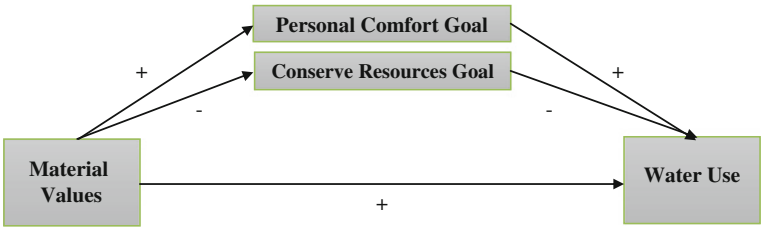

Fig. 1 Predicted mediation model where the material values-water use relation is explained by the personal comfort goal and the conserve resources goal

3 Method

3.1 Participants

We conducted an online survey of 269 undergraduate students living in apartment-style residence halls at a private Midwestern university. The average age was 19.48 years (SD = 0.78), and students were predominately White (n = 190; 41 Asian, 40 Hispanic/Latino, 16 other, 8 Black, 8 Native Hawaiian or Pacific Islander, 2 American Indian, 8 other race/ethnicity) and female (n = 192; 75 male, 2 transgender). The majority of students reported that they had spent most of their lives in suburban areas (n = 193; 50 urban, 26 rural), and most students were from the US Midwest (n = 214; 23 West, 14 Northeast, 12 South, 4 Alaska/Hawaii, and 10 non-US natives). All participants were offered a coupon for a large coffee or tea from a local cafe (valued at $3) in exchange for their participation.

3.2 Materials and Procedure

Students first completed a short form of the Material Values Scale on a 1 *strongly disagree* to 7 *strongly agree* scale (α = .67; Richins 2004). The items were "I'd be happier if I could afford to buy more things," "My life would be better if I owned things I don't have," "I usually buy only the things I need" (reverse-scored), "I like to own things that impress people," "I try to keep my life simple, as far as possessions are concerned" (reverse-scored), and "The things I own say a lot about how well I'm doing in life."

Next, we measured goals with two items using a scale ranging from 1 *strongly disagree* to 7 *strongly agree*. The conservation goal item stated, "It is personally important to me to conserve natural resources," and the personal comfort goal item stated, "I prioritize my personal comfort over everything else."

Students then reported water use, including the average length of their showers, how many showers they took in a week, if they turned off the water while brushing their teeth, and if they turned off the water while washing dishes. We summed these

items to create a water use variable (*range* = 10–29; higher numbers indicate greater water use).

Lastly, participants reported demographic information, including age, gender, race, and geographic origin.

4 Results

We tested whether people prioritized the conservation or comfort goal using a paired-samples t-test. People reported their goal to conserve resources (M = 5.29, SD = 1.34) outweighed their goal for personal comfort (M = 4.29, SD = 1.35), t (264) = 7.90, $p < .001$.

Next we examined whether the conservation goal and comfort goal mediated the relationship between material values and water use. We used the PROCESS (model 4; Hayes 2013) macro for SPSS to test for simple mediation. This analysis is similar to regression except that all paths are simultaneously estimated. The PROCESS macro uses a bootstrapping approach, generating 5000 samples with replacement. Material values, the conservation goal, and the comfort goal independently predicted water use. As predicted, the association with water use was positive for material values and the personal comfort goal and negative for the conserve resources goal. Interestingly, only the personal comfort goal mediated the relation between material values and water use (Table 1). Thus we found support for all but one path (material values-conserve resources goal) of our predicted model (see Fig. 2).

Table 1 Testing the goal to conserve and the goal for personal comfort as mediators of the relation between material values and water use

Description of estimated path	Estimate (SE)	95 % confidence intervals lower/upper
Material values → goals (conserve and comfort) → water use		
Total effect of material values on water use	.46 (.20)*	
Direct effect of material values on water use	.46 (.20)*	
Indirect effect of material values on water use through goals	.26 (.10)	.09/.46†
Material values → conserve goal → water use		
Material values to conserve goal	−.11 (.09)	
Direct effect of conserve goal on water use	−.66 (.14)**	
Indirect effect of conserve goal as a mediator	.07 (.06)	−.04/.21
Material values → comfort goal → water use		
Material values to comfort goal	.35 (.08)**	
Direct effect of comfort goal on water use	.54 (.14)**	
Indirect effect of comfort goal as a mediator	.19 (.07)	.08/.35†

*$p < .05$ **$p < .001$ (significant direct path)

†Confidence Interval did not include zero, indicating the indirect path is significant

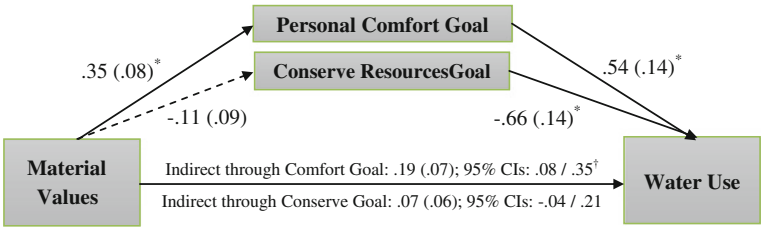

Fig. 2 The material values-water use relation is explained by the personal comfort goal but not the conserve resources goal. *$p < .001$ (significant direct path). †Confidence Interval did not include zero, indicating the indirect path is significant

5 Discussion

In our sample of college students living in apartment-style residence halls, water use was influenced by material values, the conservation goal, and the personal comfort goal. The more strongly students endorsed the goal to conserve resources, the less water they reported using. The more strongly students endorsed the goal to pursue personal comfort, the more water they reported using. Interestingly, valuing material goods did not suppress one's desire to conserve resources.

But, even though people reported conservation was more important than personal comfort, the personal comfort goal, rather than the conservation goal, explained the association between material values and water use. Students, on average, were moderately materialistic ($M = 3.83$ on a 1–7 scale), suggesting that most students have an opportunity to decrease their material values. In order to break the link between material values and the personal comfort goal, interventions should highlight other values or expressly dissuade materialism.

Gaspar (2013) differentiates between barriers, or inhibitors of goal activation, and constraints, or factors that strengthen/weaken goal pursuit, to eco-friendly behavior. Our data indicates that the goal to conserve resources may be weakened by barriers to goal activation. In contrast, material values may constrain water conservation via strengthening the goal for personal comfort. While much attention has been paid to behavioral barriers in the psychological literature on environmental behavior, there has been less research on behavioral constraints. Therefore future social science work should explore other potential constraints on pursuing the goal to conserve resources. For example, emphasis on future generations or future students at one's university may be one way to reduce material values and strengthen the desire to conserve resources.

6 Conclusions

Our study has direct implications for colleges and universities who wish to encourage campus residents to conserve resources. We propose that campus water conservation campaigns may have more success by simultaneously activating the goal to conserve while dissuading material values, like providing reminders that emphasize the value of experience over consumption. For example, a poster campaign may include some materials that activate the goal to conserve resources by reminding students of their eco-friendly behavior goals or presenting a reminder of eco-friendly actions that students can easily engage in (e.g., posters that encourage students to shorten showers). Other posters might seek to address material values by emphasizing the importance of experiences over possessions or helping one's community over consumption or individual gain.

We have used the information included here to influence material values, personal comfort goals, and conservation goals in an ongoing project on a Midwestern university campus. Some students in apartment-style residence halls will be exposed to an educational campaign featuring posters, stickers on items like dish soap and toothpaste, signs near showers, a water conservation pledge, and residence hall-wide programming. Our posters and stickers are designed to make eco-friendly behavior seem normative via priming school identity with the slogan "Ramblers Conserve Water" and featuring pictures of a well-known and liked campus staff member conserving water. These attempts should increase student's goals to conserve resources. The posters' focus on campus community identity should also decrease material values by focusing attention on one's collective well-being instead of personal comfort.

Future work should determine if the relationship between material values, goals, and water consumption is replicable at regionally, demographically, and culturally different campuses. One limitation of the present study is that it was conducted at a Midwestern Jesuit institution that has a predominately White, middle- and upper-socioeconomic status population. As values are largely shaped by cultural factors such as region, ethnicity, and SES, there may be several demographic modifiers to the relationship between values, goals, and water use. Furthermore, as members of a social justice-focused Jesuit institution with an explicit emphasis on sustainability initiatives, our participants were in a key position to align their values with the explicit values of the university. For example, some students who were attracted to the social-justice mission of the university may have had very low material values, therefore making our student population more diverse on material values than the student population on other campuses. Therefore we encourage replications of our work at non-Jesuit colleges or universities that have not adopted an environmental agenda.

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Robyn K. Mallett, PhD, is an Associate Professor of Psychology at Loyola University Chicago. She completed her BA at the University of Alaska Anchorage and her PhD in Social Psychology at the Pennsylvania State University. Growing up in Alaska, she developed an appreciation of and love for the environment. Her research focuses on pathways to positive intergroup relations and, more recently, on promoting environmentally sustainable behavior. This work considers the origins and consequences of ecoguilt resulting from failure to protect the environment. She and her co-authors have applied social psychological research to reduce residential water use.

Aaron Noble Durnbaugh, MA, LEED AP, is the Director of Sustainability for Loyola University Chicago. Working across the curriculum, culture, and campuses of Loyola, Mr. Durnbaugh builds innovation and efficiency into the University's programs and student experience focusing on water protection, energy conservation and mission-driven sustainability action. He serves on the Executive Advisory Committee and Board of the Chicago Wilderness Alliance and is Co-Chair of Mayor Rahm Emanuel's Nature and Wildlife Committee. Before joining Loyola, he served as the Deputy Commissioner with City of Chicago's Department of Environment where he oversaw the

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