# Identifying Landowners' Motivations for and Barriers to Adopting Best Management Practices Related to Watershed Based Plans: Economic, Intrinsic, and Knowledge Factors

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## Introduction/Need for research

Recently, the Texas Commission on Environmental Quality (TCEQ; 2014a) deemed Little River unusable for recreational use as it "fail[ed] to meet contact recreation use standards" (Foust, 2010, para. 1). The presence of bacteria is an indicator of pathogens that can cause harm to humans and animals if ingested (Lewis, n.d.), which could be reduced if landowners adopted best management practices (BMPs) associated with watershed based plans (WBPs). Although BMPs can help reduce bacteria pollution, many landowners face barriers that prevent adoption. Thus, landowners should be educated by targeting their motivations, which Knowles, Holton, & Swanson (1998) determined as one of six important principals in adult education, and assisting them to persist through perceived barriers towards adoption. Although many organizations use external rewards and economic incentives to educate and entice or reinforce individuals' behaviors (Rogers, 2012), De Young (1993) admitted that immediate short-term influences, such as economic incentives, were not effective in long-term use of conservation practices. Rather, internal motivations can encourage individuals to pursue a behavior for personal satisfaction (Ryan & Deci, 2000). De Young (1986) supported intrinsic motivations suggesting individuals are driven by their personal satisfaction of performing conservation activities.

Knowledge is considered an important factor in the process of adoption (Rogers, 2010); thus, lack of access to educational information or knowledge can be a barrier. Rodriguez, Molnar, Fazio, Sydnor, and Lowe (2009) found "lack of knowledge or education 'concerning sustainable agricultural practices' was frequently expressed as a barrier" (p. 66; Berthold, 2014). Rogers (2010) states that as an innovation is disseminated through a social system over time, individuals go through the five-stage innovation-decision process: knowledge, persuasion, decision, implementation, and reinforcement. Research priority two of the AAAE National Research Agenda encourages research to be conducted to better understand new practices and develop educational opportunities, to create sustainable agricultural systems (Roberts, Harder, & Brashears, 2016). This study supports research priority two (Roberts et al., 2016), to understand how a target audience receives educational information about agricultural innovations, such as BMPs, to impact the diffusion of the innovation and impact the future of water resources related to agriculture.

## Method

This quantitative study was part of a larger research project focused on the Little River watershed in Texas. This study used survey methodology to assess landowners motivations for and barriers to adopting BMPs along the Little River, San Gabriel River, and Big Elm Creek tributaries of the Little River watershed in Texas. We identified a population of 7,592 landowners along the watershed using a Geographic Information System (GIS). Using a simple random sampling method, we obtained a sample of 1,881 (Bryman, 2015). Those 1,881 landowners received mailed questionnaires following Dillman's Tailored Design method (Dillman, Smyth & Christian, 2014) and had the option to return the questionnaire via mail or to complete the questionnaire online. The instrument included a total of 24 questions with dichotomous and modified four- and five-point Likert-type scales. The five-point *motivation and barriers scale* included ≤ 1.50 = strongly disagree; 1.51 – 2.49 = disagree; 2.50 – 3.49 = somewhat agree; 3.50 – 4.49 = agree; 4.50 ≤ = strongly agree. We delivered a total of 1,880 questionnaires and achieved a 25% ($n$ = 462) response rate, which resulted in 15% ($n$ = 275) of usable data. Of those 275 participants, 28.4% were 55 to 64 years of age ($n$ = 78), 67.3% were

male ($n$ = 185), 83.6% were Caucasian ($n$ = 230), and 24.0% held a bachelor's degree ($n$ = 66). We calculated descriptive statistics and t-tests on categorical data (Field, 2013). The questionnaire established validity using content experts who specialize in water resources (Bryman, 2012), and was reliable with a post-hoc Cronbach's alpha of .969 and .905. No significant differences were found between early and late respondents (Lindner, Murphy, & Briers, 2001).

## Findings

Data revealed 39.2% of participants were aware of the term BMP, 51.3% were aware of efforts to control water pollution through BMPs, and 41.9% were aware of the term incentive program. Participants reported water quality in their area was very important ($M$ = 1.16, $SD$ = .38), believed water quality status in their area was average ($M$ = 1.96, $SD$ = .62), and expected the future water quality in their area would remain the same ($M$ = 2.08, $SD$ = .62).

Participants agreed the economical profitability of a BMP ($M$ = 4.19, $SD$ = .94) and the potential for a BMP to improve or maintain the environment for future generations ($M$ = 4.19, $SD$ = .94) influence adoption of BMPs. Participants reported they were less influenced by loans that could ease the cost of implementing the practice ($M$ = 3.09, $SD$ = 1.05). There was no significant difference between male and female participants regarding factors that influence them to adopt BMPs ($t$(102.836) = .089, $p$ = .053). However, there was significant difference between Caucasians and other ethnicities ($t$(20.45) = -.320, $p$ = .007). Caucasians ($n$ = 209) ($M$ = 4.20, $SD$ = .92) participants reported to be more motivated to adopt BMPs that improved or maintained the environment for future generations than were participants from other ethnicities ($n$ = 20), ($M$ = 4.00, $SD$ = 1.29).

Additionally, participants reported barriers to adoption of BMPs as uncertainty of government regulations and rules associated with implementing BMPs ($M$ = 3.75, $SD$ = .99), lacking information about the effectiveness of the BMP ($M$ = 3.67, $SD$ = .99), and lacking awareness of incentive programs ($M$ = 3.66, $SD$ = 1.09). Overall, participants did not report neighbors' influence ($M$ = 2.39, $SD$ = 1.06) as a barrier. There were significant differences between male and female participants regarding barriers to adoption as female participants ($M$ = 3.82, $SD$ = 1.07) were more unsure of government regulations than male participants ($M$ = 3.72, $SD$ = .97). However, no significant differences were found among Caucasians and other ethnicities ($t$(214) = -.028, $p$ = .336).

## Conclusions/Implications/Recommendations

In this study, 39.2% of participants were unaware of the term BMP and lacked knowledge-type information to adopt BMPs, which was consistent with prior research (Berthold, 2014; Rodriguez et al., 2009). Thus, instructors should provide educational opportunities for landowners leading with the reported motivations, while addressing the potential barriers of adopting BMPs (Knowles et al., 1998). This method can possibly increase adoption of BMPs and reduce bacteria entering the waterways, ultimately creating a healthy agricultural system. Further qualitative research of the landowners should be conducted to gain a more in-depth understanding of factors that influence BMP adoption. It is also imperative that a holistic understanding of all perceptions of stakeholders through a systems thinking approach (Weinberg, 1975) to encourage overall support and adoption of BMPs.

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