



Corn Belt farmers' concerns about water-related threats to farm viability

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Climate change presents a number of threats to the Corn Belt's predominant corn-soybean agricultural system. A key objective of the Sustainable Corn project is to conduct social science research to assess farmers' understanding of climate change and attitudes toward adaptation and mitigation practices and strategies. Toward that end, a survey of Corn Belt farmers was conducted in February and March 2012. This report summarizes a portion of that survey. More comprehensive results are available at: sustainablecorn.org/What_Farmers_are_Saying/Farmer_Survey.

In general, human behavioral responses to potential hazards and threats are influenced by perceived risks. In other words, if people do not view a given situation or event as risky, they are not likely to act in response. Climate scientists predict that Corn Belt weather will become increasingly variable and extreme, with negative implications for agriculture. Our survey sought to measure farmers' level of concern about those predicted impacts.

The survey provided a list of predicted changes in the Corn Belt climate that are viewed as threats to agriculture. The items covered potential threats to farm operations from increased precipitation, drought and heat, and pest and disease. The items were preceded by the text, "The following are problems that some Corn Belt farmers have experienced over

The Project

The Sustainable Corn Project is a USDA-funded transdisciplinary partnership among 11 institutions creating new science and educational opportunities. The project seeks to increase resilience and adaptability of midwestern agriculture by identifying farmer practices and policies that increase sustainability while meeting crop demand.

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The Survey

The farmer survey was carried out in partnership with the Useful to Useable (U2U) project, another USDA-funded climate and agriculture project. The 2012 survey was completed by 4,778 corn farmers with at least US\$100,000 of gross sales and a minimum of 80 acres of corn production.

Where

The sample was stratified by 22 six-digit Hydrologic Code Unit (HUC) watersheds that cover a substantial portion of 11 Corn Belt states—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, South Dakota, and Wisconsin. The 22 watersheds contain over half of U.S. corn and soybean acres.

the past few years. How concerned are you about the following potential problems for your farm operation?" Farmers' concerns were measured on a four-point concern scale from "not concerned" (1) to "very concerned" (4).

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Source: Loy, Adam, Jon Hobbs, J. Gordon Arbuckle Jr., Lois Wright Morton, Linda Stalker Prokopy, Tonya Haigh, Tricia Knoot, Cody Knutson, Amber Saylor Mase, Jean McGuire, John Tyndall, and Melissa Widholm. 2013. Farmer Perspectives on Agriculture and Weather Variability in the Corn Belt: A Statistical Atlas. CSCAP 0153-2013. Ames, IA: Cropping Systems Coordinated Agricultural Project (CAP): Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems. Available at sustainablecorn.org.

Survey Results

This report presents data for five items that measured farmers' concerns about water-related threats: (1) increased flooding; (2) more frequent extreme rains; (3) increases in saturated soils and ponded water; (4) increased loss of nutrients into waterways and, (5) increased soil erosion. For the purposes of this report, the concerned and very concerned categories are combined.

On average across all watersheds, 26% of farmers were concerned or very concerned about increased flooding (table 1). Concern was highest in Patoka-White watershed, where more than four in ten (43%) farmers selected the concerned or very concerned category. Level of concern was lowest for respondents in Big Blue watershed, where only 7% indicated that they were concerned or very concerned about increased flooding (figure 1).

In addition, across all watersheds half (50%) of respondents were concerned or very concerned about more frequent extreme rains as a threat to their farm operations (table 1). Respondents in Western Lake Erie watershed had the highest level of concern on this variable (72% concerned or very concerned), and respondents in Big Blue watershed (31% concerned or very concerned) expressed the lowest level of concern (figure 2).

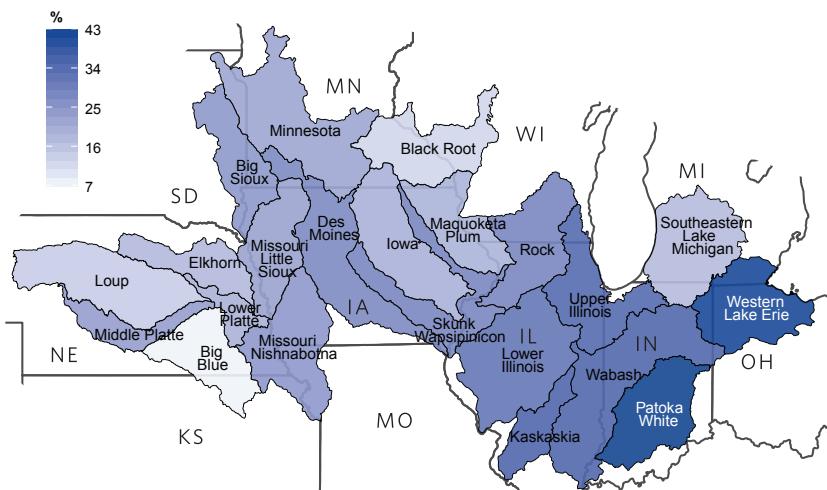


FIGURE 1 | Increased flooding, percent concerned or very concerned.

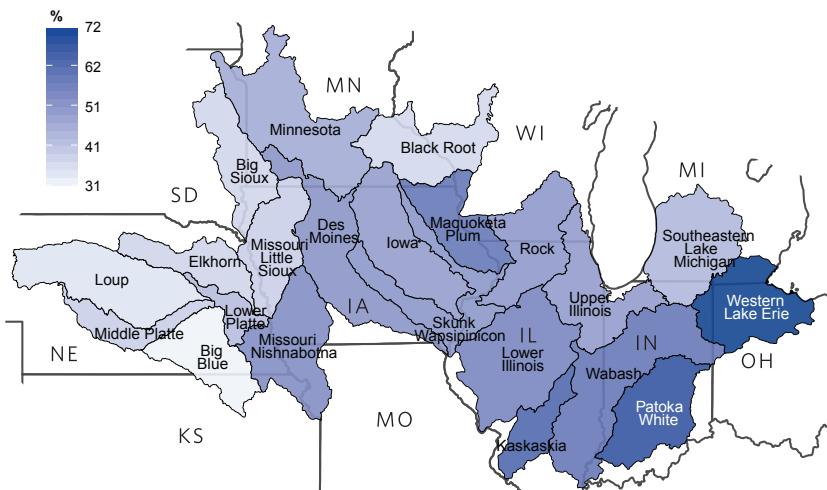


FIGURE 2 | More frequent extreme rains, percent concerned or very concerned.



More than 42% of respondents across all watersheds were concerned or very concerned about increases in saturated soils and ponded water (table 1). Sixty-four percent of respondents in Western Lake Erie watershed selected the concerned or very concerned categories, compared to 14% in Big Blue watershed (figure 3).

Among respondents across all watersheds, about one third (33%) were concerned or very concerned about increased loss of nutrients into waterways (table 1). Respondents in Western Lake Erie watershed expressed the highest level of concern (54% concerned or very concerned). Respondents in Southeastern Lake Michigan watershed expressed the lowest levels of concern (22% concerned or very concerned) about potential increases in nutrient losses (figure 4).

On average across all watersheds, 38% of farmers were concerned or very concerned about increased soil erosion (table 1). Concern was highest in Kaskaskia watershed, where more than half (54%) of respondents expressed concern about increased soil erosion, and lowest in Middle Platte watershed (20%) (figure 5).

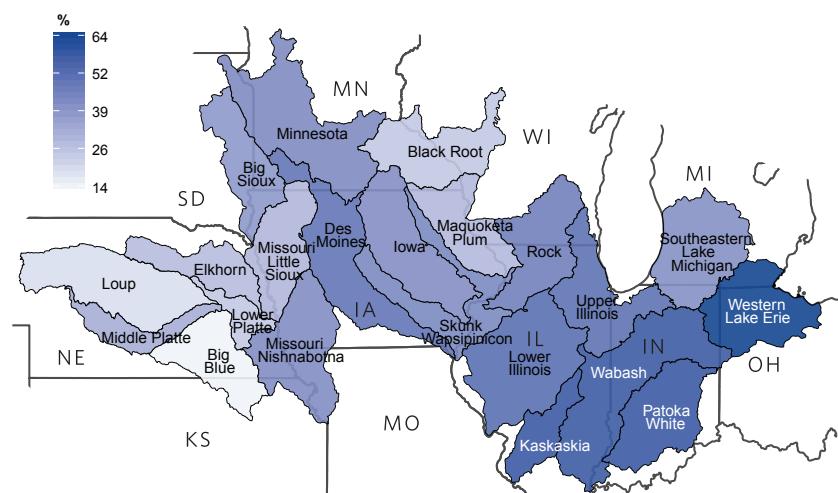


FIGURE 3 | Increases in saturated soils and ponded water, percent concerned or very concerned.

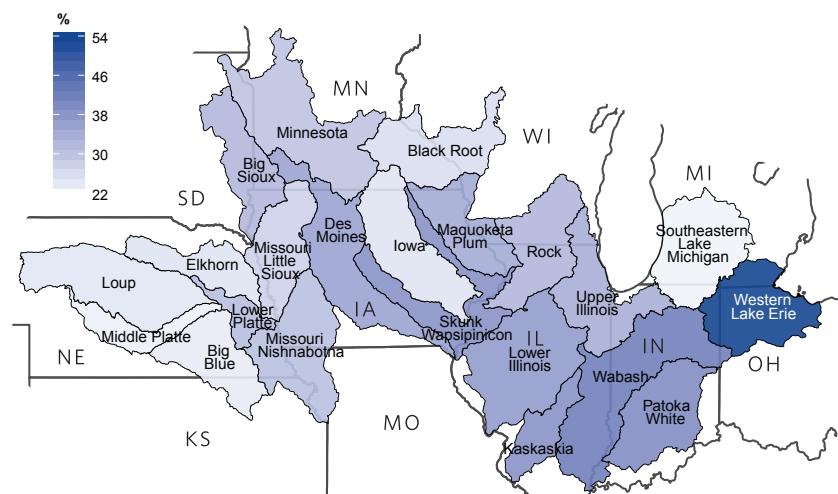


FIGURE 4 | Increased loss of nutrients into waterways, percent concerned or very concerned.

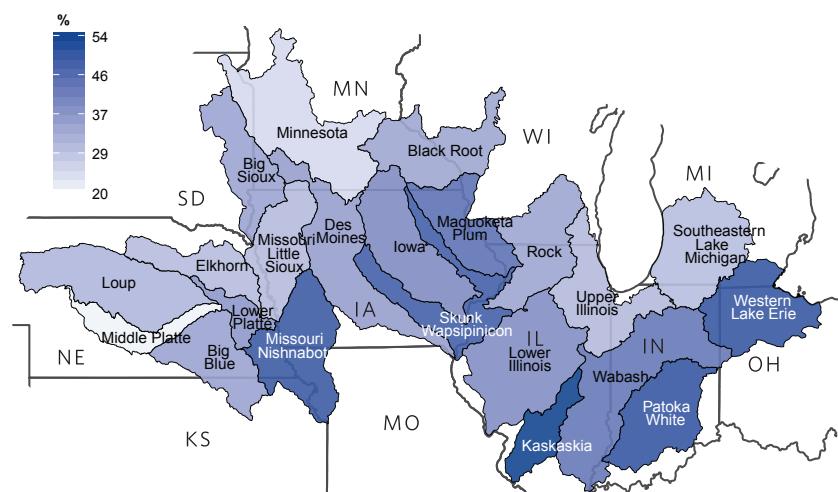


FIGURE 5 | Increased soil erosion, percent concerned or very concerned.

TABLE 1 | Concern¹ about stress on water resources from climate-related threats, percent of farmers concerned or very concerned, by watershed.

Watershed (HUC6)	Increased flooding	More frequent extreme rains	Increases in saturated soils and ponded water	Increased loss of nutrients into waterways	Increased soil erosion
All Watersheds	26	50	42	33	38
Loup	14	34	19	24	31
Middle Platte	24	39	32	23	20
Elkhorn	18	37	28	25	30
Big Blue	7	31	14	24	35
Lower Platte	20	42	25	31	37
Big Sioux	24	37	38	32	34
Missouri-Little Sioux	22	39	29	28	30
Missouri-Nishnabotna	25	53	41	31	49
Minnesota	22	46	42	30	25
Des Moines	27	51	48	35	35
Iowa	20	49	41	25	39
Black Root	13	37	24	26	34
Skunk Wapsipinicon	28	51	42	39	48
Maquoketa Plum	19	59	29	34	44
Lower Illinois	32	55	50	37	38
Rock	28	50	45	32	34
Kaskaskia	35	62	57	39	54
Upper Illinois	34	50	49	34	30
Wabash	35	58	56	42	43
Patoka-White	43	67	57	39	50
Southeastern Lake Michigan	17	44	40	22	30
Western Lake Erie	42	72	64	54	50

¹Concerns were measured on a 4-point concern scale: not concerned, somewhat concerned, concerned, very concerned.

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The Sustainable Corn project (officially referred to as the Climate and Corn-based Cropping Systems Coordinated Agricultural Project) is a transdisciplinary partnership among 11 institutions: Iowa State University; Lincoln University; Michigan State University; The Ohio State University; Purdue University; South Dakota State University; University of Illinois; University of Minnesota; University of Missouri; University of Wisconsin; USDA Agricultural Research Service - Columbus, Ohio; and USDA National Institute of Food and Agriculture (USDA-NIFA). Project website: sustainablecorn.org.



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