

# Personality Characteristics and Pro-Environmental Behavior: Understanding Farmers in Order to Improve Surface Water Quality in Tuttle Creek Lake, KS

COURTNEY QUINN and MARK BURBACH

University of Nebraska- Lincoln, School of Natural Resources



## Introduction

Farmers choose to adopt conservation practices for varying reasons. There are many models of pro-environmental behaviors that include personal, physical, economic, and institutional factors. Models of farmer behavior that include personal factors often only examine farmers' education level and years farming.

Testing additional factors would greatly improve our understanding of the relationship between farmers' knowledge, skills, and abilities and pro-environmental behaviors. This study examines three personal variables in relation to farmers' conservation practices that benefit surface water quality; environmental attitude, work motivation, and moral reasoning about the environment.

**Purpose:** To understand antecedents to the use of pro-environmental behaviors by conventional farmers that benefit surface water quality.

**Objectives:** To discover if a farmers' environmental attitudes, work motivation, and moral reasoning about the environment are causally related pro-environmental behaviors that benefit surface water quality. The ultimate goal is to provide a greater understanding of why farmers choose to engage in practices that benefit the environment to aid researchers and policy makers in conservation management decisions.

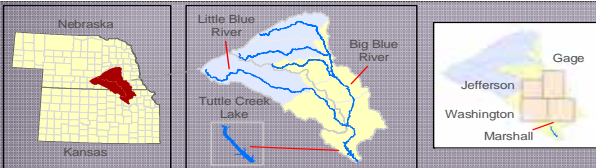
## Description of Study Area & Problem

Tuttle Creek Lake, Kansas is a 14,000-acre impoundment located in northeast Kansas at the lower end of the Big Blue River. Tuttle Creek Lake is a major source of water for the Kansas River, which supplies public drinking water for the cities of Kansas City, Topeka, and Lawrence, KS.

Land use within the Tuttle Creek Lake Watershed is primarily agriculture, with approximately 72% in corn, soybean, grain sorghum, or other crops, 10% in pastureland, and 10% in woodland. Herbicides are used extensively to control agricultural weeds. Soil infiltration rates in the project area range from moderate to very slow. The topography of the area is highly differentiated with slopes ranging from 1% to greater than 10%. As a consequence, the area has a moderate to very high potential of transporting contaminants to surface waters.

Tuttle Creek Lake is listed on the Clean Water Act Section 303(d) list as impaired for siltation, eutrophication, atrazine, and alachlor. Extremely high suspended solids and nutrient loads enter the reservoir during storm events and excessive siltation has occurred in the upper third of the original conservation pool reducing its volume by approximately 30%.

These elevated herbicide concentrations pose a risk to potable water supply downstream of the lake in the Kansas River. Atrazine concentrations in the impoundment during the period of record show many periods when the public drinking water criterion of 3 µg/L has been exceeded.



## Methods

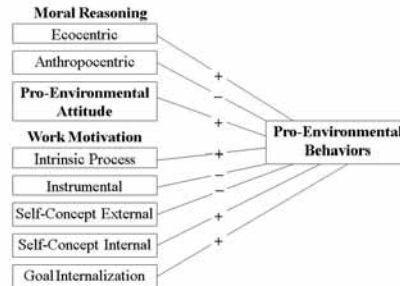
• In November 2007, 4,191 mail surveys were delivered to farmers in Gage and Jefferson counties in southeast Nebraska, and Washington and Marshall counties in northeast Kansas. Data of farmers' conservation practices and the personality variables, hypothesized to be antecedents to behaviors, were collected. 503 survey responses were used in this analysis.

• Environmental attitude was measured with the New Environmental Paradigm scale (Dunlap and Van Liere 2000), Moral Reasoning was measured with the Ecocentric-Anthropocentric scale (Thompson and Barton 1994), and Work Motivation was measured with the Motivation Sources Inventory (Barbuto and Scholl 1998).

• Pro-environmental behavior was measured by compiling each farmer's score for tillage practices, chemical application practices, and use of physical barriers. Structural equation modeling (SEM) was used to analyze the data. SEM allows for factor construction, verification of measures' properties, elaboration and testing of causal and ecological models, and the assessment of models' adequacy, simultaneously (Corral-Verdugo 2002).

• Demographic variables included age, years farming, education, farm sales, farm assets, and % income from farming.

## Model of Hypotheses



## Results

| Pro-Environmental Behavior on     | Estimates | S.E.  | Est./S.E. |
|-----------------------------------|-----------|-------|-----------|
| Intrinsic Process Motivation      | -0.019    | 0.071 | -0.264    |
| Instrumental Motivation           | 0.142     | 0.078 | 1.817     |
| Self-concept External Motivation  | -0.153    | 0.056 | -2.722*   |
| Self-concept Internal Motivation  | -0.048    | 0.099 | -0.485    |
| Goal Internal Motivation          | 0.192     | 0.099 | 1.932     |
| Pro-Environmental Attitudes (NEP) | -0.010    | 0.005 | -1.825    |
| Ecocentric Moral Reasoning        | 0.045     | 0.076 | 0.595     |
| Anthropocentric Moral Reasoning   | -0.141    | 0.067 | -2.102*   |

## Conclusions

The findings of the study indicate a significant negative causal relationship between an externally based self-concept and Pro-Environmental Behaviors. This finding lends support to the notion that farmers concerned about what their neighbors and peers think may not believe their conservation practices that benefit surface water will be adequately recognized. A significant negative causal relationship was found between Anthropocentric reasoning and Pro-Environmental Behaviors. This finding indicates that farmers who value nature because of material or physical benefits it can provide for humans are less likely to use conservation practices.

Additionally, there were significant positive correlations between farmers' Pro-Environmental Behaviors and education level, farm sales, and percentage of income from farming. Farmers who have obtained higher education degrees are learning either a concern for the environment or the ability to apply newer conservation technologies. Farmers with higher sales also use more conservation practices. This suggests that their income allows them to implement practices that may have high initial start-up costs. Farmers who earn a high percentage of their family income from farming also use more conservation practices. A heavy dependence on the success of the farm may cause farmers to have a long-term outlook and see the benefits of using conservation.

There were significant negative correlations between Pro-Environmental Behaviors and age, and years farming. Younger farmers, and those who have been farming for fewer years, are more interested and willing to use conservation practices. This may be because younger farmers have grown up during a time of concern for the natural environment. Younger farmers may also be less set in their ways and therefore willing to try new practices.

**Implications for Research:** Other personal characteristics should be studied. For example, researchers should investigate whether farmers experience empathy with downstream residents and the distance of concern farmers consider when making decisions. Farmers' need for control, and their perceived ability to create desired change should be researched to discover if causations exist with likelihood to use Pro-Environmental Behaviors.

## Works Cited

- Barbuto, J.E., & Scholl, R.W. (1998). Motivation Sources Inventory: Development and validation of new scales to measure an integrative taxonomy of motivation. *Psych. Rep.*, 82, 1011-1022.
- Corral-Verdugo, V. (2002). Structural Equation Modeling. In: Handbook of Environmental Psychology, (eds) R. Bechtel and A. Churchman.
- Dunlap, R.E., Van Liere, K.D., Merrig, A., & Jones, R.E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *J. Soc. Issues*, 56(3), 425-442.
- Fazio, R.J., & Zanna, M. (1978). Attitudinal qualities relating to the strength of the attitude-behavior relationship. *J. Exp. Soc. Psychol.*, 14, 398-408.
- Sample, N., & Freese, M. (1973). Attitude and prediction of behaviors. *Social Forces*, 51, 292-303.
- Thompson, S.G. & Barton, M.A. (1994). Ecocentric and anthropocentric attitudes towards the environment. *J. Env. Psychol.*, 14, 149-157.



All photos from USDA photo gallery  
http://www.ers.usda.gov/ncwp/photos.htm

## Environmental Attitude

An individual's attitude towards the environment, considering how environmentalism challenges society's current views about nature and the relationship between humans and nature (Dunlap and Van Liere 1978).

Attitudes held with high confidence are better predictors of behavior than are attitudes held with low confidence (Sample and Warland 1973; Fazio and Zanna 1978).

## Work Motivation

- 1) *Intrinsic Process*: the activity itself is the reward.
- 2) *Goal Internalization*: the behavior is congruent with the individual's value system.
- 3) *Instrumental Reward*: characterized by a concern for tangible incentives.
- 4) *Self-Concept External*: relies on their social identity and others to define them.
- 5) *Self-Concept Internal*: a person's sense of self is primarily inner directed.

## Moral Reasoning

The essential dilemma for all environmental ethics concerns is the resolution to the question 'Why should I care?'

*Anthropocentrism*: Other life is important only to the degree that it affects or can be useful to humans. (negative correlation)

*Ecocentrism*: Nature is considered to have intrinsic value and should be preserved for its own sake. (positive correlation)

## Pro-Environmental Behaviors

- 1) *Tillage practices*
  - No till, reduced till, minimum till, and conventional till
- 2) *Pesticide application timing*
  - Post-emergence (based on weed problems), post-emergence (routine), Pre-emergence (based on previous season weeds), and Pre-plant/ Pre-emergence/or burndown
- 3) *Physical barriers*
  - Buffer strips, terracing, contour farming, and sediment basins