

Farmers' Perception of Wetlands and Their Attitude on Government Wetlands Policies: A Study of Four Illinois Counties in the United States

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농민들의 습지 및 습지정책에 관한 환경인식 -미국 일리노이 주 4개 카운티의 사례-

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Abstract : This study examines farmers' knowledge and perception on the functions and values of wetland and their attitudes on government wetland policies in the state of Illinois in the United States. No significant differences were found in the knowledge of the functions and values of wetland between farmers and non-farmers, although farmers tend to value the importance of wetland less than non-farmers. However, farmers are negative on the importance of protecting wetland and replacing damaged or destroyed wetlands as well as stricter government wetland policies. It suggests that noticeable discrepancy exists between farmers' knowledge of wetland and their practice to protect wetland.

Key Words : wetland, wetland policies, farmers, environmental perception, Illinois

요약 : 경제활동의 특성 상 습지와 친숙한 농민들의 습지 기능이나 가치에 대한 인식과 습지관련 정부정책에 대한 태도는 습지관리의 중요한 변수이다. 이러한 맥락에서 이 논문은 일리노이 주 4개 카운티 주민 대상의 설문조사 자료를 바탕으로 농민들이 갖는 습지에 대한 인식과 태도의 특성을 고찰하였다. 분석 결과, 습지의 기능이나 가치에 관한 지식수준에서 농민과 비농민 간에 의미 있는 차이는 없었다. 그러나 습지의 중요성에 대해서는 농민들이 비농민에 비해 다소 낮게 평가하는 경향이다. 특히, 농민들은 습지의 보호와 손상되거나 파괴된 습지의 대체 정책에 대해서는 비농민에 비해 부정적인 태도를 갖는다. 이는 농민들에게 있어서 습지에 대한 지식과 가치 평가(실제 습지보호를 위한 실천) 간에서는 괴리가 있을 수 있음을 보여준다.

주요어 : 습지, 습지 정책, 농민, 환경지각, 일리노이

1. Introduction

Many values may be attributed to wetland. Wetland have been proven to clean water naturally, recharge water supplies, to reduce

flood risks, to provide fish and wildlife habitat, and to provide recreational opportunities, aesthetic benefits, research sites, and commercial fishery benefits (Barbier, 1994; Barbier *et al.*, 1997; Costanza *et al.*, 1998; Mitsch and Grosslink,

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2007). It is evident that society has much to gain from the conservation of wetland. Wetlands are multiple resource system and are a product of interaction between water, soil, sunlight and the living organisms within a particular topography. The resultant system is ecologically complex, and people's interaction with wetlands is as old as human society (Ndaruga and Irwin, 2003).

Human activities, particularly agricultural practices, have caused the significant loss of wetland (Vileisis, 1997; Dahl, 1990; 2000). State of Illinois in the United States has also experienced tremendous loss of wetland. Wetland once comprised nearly 23 percent of the state's surface area, but currently accounts for nearly 3.2 percent (Suloway and Hubbell, 1994). The conversion of wetland for agricultural purposes has been especially profound (Illinois Department of Energy and Natural Resources, 1994). Recently efforts to restore or construct wetland have been encouraged through several government wetland mitigation and preservation programs, providing regulatory guidelines for the protection of wetland. Despite these efforts, wetland continues to be damaged or destroyed in the United States.

Like other government policies, a better understanding of public knowledge and perception on the wetland and government wetland policies may help to create and implement more effective mitigation policies (Hollis, 1993; Kaplowitz *et al.*, 2007). Several studies have revealed public perception of wetland and wetland mitigation policies. Lupi *et al.* (2002) surveyed residents of the state of Michigan to determine their willingness to accept wetland mitigation as in-kind compensation for the loss of existing wetland. A statewide survey of Kaplowitz and Kerr (2003) examined Michigan residents' knowledge, perception and attitudes to wetland, functions of wetland and the importance of wetland existence. Ambastha *et al.* (2007) examined the attitudes of locals on wetland and

wetland conservation in India. Ndaruga and Irwin (2003) studied the cultural perceptions of wetlands by primary school teachers in Kenya. They intended to analyze how teachers perceive their local wetlands after attending the training programme.

These previous studies, however, relatively neglect potential difference between farmers and non-farmers in perception and attitude to the wetland and government wetland policies, although agricultural activities are primarily responsible for wetland destruction and modification. There may be only a case study on the difference between farmers and non-farmers in perception of wetland so far. Rispoli and Hambler (1999) examined farmers' attitudes to wetland restoration in two sites Britain. They divided their investigation population into 4 groups - farmers on wetland, farmers not on wetland, public supporting restoration, general public, and analyzed the differences between groups in attitude to wetland restoration.

Environmental perception is an active process; individual actively perceives their environment through their personal and social experiences in place. This is describes firstly as a personal experience which local features and qualities impact the way we perceive and secondly how social and cultural factors influence perception. Social conditions can impact on how the environment is perceived as well as environmental condition can impact on work and identity (Broderick, 2007). This calls our attention to reveal public knowledge and perception on the wetland and attitudes to the government policies, particularly those of farmers who are most responsible for the loss of the wetland. This study analyzes the difference in public knowledge and perception of wetland and government wetland policies between farmers and non-farmers in the state of Illinois in the United States.

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2. Research design: data and method

The study area consists of four Illinois rural counties: Alexander, Clinton, Ford, and Warren Counties (Figure 1). These counties have relatively low population and highly agricultural land use. They also reflect the concentration of wetland in the state: counties with the greatest concentration of wetland, Alexander and Clinton Counties, and those with the least concentration, Ford and Warren Counties (Table 1).

Approximately 3.2 percent of Illinois' total surface area or nearly 1.2 million acres is covered by wetland. Every country in the state has wetland, ranging in area from 1,014 acres (Stark County) to 35,502 acres (Clinton County). Five broad categories of wetland are found in Illinois;

1) shallow marsh/wet meadow, 2) deep marsh, 3) bottomland forest, 4) swamp, and 5) shallow water wetland.¹⁾ Bottomland forest is the most prevalent form of wetland followed in decreasing acreage by shallow water wetland. Clinton County has the largest wetland at 35,502 acres comprising 11 percent of the county (Table 2). Alexander County is not the top ten counties in wetland acreage, it is a leader in percentage of county in wetland. Four of the top ten wetland counties, Alexander, Calhoun, Clinton and lake, have more than 10 percent of their area covered by wetland (Table 3). The top ten counties contain 61 percent of Illinois' deep marsh wetland, and account for 85 percent of the state's total swamp acreage (Critical Trends Assessment Program, 1995).

A survey was conducted in Spring 2005. A mail-out questionnaire was sent to 1,400

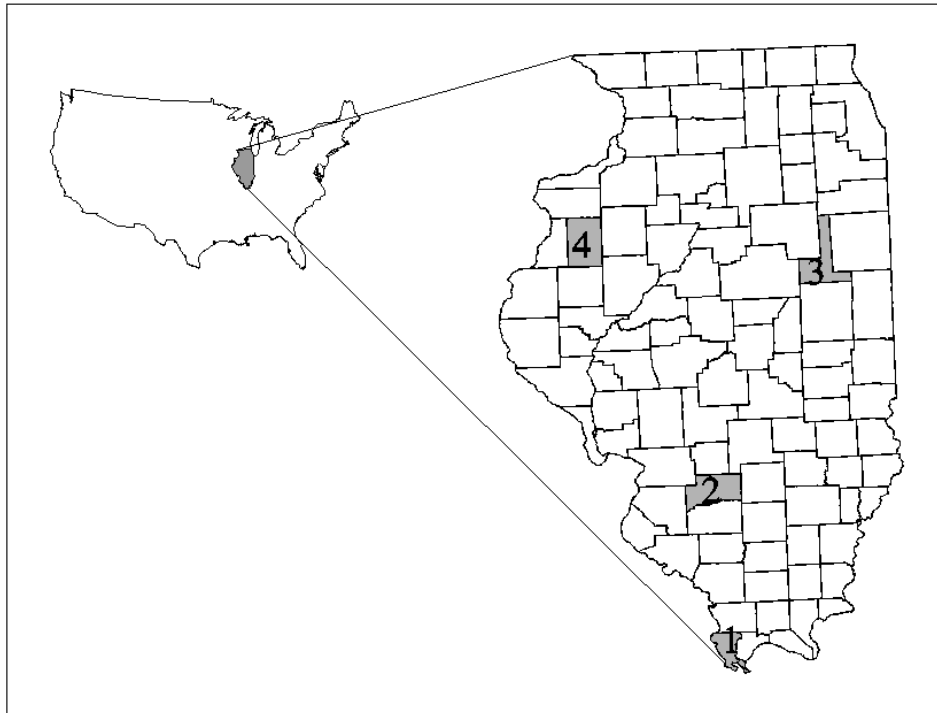


Figure 1. Illinois Counties included in the study

(1; Alexander County, 2; Clinton County, 3; Ford County, and 4; Warren County)

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Table 1. Detailed information of Counties included in this study

	Alexander	Clinton	Ford	Warren
Population	9,327	36,135	14,094	18,246
Land area in mi. ²	236	474	486	543
(% area in wetland)	(14.5)	(11.0)	(0.3)	(0.5)
Number of questionnaires returned/mailed	26/300	92/400	72/350	103/350

Table 2. Ranking of counties by acreage in wetland

County	Acres	% of State	Rank	County	Acres	% of State	Rank
Top Ten				Bottom Ten			
Clinton*	35,502	3.0	1	Hardin	2,928	0.3	93
Jackson	34,374	2.9	2	Edgar	2,797	0.2	94
St. Clair	33,811	2.9	3	Brown	2,690	0.2	95
Lake	31,259	2.7	4	DeWitt	2,636	0.2	96
Franklin	26,428	2.3	5	Scott	2,563	0.2	97
Mason	26,345	2.3	6	Kendall	2,389	0.2	98
Wayne	26,026	2.2	7	Comberland	2,371	0.2	99
Fayette	25,235	2.2	8	Warren*	1,704	0.1	100
Randolph	24,079	2.1	9	Ford*	1,043	0.1	101
Jefferson	23,692	2.0	10	Stark	1,014	0.1	102

Source: Critical Trends Assessment Program (1995). * is the study area.

Table 3. Ranking of counties by percentage area in wetland

County	Acres	% of State	Rank	County	Acres	% of State	Rank
Top Ten				Bottom Ten			
Alexander*	23,579	14.5	1	DeKalb	3,901	1.0	93
Calhoun	20,501	11.3	2	Shelby	4,560	0.9	94
Clinton*	35,502	11.0	3	Henry	4,834	0.9	95
Lake	31,259	10.4	4	Champaign	5,202	0.8	96
Pulaski	12,487	9.6	5	Edgar	2,797	0.7	97
Franklin	26,428	9.6	6	McLean	5,224	0.7	98
Jackson	34,374	8.9	7	Stark	1,014	0.6	99
Gallatin	17,950	8.6	8	Livingston	3,486	0.5	100
St. Clair	33,811	7.8	9	Warren*	1,704	0.5	101
Mason	26,345	7.3	10	Ford*	1,043	0.5	102

Source: Critical Trends Assessment Program (1995). * is the study area.

randomly sampled households living in the study area. The mailing list for each county was compiled from county and township records through MANATRON, which is a property recording and tax assessment software. The

sample size for each county was adjusted according to county population. The questionnaire was composed of 30 close-ended questions. Respondents rated their knowledge and perceptions with regard to wetland functions

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and values, their familiarity with government wetland policies and their opinion of the importance of replacing damaged or destroyed wetlands.

Respondents were also asked about their demographic and socioeconomic details. Respondents were regrouped by their occupations into two separate groups, farmers (40 respondents) and non-farmers (170 respondents). The analytical frameworks used in this study are one-way analysis of variance (ANOVA) and Chi-square tests. One-way ANOVA was used to find dissimilarities in knowledge and perceptions of wetland between farmers and non-farmers. Chi-square test analyzed the differences in perception toward wetland destruction and government wetland policies.

3. Rating the importance of wetland

Respondents were asked to describe their current knowledge of wetland, ranging from (1) “well informed” to (4) “not informed at all.” The results indicate that Illinois residents’ knowledge of wetland is satisfactory. Of all respondents, more than 80% believe themselves knowledgeable of wetland: well informed or somewhat informed about wetland. Although farmers’ knowledge of wetland is little lower than that of non-farmers, results of the F-ratio (0.445)

Table 4. Current knowledge of wetland

	Farmers	Non-farmers
Well informed	35.9%	20.7%
Somewhat informed	46.2%	65.7%
Poorly informed	12.8%	11.2%
Not informed at all	5.1%	2.4%

F-ratio=0.445 / F-probability=0.506

and F-probability (0.506) in Table 4 concluded that no significant difference in current knowledge of wetland is found between farmers and non-farmers.

Similar results were found on the importance of the existence of wetland and wetland functions (Table 5). Using a Likert scale, respondents were asked about five different levels of importance according to the following five scales; (1) “not important at all”, (2) “not very important”, (3) “somewhat important”, (4) “very important”, and (5) “extremely important”. Farmers value less important wetland than non-farmers, although both farmers (4.00) and non-farmers (4.33) recognize the importance of the existence of wetland. The result also identifies the difference in importance on the existence of wetland between two groups at a 90% confidence level.

Table 5 also indicates that both farmers and non-farmers value the importance of wetland functions with a range from 3.30 to 4.35. However, the results in Table 4 indicate that no significant difference exists between the two

Table 5. Perception of wetland function (Farmers: F, Non-farmers: NF)

	Average rating			
	F	NF	Difference	F-ratio (Probability)
Provision of wildlife habitat	4.25	4.34	0.09	0.267 (0.606)
Provision of recreational opportunities	3.30	3.54	0.24	1.417 (0.235)
Provision of unique vegetation	3.78	4.06	0.28	2.177 (0.142)
Natural flood control and filtration of water*	4.05	4.35	0.30	3.498 (0.063)

* Significant $p \leq .10$

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groups at a 95% confidence level. However, significantly more non-farmers value the importance of flood control and filtration of water at a 90% confidence level.

In summary, both farmers and non-farmers are well informed about wetland and they value functions of wetland. In addition, no significant difference can be found between two groups. However, farmers have a tendency to undervalue the importance of wetland functions and the existence of wetland.

4. Perceptions of wetland mitigation and government wetland policies

Substantial differences were found in the perception of the importance of wetland protection and the replacement of damaged wetland between farmers and non-farmers (Table 6). Farmers are well aware of the importance of protecting wetland but they value the importance less than non-farmers. Differences in perception of both groups are valid at a 90% confidence level. Similar pattern of farmers' perception was also found on the questions of the importance of replacing damaged or destroyed wetlands.

Significant differences were found in perception between farmers and non-farmers at a 95% confidence level. When replacing damaged or destroyed wetlands, both groups believe that it is important for those wetlands to duplicate conditions of natural wetland. No statistically significant difference was found between groups.

Respondents were also asked their familiarity with government wetland policies. Farmers' familiarity with government wetland policies is greater than non-farmers and the difference between two groups is statistically significant. Considering farmers are less in favor of stricter government wetland policies with regard to the protection of wetland (Table 6) and farmers' knowledge of wetland is lower than non-farmers with no statistical difference between two groups (Table 4), it is interesting that farmers show great attentions to government wetland policies with regard to the protection of wetland.

Respondents' perceptions on the destruction of wetland and government wetland policies are measured by the following three nominal scales: Yes, No, and Do not know. Chi-square test results in Table 7 indicate both farmers and non-farmers perceive that the destruction of wetland causes serious environmental consequences, endangers certain wildlife or plant species, and

Table 6. Perception of protecting wetland

	Average rating			
	F	NF	Difference	F-ratio (Probability)
In general, existence of wetland*	4.00	4.33	0.33	3.815 (0.052)
Importance of protecting wetland*	4.00	4.32	0.32	3.077 (0.081)
Importance of replacing damaged or destroyed wetlands**	3.60	4.08	0.48	5.958 (0.015)
Importance of duplicating conditions of natural wetland	3.74	3.99	0.25	1.541 (0.216)
Familiarity with government policies for the protection of wetland**	2.90	2.43	0.47	5.623 (0.019)

* Significant $p \leq .10$, ** Significant $p \leq .05$

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Table 7. Perception of wetland destruction and government wetland policies

		Perception (%)			Pearson χ^2 (Probability)
		Yes	No	Do not know	
Destruction of wetland is a serious problem*	F	61.5	28.2	10.3	11.774 (0.003)
	NF	65.9	9.4	24.7	
Destruction of wetland can have serious environmental consequence*	F	57.5	17.5	25.0	8.841 (0.012)
	NF	79.9	8.9	11.2	
Destruction of wetland can endanger certain wildlife or plant species	F	85.0	7.5	7.5	1.398 (0.497)
	NF	91.2	4.7	4.1	
Approval of stricter government policies regarding the protection of wetland*	F	37.5	42.5	20.0	10.285 (0.006)
	NF	56.5	18.8	24.7	

*Significant $p \leq .05$

destroys wildlife habitats. Farmers believe as much as non-farmers that the destruction of wetland can endanger certain wildlife or plant species. However, similar to the results of the perception on the importance of the existence of wetland and wetland functions, farmers have a tendency to perceive the destruction of wetland as less important or as a less serious problem. Significant differences are found between the two groups in the perception regarding wetland destruction.

Farmers' perception of the importance of wetland functions, the existence of wetland, and wetland destruction also influence the perception of government wetland policies. Respondents were asked about their perception regarding

stricter government wetland policies aimed at protecting wetland. Among non-farmers, a much higher percentage was in favor of stricter wetland policies than those against. To the contrary, farmers voted against stricter wetland policies (Table 8). Why are farmers generally not in favor of stricter wetland policies, although they understand the importance of the existence of wetland? This is because a relatively higher percentage of farmers consider the destruction of wetland as a less serious problem, but their property and agricultural activities are closely related with government wetland policies.

Similar results are found on the question of whether landowners/developers should be required to replace wetland. 68.8% of non-

Table 8. Perception of wetland replacement (% , Farmers: F, Non-farmers: NF)

		F	NF	Pearson χ^2 (Probability)
		Should landowners/developers be required to replace wetland?	Yes	
	No	30.0	12.4	
	Does not matter	5.0	0.6	
	Do not know	20.0	18.2	
Where should replacement wetland be located?	Same Property	40.0	41.7	1.196 (0.754)
	Any location	22.5	26.2	
	Does not matter	17.5	11.3	
	Do not know	20.0	20.8	

farmers agree that landowners/developers are responsible for replacing wetland and that rate is much higher than farmers, of which only 45.0% agree. The difference in perception between farmers and non-farmers is significant at a 95% confidence level. From the farmers' point of view, it is very natural for them to be sensitive to the issue about who is responsible for the destruction of wetland, since farmers themselves can be the ones who destroy wetland or damage wetland by their agricultural activities. Because of the same reason, it is also expected that farmers are negative toward any government wetland policies that potentially gives them the responsibility to replace damaged or destroyed wetlands. When respondents were, however, asked where replacement wetland should be located, either at the same location or at any location, no significant difference was found between farmers and non-farmers (Table 8). This result is different from the previous question.

5. Discussion and conclusion

Copeland and Zinn (2008) revealed that agricultural practices have resulted in the destruction of an estimated 80 percent of the loss of wetlands across the United States for the last two decades. In Illinois, agricultural activities, as the dominant land use, have resulted in the destruction of an estimated 90 percent of wetland in Illinois. Thus, the farmers' perception and attitude on wetland issues can be very critical in the conservation of wetland and the success of governmental wetland policies.

The results revealed that both farmers and non-farmers are well aware of wetland and the importance of wetland. Compared to the non-farmers, farmers do not show substantial difference in the knowledge of wetland and the

perception of wetland functions. Farmers generally, however, value the functions of wetland and the importance of the existence of wetland less than non-farmers. Similar trends were found in the perception regarding wetland destruction. Farmers' inconsistent attitude perceives the importance of wetland but carries reservations in protecting wetland and replacing damaged/destroyed wetland because farmers are the most responsible for destroying and replacing wetland.

The discrepancy between farmers' knowledge of wetland and their tendency to underestimate the value of wetland is because their economic interests clash with the wetland conservation. Wetland conservation could hinder farmer's efforts to maximize their profit by utilizing wetlands. From the farmer's standpoint, government wetland policies are not only unnecessary but also unfair burden on their agricultural practices. Farmers' lack of correspondence toward wetland conservation and their pursuit of profit utilizing wetland should not be the target of criticism, because their perception and attitude on wetland stem from the conflict between conservation of environment and protection of private ownership.

Thus, successful wetland policies should convince farmers that conserving wetlands will be beneficial to them in the long run although it could bring a short-term loss. To do that, it is necessary for government to provide farmers in-depth information and educational activities regarding the value of wetlands, although their knowledge on wetland is not lacking. Furthermore, fair compensation should be given to the farmers who participate in government wetland policies. In addition, it is also necessary to build a network among policy makers, wetland specialists, and farmers to share information how to successfully manage wetland and to enhance further collaboration to save

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wetland. These findings may assist the policy makers to determine proper methods of educating farmers about government wetland policies, to find better methods of getting farmers involved in wetland issues and of formulating and implementing future mitigation practices to farmers.

Farmers' and non-farmers' perceptions of wetland are not highly varied. In conclusion, it is not apparent that farmers perceive more actively their wetland environment than non-farmers, and that they are more active than others. However, identifying environmental perceptions of population in wetlands is important because how the environment is perceived will ultimately influence how an individual or group will act it. Acting can occur on a number of levels, from private property management decisions to contributions to wetland-focused decision-making processes. Perception is fundamental to environmental management. An individual's perception of their environment is influenced by interrelated factors of spacial location, personal experiences of the ecosystem and ecosystem management, and individual's interaction in social groups.

Note

1) Shallow Marsh/Wet Meadow: Areas characterized by standing water or saturated soils for brief to moderate periods during growing season. Deep Marsh: Areas characterized by standing water or saturated soils on a semi-permanent or permanent basis during growing season. Bottomland Forest: Forested wetland, temporarily or seasonally flooded. Swamp: Forested wetland, with permanent or semi-permanent water. Shallow Water Wetland: Permanently flooded areas less than 2 meters deep(ponds, borrow pits, open area of marsh or swamp).

References

- Ambastha, K., Hussain, S. A., and Badola, R., 2007, Resource dependence and attitudes of local people toward conservation of Kabartal wetland: a case study from the Indo-Gangetic plains, *Wetlands Ecology and Management*, 15, 287-302.
- Barbier, E. B., 1994, Valuing environment functions: tropical wetlands, *Land Economics*, 70, 155-173.
- Barbier, E. B., Acreman, M., and Knowler, D., 1997, *Economic Valuation of Wetlands: A Guide for Policy Maker and Planners*, Ramsar Convention Bureau, Department of Environmental Economics and Management, University of York, Cambridge.
- Broderick, K., 2007, Getting a handle of social-ecological systems in catchment: the nature and importance of environmental perception, *Australian Geography*, 38(3), 297-308.
- Copeland, C. and Zinn, J. A., 2008, *Wetland: An Overview of Issues*, Congress Research Service Report for Congress, Order Code RL 33483, Congress Research Service.
- Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R. V., Paruelo, J., Raskin, R. G., Sutton, P., and van den Belt, M., 1998, The value of the world's ecosystem services and natural capital, *Ecological Economics*, 25, 3-15.
- Critical Trends Assessment Program, 1995, *Land Cover: An Atlas*, Illinois Department of Natural Resources.
- Dahl, T. E., 1990, *Wetlands Losses in the United States 1780's to 1980's*, U.S., Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C..
- Dahl, T. E., 2000, *Status and Trends of Wetlands in the Conterminous United States 1986 to 1997*, U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C..
- Hollis, G. E., 1993, Goals and objectives of wetland restoration and rehabilitation, in Prentice, M. and Vessem, V.(eds.), *Waterfowl and Wetland Conservation in the 1990s: A Global Perspective*,

Farmers' Perception of Wetlands and Their Attitude on Government Wetlands Policies

- International Waterfowl and Wetlands Research Bureau, 187-195.
- Illinois Department of Energy and Natural Resources, 1994, *The Changing Illinois Environment: Critical Trends, Summary Report of the Critical Trends Assessment Project*, Illinois Department of Energy and Natural Resources and The Nature of Illinois Foundation.
- Kaplowitz, M. D. and Kerr, J., 2003, Michigan residents' perceptions of wetlands and mitigation, *Wetlands*, 23, 267-277.
- Kaplowitz, M. D., Lupi, F., and Hoehn, J. P., 2007, What does the public know about wetlands in Michigan? Using focus groups for scoping and exploratory research, *Michigan Academician*, 37, 19-34.
- Lupi, F., Kaplowitz, M. D., and Hoehn, J. P., 2002, The economic equivalency of drained and restored wetlands in Michigan, *American Journal of Agricultural Economics*, 84, 1355-1361.
- Mitsch, W. J. and Gosselink, J. G., 2007, *Wetlands*, John Wiley & Sons, Hoboken, NJ.
- Ndaruga, A. M. and Irwin, P. R., 2003, Cultural perceptions of wetlands by primary school teachers in Kenya, *International Research in Geographical and Environmental Education*, 12(3), 219-230.
- Rispoli, D. and Hambler, C., 1999, Attitude to wetland restoration in Oxfordshire and Cambridgeshire, UK, *International Journal of Science Education*, 21(5), 467-484.
- Suloway, L. and Hubbell, M., 1994, *Wetland Resources of Illinois: An Analysis and Atlas*, Champaign, Illinois: Illinois Natural History Survey.
- Vileisis, A., 1997, *Discovering the Unknown Landscape: A History of America's Wetlands*, Island Press, Washington, D.C..
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