

WATERSHED MANAGEMENT AND LANDOWNERS' ENVIRONMENTAL PERCEPTIONS

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1.0 INTRODUCTION

The State of Iowa has 72,000 miles of rivers and streams. These waters have several designated uses for more than 2.9 million Iowans, such as urban and agricultural needs, sustaining environmental resources, power plant cooling, and providing tourism, sport, and recreation. Of serious concern is the amount of pollution currently found in many of these waters (Water Tech online 2005). Too many waterways in Iowa are on the Federal Clean Water Act Section 303(d) list of impaired waters and are regarded as too polluted to maintain their designated function. Prominent non-point pollution sources that impact the quality of Iowa water bodies include silt, nitrogen, phosphorous, pesticides, animal waste, hormones and antibiotics (IDNR n.d., USGS n.d., WHO's 13 News 2005). In 2002, the Iowa Department of Natural Resources identified 205 water bodies and 286 impairments with additional investigation needed in 40 wetlands, 23 lakes, and 108 stream and river segments (IDNR n.d., Maas n.d.). These numbers continue to slowly but steadily increase. Stakeholders such as urban and rural residents, developers, farmers, and public land managers must be full participants in reversing this trend. Yet not enough has been done to measure awareness of the causes and effects of this problem, and assess their willingness to institute good environmental practices. As public debate surrounding land use and preservation issues increases, insight into the nuances of landowner awareness, concerns, and attitudes becomes increasingly important.

2.0 THEORETICAL FRAMEWORK

This study focuses on the association between landowners' perceived environmental social identity

(anthropocentric vs. ecocentric) and their environmental behavior, in the context of a small impaired stream located in Black Hawk County of northeastern Iowa (see Figure 1). This social identity theoretical framework can be applied for single and multiple use recreation and tourism issues of development or preservation.

Environmental identity is the set of meanings attached to the self as the person interacts with the natural environment. How one views one's self within the environment is distinguished between the worldviews of anthropocentrism and ecocentrism. An anthropocentric position views humans as intrinsically valuable, unique among all species, and shaped by their social and cultural environment. From this perspective, the environment does not have intrinsic value, but instead is viewed as a means to a human end. Individuals holding an anthropocentric view "tend to favor economic development over environmental protection, and tend to engage in fewer environmental behaviors" (Schultz & Zelezny 2003, p. 126). An ecocentric worldview considers humans as valuable and unique yet just one among many other species and objects of value and worth (such as trees, rivers, and prairies), and they must consider environmental forces that may impose constraints on human actions. Ecocentrists define their relationship with the environment as interdependent and tend to "care more about environmental problems, favor environmental protection over economic growth, and engage in more pro-environmental behaviors" (Schultz & Zelezny 2003, p. 126). Research has shown that public attitudes and values toward the environment—citizens' sense of environmental identity—vary on a continuum between anthropocentrism and ecocentrism (Hunter & Rinner 2004, Schultz & Zelezny 1999).

The following model was utilized to develop the study approach (see Figure 2). Stets and Biga (2003) suggest that the level of environmental identity can help explain the attitudes toward a resource (in this case the watershed) and the subsequent behaviors (the likelihood of pursuing or accepting assistance from the Soil Water Conservation District (SWCD) to implement

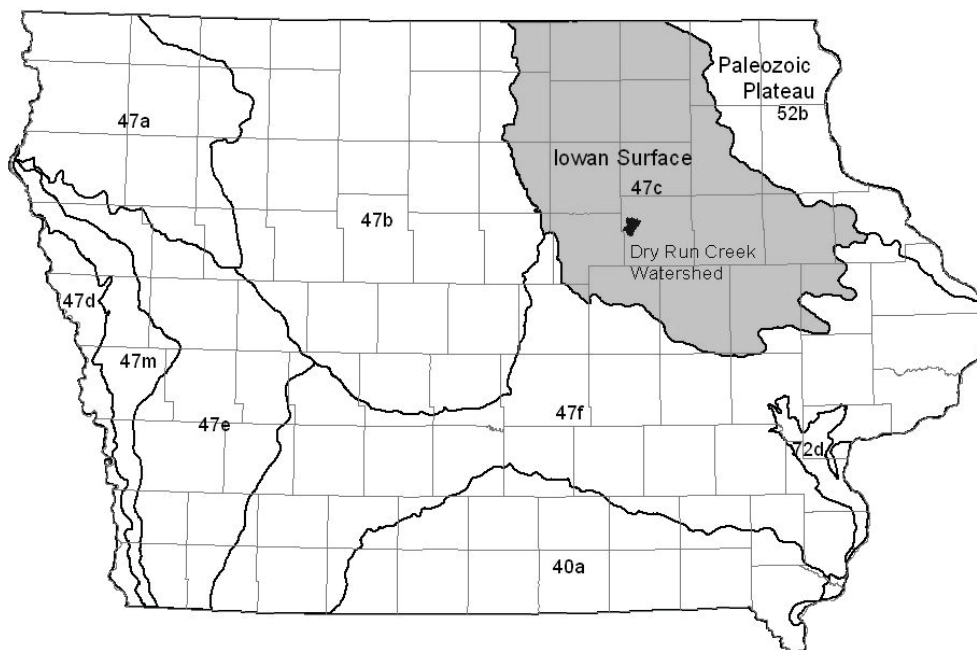


Figure 1.—Iowa Ecological Regions (Wilton, 2005).

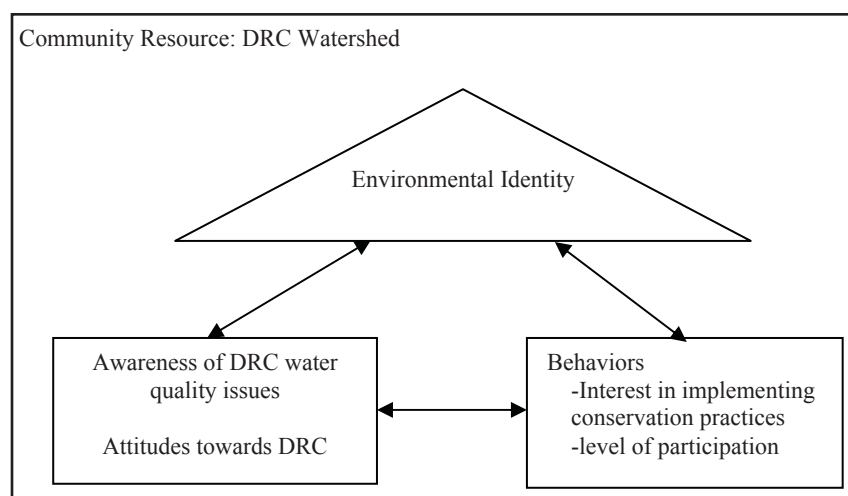


Figure 2.—Environmental identity, attitudes, and behavior in a social context adapted from Stets and Biga (2003).

conservation practices on their property located within the Dry Run Creek (DRC) watershed). Stets and Biga posit that once a person's "environmental identity is formed, environmental attitudes will form followed by environmental behavior" (p. 406). "Attitudes are just a part of one's environmental identity for people construct attitudes about an object (such as the environment) on the basis of how the objects affect what they value" (Stets & Biga 2003, p. 401). Attitude theory focuses on the choices or decisions a person makes regarding a specific object. Examining environmental attitudes and the intentions they produce is not sufficient to understand environmental behavior. Identity theory not only looks at individual choice but also links the individual to a larger

social structure that guides individual choices. Therefore the identity, the attitude, and the behavior must be considered in predicting environmentally responsible behavior. In this case, the supposition that if a landowner believes a particular environmental degradation has adverse consequences to what he/she values, the individual is more likely to instigate conservation practices.

3.0 METHODS

3.1 Study Site

DRC is the primary drainage system in northwestern Black Hawk County, Iowa (see Figure 1). The creek is composed of 24.5 miles of stream channel that drains

approximately 35 square miles. It drains from rural farm fields at its outer reaches, coalesces into channels as it travels into the city of Cedar Falls, and empties into the Cedar River. Despite the creek's name, water is present in much of the stream throughout the year. In 2002 and again in 2004, the IDNR labeled DRC watershed an "impaired water body," indicating that certain aquatic life was not present in the stream and that it was unsuitable aquatic habitat. Other stream quality issues have been noted including the use of the creek as small landfills and the presence of a mixture of chemicals and bacteria microfauna, such as *Escherichia coli* (*E-coli*). The presence of these chemicals and bacteria in the stream deteriorate the water quality, further impairing the aquatic life in the stream (Beason 2005). Despite these dangers, however, very few Cedar Falls residents know of these findings.

3.2 Survey Sample

In January of 2005, Black Hawk SWCD set out to identify landowner awareness, concerns, and attitudes of water quality issues specific to the DRC watershed. To accomplish this task, 348 systematic randomly selected property owners within the DRC watershed were sent a survey to identify potential conservation practices that they may be interested in implementing. Two hundred and fifteen surveys were returned (61.8%). Considering that the City of Cedar Falls and rural farmers own more acres of land within the DRC watershed, 122 additional surveys were sent to these landowners who were not initially selected as part of the sample, with 49 surveys returned. Since significant differences between each group's responses were not found, both sets of surveys were combined for a total of 264 surveys in this sample of landowners.

4.0 RESULTS

Landowner human-environmental perspectives are distinguished between the worldviews of anthropocentrism and ecocentrism. The sum of 11 human-environmental perspectives questions was calculated to give an indication of landowner human-environment perspective towards preserving the overall environmental health of the watershed. The higher the total score, the more environmentally friendly is

the landowners's sense of self. The scores ranged from 5.5 to 60.5 with a mean score of 36.9 and a standard deviation of 7.47. To determine whether a landowner had a tendency towards an anthropocentric, moderate, or ecocentric world view, environmental identity scores were categorized in the following manner: landowners with a score of 27.4 or less were categorized as anthropocentric; landowners with an identity score between 27.5 and 38.5 were categorized as holding a moderate environmental world view; and landowners who scored higher than 38.6 were categorized as ecocentric.

Findings indicated that landowners with a higher environment identity score were more aware, concerned, and interested in instigating possible conservation practices on their property than those individuals whose environmental identity scores tend to favor development within the watershed over preservation. Although the majority of landowners (74.7%) indicated that they were "unaware" or "not sure" of the watershed water quality issues, landowners with an ecocentric world view were more likely to be aware of DRC water issues compared to those with moderate environmental identity (Scheffe, $p = .001$).

4.1 Interest in Conservation Practices

Table 1 illustrates the association between landowners' human-environmental perspectives with their potential conservation behavior. Cross tabulation between landowner interest in learning and implementing conservation practices and landowner differences in environmental identity was analyzed. For all 17 conservation practices, individuals who held an ecocentric worldview were more likely to be interested in learning more about conservation practices that would help improve DRC water quality. Interestingly, for the 17 listed conservation practices, 100% of the landowners who held an anthropocentric world view were not interested or felt seven of the 17 practice did not apply to their situation. However, a high percentage of all surveyed landowners were interested in the following practices: Native landscaping/wildflower gardens/rain gardens (55.9%); backyard conservation/wildlife habitat improvement (50.8%); and urban construction control (49.8%) (Table 1).

Table 1—Environmental identity and level of interest in conservation practices

	All landowners	Environmental Identity			x ² Sig.
		Anthropocentric World view	Moderate Environmental Identity	Ecocentric World view	
<i>Native landscaping/Wildflower gardens/Rain gardens</i>					p ≤ 0.001
no interest/not applicable	33.9%	88.9%	40.2%	15.9%	
interested but need more information	55.9%	11.1%	48.5%	50.7%	
already adopted practice	10.2%		11.4%	11%	
<i>Backyard conservation/wildlife habitat improvement</i>					p ≤ 0.001
no interest/not applicable	37.7%	94.7%	45.5%	13.6%	
interested but need more information	50.8%	5.3%	41.8%	73.5%	
already adopted practice	11.4%		12.7%	12.5%	
<i>Urban construction control</i>					p ≤ 0.001
no interest/not applicable	45.5%	100%	56.8%	18.9%	
interested but need more information	49.8%		36.4%	77.8%	
already adopted practice	4.7%		6.8%	3.3%	
<i>Permeable paving</i>					p ≤ 0.001
no interest/not applicable	50.6%	94.1%	58.3%	30.8%	
interested but need more information	48.5%	5.9%	40.2%	69.2%	
already adopted practice	0.9%		1.5%		
<i>Inlet protection for storm sewers</i>					p ≤ 0.001
no interest/not applicable	47.6%	94.1%	52.7%	31.1%	
interested but need more information	47.2%	5.9%	41.2%	64.4%	
already adopted practice	5.2%		6.1%	4.4%	
<i>Assistance in disposal of household hazardous waste</i>					p ≤ 0.001
no interest/not applicable	34%	82.4%	37.9%	78.7%	
interested but need more information	46.4%	5.9%	42.4%	60.4%	
already adopted practice	19.6%	11.8%	19.7%	20.9%	
<i>Conservation cover</i>					p ≤ 0.001
no interest/not applicable	41.1%	94.7%	51.1%	14.6%	
interested but need more information	45.3%	5.3%	34.6%	69.7%	
already adopted practice	13.6%		14.3%	15.7%	
<i>Wetland restoration</i>					p ≤ 0.001
no interest/not applicable	51.1%	100%	61.2%	24.7%	
interested but need more information	43.9%		32.8%	70.8%	
already adopted practice	5.1%		6%	4.5%	
<i>Filter strips along the creek</i>					p ≤ 0.001
no interest/not applicable	46.6%	100%	56.7%	20.9%	
interested but need more information	43.3%		29.9%	71.4%	
already adopted practice	10.1%		13.4%	7.7%	
<i>Waterways</i>					p ≤ 0.001
no interest/not applicable	43.6%	100%	50%	22.8%	
interested but need more information	41.9%		32.3%	64.1%	
already adopted practice	14.5%		17.7%	13.1%	
<i>Rock check dams</i>					p ≤ 0.001
no interest/not applicable	55.2%	94.1%	63.1%	35.6%	
interested but need more information	40.9%	5.9%	32.3%	61.1%	
already adopted practice	3.9%		4.6%	3.3%	
<i>Minimal use of lawn and garden fertilizers and pesticides</i>					p ≤ 0.001
no interest/not applicable	36.6%	100%	40.6%	17.6%	
interested but need more information	40.5%		36.1%	54.9%	
already adopted practice	23.2%		23.3%	27.5	
<i>Terraces</i>					p ≤ 0.001
no interest/not applicable	51.9%	100%	59.7%	31.5%	
interested but need more information	36.6%		29.1%	55.6%	
already adopted practice	11.5%		11.2%	13.5%	

continued

Table 1—continued

	All landowners	Environmental Identity			x ² Sig.
		Anthropocentric World view	Moderate Environmental Identity	Ecocentric World view	
<i>Community sewage treatment</i>					p ≤ 0.001
no interest/not applicable	52.4%	88.2%	61.1%	33.3%	
interested but need more information	33.9%	5.9%	28.2%	47.8%	
already adopted practice	13.7%	5.9%	10.7%	18.9	
<i>Windbreaks around dwellings</i>					p = 0.002
no interest/not applicable	49.8%	88.9%	52.6%	37.1%	
interested but need more information	33.6%	11.1%	31.6%	42.7%	
already adopted practice	16.6%		15.8%	20.2%	
<i>Contour strips</i>					p ≤ 0.001
no interest/not applicable	60%	94.1%	65.1%	46.1%	
interested but need more information	31.7%	5.9%	24.8%	47.2%	
already adopted practice	8.3%		10.1%	6.7%	
<i>Private septic system upgrades</i>					p ≤ 0.001
no interest/not applicable	70%	100%	77%	54%	
interested but need more information	21.9%		15.6%	35.6%	
already adopted practice	8%		7.4%	10%	

Table 2.—Environmental identity, and environmental concerns and attitudes (Numbers are means of counts, not percentages)

	Environmental Identity			Sig.
	Anthropocentric World view	Moderate Environmental Identity	Ecocentric World view	
Do you believe that the water quality of DRC is declining?	2.84	3.27	3.67	F(2, 252)=14.156, p <.001
Water contamination is an important environmental issue in DRC	2.89	3.74	4.23	F(2, 251)=29.847, p <.001
Poor water quality in DRC affects economic development in this area of Iowa	2.40	3.03	3.23	F(2, 253)=7.245, p <.001
Agriculture fertilizers have significantly impacted the water in DRC	2.6	3.24	3.54	F(2, 252)=10.858, p <.001
Lawn fertilizers have significantly impacted the water in DRC	2.9	3.46	3.59	F(2, 252)=5.528, p <.004
New construction and development have increased the amount of soil loss in this area	2.68	3.49	3.97	F(2, 251)=19.597, p <.001
Septic systems can affect the water quality of DRC	2.95	3.41	3.75	F(2, 251)=9.011, p <.001
Livestock production contributes to the reduction of water quality of DRC	2.75	3.19	3.08	F(2, 252)=2.420, NS
Run off from paved surfaces including parking lots affect the water quality of DRC	3.10	3.71	4.11	F(2, 253)=15.850, p <.001

1=strongly disagree; 2=disagree; 3=not sure; 4=agree; 5=strongly agree

Analysis on other independent variables revealed no significant differences between the different types of landowners (urban, rural, business) and the number of years landowners had lived in the watershed, and their interest in a specific conservation practice or their concerns and attitudes towards environmental degradation. Table 2 shows that a landowner's human-environmental perspective does influence a person's concern and attitude toward potential environmental impacts.

To see whether a landowner's willingness to participate in DRC conservation practices was associated with environmental identity, respondents were asked to indicate either a minimum, moderate, or maximum level of conservation participation. The majority of landowners expressed only a minimal amount of time available (72.4%), whereas 14.4 percent and 13.1 percent of landowners could offer a "moderate" to "maximum" amount of time, respectively, to help improve the stream water quality. Results of crosstabulation identified that landowners who are more environmentally sensitive (ecocentric) indicated more desire to be active in environmental conservation practices.

5.0 DISCUSSION

Gaining an understanding of landowners with differing environmental viewpoints was considered important to the Black Hawk SWCD in order to direct appropriate educational efforts for various conservation practices. The results indicated that an individual landowner's environmental outlook is associated with awareness of DRC watershed issues, a greater concern for potential pollutants, and a greater interest in participating in modern conservation practices. Thirty-five percent of landowners surveyed held a moderate environmental perspective and indicated that they were "unaware" of the DRC water quality issues.

Landowners holding an environmentally-friendly perspective represent a consistently strong association for interest in watershed conservation, suggesting that outreach and education aimed at environmental values and the threat to these values represent a potential approach for increasing support for watershed conservation practices. SWCD could target its outreach

to this group to further assess these landowners' level of willingness to participate in specific land conservation efforts. This study also found that those with an anthropocentric identity did not support these conservation practices. It is recommended that SWCD invite individuals to the table with an anthropocentric perspective to hear and understand their environmental views and values and create opportunities to increase landowner knowledge of cost-effective conservation practices towards sustainable rural and urban growth. One recommendation is to target watershed information on specific facts related to the economic impacts to the watershed, rather than aiming to advance general and global watershed concerns. This is not to say that communicating comprehensive environmental concepts and issues are unimportant, but rather such education may not be the best route to increase public support for watershed protection by some landowners where environmental protection is not one of their concerns.

Therefore, as agricultural and urban development continues to increase demands on our nation's waterways, resource managers must identify appropriate strategies that reverse the trend of non-point sources pollutants degrading public waters. Increasing public participation is a prerequisite in this endeavor. However, land management agencies are faced with diverse landowners who hold varied values toward human-environmental relations that affect landowners' watershed awareness, concerns, and behaviors towards conservation practices on their land. These results assist in a more precise understanding of landowners' personal environmental beliefs and the degree to which landowners might support or personally contribute to the solution of cleaner water within their community. In the case of DRC watershed, it is recommended to start by educating the public on specific urban pollution issues and various means by which to mitigate them. As the public debate surrounding land use and preservation issues increases, insight into the nuances of landowner awareness and level of public support becomes increasingly important. When seeking public involvement in land management decisions, it is useful to have this insight into public understanding and the general level of public concern for local and state water quality. These results support targeting outreach, education, and technical assistance

efforts based on a public education campaign about water quality from a development and economic perspective as well as recreation and preservation perspectives.

6.0 REFERENCES

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