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Climate Change and Ideological Transformation in United States Agriculture

Diana Stuart

Abstract

Farmers pay close attention to their environment and are increasingly experiencing and recognising the impacts of climate change. Drawing from the work of Göran Therborn, this article examines farmers' climate change beliefs, explores emerging contradictions between conservative ideological positions and personal experiences, and looks for signs of ideological transformation. Data from 154 personal interviews with corn farmers in the Midwestern United States reveals that many farmers believe that humans play some role in climate change and that climate change has serious and negative impacts on agriculture. Interview data also illustrates how farmers contradict themselves when discussing their positions on climate change and suggests that farmers may be losing faith in political elites. As farmers continue to experience the impacts of climate change, they may find it increasingly difficult to support conservative positions. However, this study also reveals that, despite individual beliefs, the political economy of industrial agriculture will continue to constrain the adoption of climate change mitigation measures.

Introduction

Despite a growing scientific consensus regarding the seriousness of climate change, widespread public concern and meaningful policy responses have failed to materialise in the United States (US) (Hart *et al.* 2015). Instead, a climate change denial movement has shaped public opinion through continuous rejection and dismissal of the issue (Hoffman 2011; McCright and Dunlap 2011a, 2011b). In the US, conservative/Republican positions on the environment have diverged significantly from liberal/Democrat views (McCright *et al.* 2014a, 2014b) and climate change denial has become imbedded in conservative ideology (Dunlap *et al.* 2001; Klein 2014; McCright *et al.* 2014a, 2014b). Ideology can be defined as a system of beliefs through which an individual makes sense of the world (Therborn 1980). Adopting meaningful climate change mitigation measures may depend on

significant ideological transformation, shifting away from the dominant conservative ideology.

Applying the concept of ideological transformation as described by Göran Therborn (1980), I examine how increasingly experiencing the impacts of climate change may result in the abandonment of conservative ideology and increased willingness to adopt mitigation measures. Studies suggest that experiencing the impacts of climate change likely influences beliefs about climate change and anthropogenic causes (Hamilton and Stampone 2013; Howe and Leiserowitz 2013; McCright *et al.* 2014a, 2014b). As the impacts of climate change become more visible, ideological positions may shift. Therborn (1980) describes how ideologies can transform, including the influence of biophysical change or the 'material matrix' and offers a useful framework to explore ideology and climate change.

In this article, I specifically examine how emerging contradictions may further ideological transformation among US farmers. Farmers represent a unique sub-population that by necessity pays close attention to environmental factors and may be more acutely aware of the impacts of climate change. In addition, farmers' cumulative management decisions result in significant greenhouse gas (GHG) emissions and farmers can play an important role in climate change mitigation (IPCC 2007; CAST 2011; EPA 2015). I draw from 154 interviews to explore how US corn farmers perceive changes in their environment and if their experiences challenge conservative ideology. These farmers grow corn in the US Midwest, a highly fertile region that produces the majority of the nation's corn. I examine farmers' climate change beliefs, explore emerging contradictions between conservative ideology and personal experiences, and look for signs of ideological transformation. While other studies have quantitatively examined farmers' beliefs about climate change, I use qualitative data to understand how environmental change influences beliefs, faith in conservative positions, willingness to participate in mitigation efforts, and the potential for ideological transformation. Although this study focuses on US farmers and the political context is specific to the US, findings may also be applicable to Europe and other regions where farmers increasingly experience climate change while still questioning if it is occurring and if it is due to anthropogenic causes (e.g., Barnes and Toma 2012; Eggers *et al.* 2014; Asplund 2016). In the following sections, I will discuss ideology and climate change, present Göran Therborn's conception of ideological transformation, and then apply this theoretical framework to examine farmers' climate change experiences and beliefs through interview data.

Climate change and ideology in the United States

In the last several decades, conservative movements in the US have invested considerable time and resources into refuting climate science, denying climate change, denying that it is anthropogenic, and denying the seriousness of potential impacts (McCright and Dunlap 2000, 2003, 2010; Lahsen 2005, 2008; McCright 2007; Dunlap and McCright 2010; Oreskes and Conway 2010). McCright and Dunlap (2010, 2011a, 2011b) describe how 'anti-reflexivity' forces, including conservative think tanks, conservative media outlets, and climate change contrarians, successfully

challenged climate science and opposed policy responses to climate change. As a result of these 'anti-reflexivity' efforts, less than half of the US population believes in anthropogenic climate change and it is one of the lowest national priorities (Hart *et al.* 2015).

A growing number of US surveys confirm that climate change beliefs follow political party lines (McCright and Dunlap 2011a, 2011b; Weber 2016). Individual beliefs about climate change and how individuals respond to climate change information remain strongly biased by political ideology (Hart *et al.* 2015). Democrats generally believe in climate change and are concerned about it, whereas Republicans are less convinced and these differences have increased over time (McCright and Dunlap 2011a, 2011b). Republicans are also more likely than Democrats to deny that human activity is a major contributor to global warming (Pew Research Center for the People & the Press 2006; McCright and Dunlap 2011a). The polarisation of climate change beliefs suggests that denying climate change 'has become part of Republican identity' (McCright *et al.* 2014a, 2014b, p. 199). Explanations as to why it remains difficult to change climate change beliefs include conforming with group identity (conservative/Republican), dependence on cues from political elites, and a defensive justification of the current system (Jost *et al.* 2003; Jost *et al.* 2008; Feygina *et al.* 2010; McCright *et al.* 2014b; Unsworth and Fielding 2014).

Education and the re-framing of climate change have been proposed as ways to change climate change beliefs; however, an increasing number of studies indicate that these approaches will be insufficient due to political ideology. McCright and Dunlap (2011a, 2011b) found that the effect of climate science education is positive for liberals but weak or negative for conservatives, thus 'undercutting the efficacy of efforts to "educate the public"' (McCright *et al.* 2014b, p. 258). Others have suggested re-framing climate change in terms of valued outcomes (Bain *et al.* 2012), appeals to conservative values (Feygina *et al.* 2010), or to neutralise or counteract climate change denial (McCright *et al.* 2016). However, McCright *et al.* (2016) found that positive framings have very limited potential of changing climate change beliefs, especially when presented simultaneously with a climate change denial message. Evidence suggests that education and reframing will do little to change beliefs without a shift away from conservative ideology. It therefore becomes imperative to understand how ideological transformation can occur.

Theoretical approach

To examine ideological transformation, I draw from the work of Göran Therborn. In *The Ideology of Power and the Power of Ideology* (1980), Therborn extends and departs from the work of Althusser (1971) to examine ideological and social transformation. While scholars have pointed out issues with Therborn's broad definition of ideology, unclear connections between ideology and economy, and his general departure from other Marxist applications of ideology (Abercrombie *et al.* 1994), his focus on ideological transformation and linkages between ideology and the environment make his work particularly useful to examine climate change.

According to Therborn (1980, p. 2), ideology includes ‘everyday notions and “experience” and elaborate intellectual doctrines, both the “consciousness” of social actors and the institutionalised thought-systems and discourses of a given society’. Ideology directs how people make sense of the world and how they live their lives. Therborn explains that ideologies involve both the subjection and qualification of individuals. Subjection refers to individuals being subjected to a specific social order and qualification refers to the role that individuals feel they must perform in a given social order. However, contradictions can emerge between subjection and qualification, for example, when a social role no longer fits within a changing social order.

According to Therborn, ideologies are not constant, but are always in flux. He explains that there are ‘three fundamental modes of ideological interpellation’ through which individuals recognise: 1) what exists, 2) what is good/bad or right/wrong, and 3) what is possible (Therborn 1980, p. 18). He also notes that there can be and often are contradictions between these three modes. Of specific importance for this article is Therborn’s (1980, p. 19) ‘logic of change’ to ideological transformation:

‘In order to become committed to changing something, one must first get to know that it exists, then make up one’s mind whether it is good that it exists. And before deciding to do something about a bad state of affairs, one must first be convinced that there is some chance of actually changing it’.

In this article I apply this logic to climate change, focusing on the potential for ideological transformation among US farmers – a politically conservative group (Swanson 2015; Agri-pulse 2016) whose land management practices continue to have a significant contribution to GHG emissions (IPCC 2007; EPA 2015).

I draw upon Therborn’s work specifically for this analysis because, in contrast to other Marxist applications of ideology, Therborn focuses on ideological transformation and how alternative ideologies can emerge that challenge and oppose dominant ideologies (Abercrombie *et al.* 1994). Therborn explains that ideology is enforced and reinforced through apparatuses – specific forces and structures in society. There is a dominant apparatus, but there are also ‘counter-apparatuses’ that work against hegemonic ideology. Through his work, Therborn illustrates how oppositional ideologies can transform power and organisation in society. At any moment, clashing ideologies exist that create contradiction and disorder. The politicised debate over climate change represents a clear example of this contradiction and disorder.

Therborn also argues that ideological change is dependent upon the material world. He states, ‘The material matrix operates . . . as a determinant in the competition and clash between different ideologies . . .’ (Therborn 1980, p. 34). Therborn suggests that if the natural environment changes (part of the material matrix), ideology will change as well. Therefore, his work presents a useful lens to examine counter-ideologies that emerge in the wake of increasing environmental change. We can examine what happens when the ‘material matrix of the previous dominant ideology crumbles away’ (Therborn 1980, p. 119). In this case, what happens when farmers who have denied climate change increasingly experience the material realities of climate change?

Therborn also explains that the replacement of a dominant ideology with a new ideology involves the ‘decomposition of an old system of qualification-subjection, and

the recomposition of a new one' (Therborn 1980, p. 120). This decomposition takes place when there is a growing contradiction between qualification and subjection and when the previous system of sanctions and affirmations shifts. Sanctions refer to penalties, losses, and negative feedback that contradict a given ideology. Affirmations are the rewards, gains, and positive discourses that affirm an ideology. Therborn (1980, pp. 47–48) states: 'Ideologies change and new ideologies emerge and spread when the old matrix of affirmations and sanctions changes through contradictions ... ' and the 'previous subjection-qualification is no longer adequately affirmed and sanctioned'.

In this study, I examine US corn farmers who are subjected to the capitalist logic of industrial agriculture (social order) and are affirmed by conservative ideology, but at the same time increasingly face the material realities of anthropogenic climate change. In this article, I draw from Therborn (1980) to explore the following questions:

- 1) What do farmers think exists, is good or bad, and possible in terms of climate change? (Therborn's modes of ideological interpellation)
- 2) What is the system of subjection and qualification and are there tensions?
- 3) What affirmations and sanctions influence climate change beliefs, especially related to changes in the 'material matrix'?

US farmers and climate change

Farmers make decisions daily that contribute to either the storage or release of GHGs and could become key players in climate change mitigation (IPCC 2007; CAST 2011; EPA 2015). However, the majority of US farmers are politically conservative/Republican (Swanson 2015; Agri-pulse 2016) and surveys indicate that most continue to deny anthropogenic climate change (Haden *et al.* 2012; Rejesus 2012; Arbuckle *et al.* 2013; Gramig *et al.* 2013). In this section, I will briefly review findings from surveys of US farmers that set the stage for the analysis of the qualitative data from this study.

A growing number of surveys have explored US farmers' climate change beliefs. Studies in different regions indicate that a slight majority of farmers recognise that climate change is occurring (Haden *et al.* 2012; Arbuckle *et al.* 2013; Gramig *et al.* 2013). However, these studies also found that the majority of these farmers believe that climate change is not related to human activities (Haden *et al.* 2012; Rejesus 2012; Gramig *et al.* 2013). Specific to the Midwestern US, Arbuckle *et al.* (2013) surveyed close to 5,000 farmers, finding that 66 per cent believed that climate change is occurring, but only 8 per cent believed that it is caused mostly by human activities. Similarly, Gramig *et al.* (2013) surveyed 2,000 farmers in Indiana and found that over 79 per cent of respondents believed that climate change is a natural process while only 45 per cent believed that human activities contribute to climate change. Lastly, Rejesus *et al.* (2013) found that the majority of farmers surveyed in North Carolina, Wisconsin, and Mississippi do not believe that humans have a causal role

in climate change. Studies also indicate that most US farmers do not perceive climate change as a serious threat (Rejesus 2012; Gramig *et al.* 2013; White and Selfa 2013). Safi *et al.* (2012) conclude that in US agriculture, climate change beliefs are largely in line with political orientations and that political divides are hindering mitigation actions. A recent poll of farmers in the US found that 70 per cent of survey respondents identified as Republican and two thirds of respondents were 55 or older and 83 per cent were male (Agri-pulse 2016).

While many farmers continue to deny anthropogenic climate change, they are increasingly experiencing the biophysical realities of climate change including changes in growing seasons, heat waves, and extreme precipitation events (ICCAC 2008). Those who experience climate change first hand may be more likely to support mitigation (Whitmarsh 2008; Spence *et al.* 2011). However, the inherent biophysical variability associated with climate change can make it difficult to detect (Schneider *et al.* 2000; Haden *et al.* 2012; Safi *et al.* 2012). Despite these difficulties, as extreme weather events become more common, farmers may increasingly recognise climate change and re-examine climate change positions embedded in conservative ideology. While recent surveys provide valuable information regarding farmers' climate change beliefs, this study uses qualitative data to understand *how* conservative ideologies may be challenged by the realities experienced by farmers.

Research methods

This study draws from 154 personal interviews conducted with commercial corn farmers in three Midwest states: 53 interviews in Iowa (IA), 51 in Indiana (IN) and 50 in Michigan (MI). These states are considered part of the 'corn belt' region where the majority of corn in the US is grown. Interviews were conducted between May and September 2014. Interview participants were primarily identified through university extension and other state resource professionals, with a reliance on snowball sampling (Coleman 1958) after initial contacts. Snowball sampling is an appropriate method to contact subjects who are difficult to identify (Faugier and Sargeant 1997) and has been used in a number of studies on farmers (e.g., Stuart *et al.* 2012; Feliciano *et al.* 2014).

Participant identification varied by state. In IA ($N = 53$), participants were identified through the Iowa State University Extension (23 per cent of the sample), county Soil and Water Conservation District offices (23 per cent), Practical Farmers of Iowa (6 per cent) at events, such as field days (4 per cent), and through snowball sampling (45 per cent). Interviews took place across 27 of the 99 counties in Iowa. In Indiana ($N = 51$), Purdue University Extension was the primary source of the contacts (59 per cent), followed by those obtained through snowball sampling (33 per cent) and via other relevant organisations (8 per cent). Interviews took place across 23 of the 92 counties in Indiana. In Michigan, ($N = 50$), most of the contacts were made through Michigan State University Extension (64 per cent). Snowball sampling was used to generate the majority of the remaining contacts (24 per cent), with some additional contacts made through lists of Michigan Agriculture Environmental Assurance Program (MAEAP) participants (12 per cent). Interviews took place across 17 of the

83 counties in Michigan. These counties accounted for 42 per cent of Michigan's total planted corn acres in 2014 (USDA 2015). It should be noted that based on these methods of recruitment (non-random and affiliated with university or conservation groups) participants may be more likely to believe in climate change and may be more open to mitigation. This sample is ideal to better understand how ideology and other factors may constrain these farmers from participating in climate change mitigation.

The same semi-structured interview guide was used for all 154 interviews and included questions on climate change beliefs, expected climate change impacts, sources of information, and the role of farmers in climate change mitigation. All farmers managed at least 100 acres of corn and total farm size ranged from 170–9,000 acres. Respondent's average farm size ranged by state. In Iowa, farm sizes ranged from 170 to 5,000 acres, with an average size of 1,236 acres. In Indiana, farm sizes ranged from 200 to 9,000 acres, with an average size of 2,216 acres. In Michigan, farm sizes ranged from 200 to 4,500 acres, with an average farm size of 1,529 acres.

All interviews were recorded, transcribed, and analysed. Quantitative analysis involved descriptive statistics. While some statistics are presented in this article, it should be noted that based on sampling approaches they represent a description of the interview population, not the farming population at large. NVivo software was used to qualitatively analyse interview data for key themes, trends, and explanations. Coding was done twice: first to identify general themes and again to explore ideological transformation. Based on Therborn (1980), I will now use the interview data to examine my research questions.

Findings

What do farmers think exists, is good or bad, and possible in terms of climate change?

Does climate change exist? While most farmers interviewed agreed that climate change is occurring, respondents indicated less agreement and certainty regarding the causes. Approximately 86 per cent of the 154 interview respondents stated that they believed climate change is occurring. Uncertainty regarding the causes was widely expressed. When asked if climate change was caused by humans, 18 per cent of respondents indicated they were not sure or didn't know what caused climate change: 'I think something's happening to the climate, I just don't know what it is; nobody seems to agree on it' (MI farmer). As another farmer in IN expressed: 'Absolutely climate is changing. Whether it's unnatural or not I couldn't tell you. I don't know'.

Approximately 23 per cent of respondents stated that climate change was a result of natural cycles and humans have no impact on climate. For example, one IA farmer stated: 'We're in a cycle. And I believe that global warming is part of the climate cycle'. As a MI farmer explained, 'the climate's changing but it always has changed'. These farmers described how climate might change, but will change back. The time span of the cycle described by farmers varied from 40–50 years to thousands of years.

Only four per cent of respondents stated that climate change is caused solely by human actions. As the minority view, some of these farmers expressed frustration with their peers. A farmer from Indiana shared this frustration: 'I mean, to me it's a no-brainer, but I know there's a lot of people out there who'll argue with you. I drink coffee in McDonalds down there and we've got the deniers, but I guess you can believe whatever you want to'. One MI farmer stated: 'Antarctica; it's melting. . . . I mean, do you have to be a rocket scientist to say we've got to do something?'

Approximately 55 per cent of interview respondents felt that human and natural factors in some combination both contribute to climate change: 13 per cent stated it is mostly caused by humans, 24 per cent stated it is mostly caused by nature, and 18 per cent stated that both contribute and could not say which is more influential. When this total is added to the number of respondents who believe humans alone are causing climate change, 59 per cent of respondents believe that humans in some way contribute to climate change. This suggests that most respondents to some extent accept the idea of anthropogenic climate change. A statement from an IN farmer illustrates this opinion: 'Has climate changed? Yes. Is it man induced? Yeah, I think so to some degree'. As a farmer from IN explained: 'I would think it would be naïve to think that we do not affect the climate somewhat'.

Is climate change good or bad? Farmers participating in this study were asked if they believed climate change would be beneficial or harmful to agriculture. Approximately nine percent believed climate change is or will be beneficial to agriculture. The following quotations illustrate farmers' views about the benefits of climate change:

'It's gonna benefit agriculture in a huge way. We've got all sorts of water, all we lack is heat'. (MI Farmer)

'Let's heat this thing up so we can shift everything north for a while in my lifetime so I can get two more crops'. (IA Farmer)

'You've gotta have a place for the polar bears to live, but we've got to have warm weather to grow corn'. (MI Farmer)

'Global warming with irrigation and water management – we can increase food production on this planet. A little bit of heat, with moisture, we can grow a lot more food; we can feed a lot more people cheaper. So geez, is global climate change a real problem?' (MI Farmer)

Approximately 30 per cent of respondents stated that they believe climate change is or will be harmful for agriculture. Many specifically mentioned extreme weather events already causing problems: 'We're getting more and heavier rain events and they do a lot more damage than they used to. So I don't see climate change helping anybody' (IA farmer). Farmers explained how extreme weather events erode soils, increase fertiliser run-off, damage crops, make planting difficult, and result in economic losses. An IN farmer stated: 'I don't see how it can be beneficial at all'. Several farmers explained that warmer temperatures would mean less water and increased drought will be extremely costly. Extending climate change impacts beyond agriculture, another IN farmer stated: 'I think as a civilisation we are probably doomed'.

Less than ten per cent of respondents said that climate change could be both positive and negative for agriculture, most stating that it depended on time and place. Some stated that there could be short-term benefits (e.g., increased crop yields in the next 30–40 years), but then long-term harm (e.g., lower yields or inability to grow crops in the more distant future). Others explained that it depended on location, with northern states experiencing more benefits and southern states experiencing more harm: ‘Depends on where you’re at. If you live in Canada, if there is climate change, might be a good time to own farm ground’ (IA farmer).

Is climate change mitigation possible? When asked if farmers could help to address climate change, 46 per cent of participants responded positively. Most of these farmers mentioned the role of no-till agriculture to increase carbon storage as well as using cover crops and perennial crops to keep carbon in the soil. For example, a farmer from IN explained, ‘I think more no till would help climate change, I think we are releasing a lot of carbon into the atmosphere anytime tillage is done’. Others mentioned nitrogen fertiliser management, specifically using efficient methods to reduce overall application. Additional ideas involved using less fuel in farm equipment, using smaller tractors, using renewable energy sources, and participating in carbon credit programmes. In response to the question, a farmer from IN explained why he supports adopting practices to address climate change:

‘I completely agree that we have obligations. I’m old enough to remember, there was a very strong movement back in the 70s about pollution. . . Tremendous steps have taken place over the last 30–40 years, large changes . . . and if agriculture is now the new industrial pollutant, I’m willing to step up to that’.

Several farmers shared that the practices that would help address climate change are also smart in terms of economics. They explained that they were already doing these practices for economic reasons: ‘of course we’re not thinking about greenhouse gases when we do that [no-till], we’re thinking about the dollars of fuel and the erosion’ (IA Farmer). Others also combined the goal of reducing GHG emissions with long term farm sustainability: ‘We need to grow profitable crops, we need to sustain our lifestyles and our families . . . all our conservation efforts are about improving the soil for our children and our grandchildren, and I don’t want to contribute to climate change’ (IN Farmer).

Approximately 28 per cent of farmers responded that farmers could not help address climate change. Some felt that this was not possible because they believe that farmers have no impact on climate change. As a farmer from MI stated: ‘I don’t think there’s anything I can do. I don’t know what we could do to impact climate change’. Others said changes in agriculture won’t matter because other sources of GHG emissions are the real problem. Ten per cent of respondents named cars, trucks, cities, and industry as the major sources of emissions: ‘I don’t think farmers have much to do with climate change. If there is anything that’s causing it, it’s probably the pollution from cars and trucks and cities’ (IA farmer). Some indicated that it did not matter what the US did because other countries, such as China and India, are emitting the GHGs.

Several respondents indicated that it would not be possible for agriculture to reduce GHG emissions and be part of a climate change solution because it would be too difficult in the current system. Farmers expressed that addressing climate change would entail too much change: 'What are we supposed to do? Shut down production in this country? We're really dependent on fossil fuels' (IA farmer). The only solution one farmer could come up with was to stop farming: 'Quit farming. Which isn't going to happen, people need to eat . . . the truth is that economics dictates everything' (MI farmer). In the current competitive industrial system, these farmers did not believe that it would be possible to change agriculture to address climate change. While supportive of measures they had already adopted or could easily adopt, farmers expressed resistance to any additional changes. They tended to justify the current system, and refute that further change was necessary or possible. A farmer from MI explained this resistance:

'If you accept that there's an issue with global warming, if you accept that, then you have to begin to look at what your contribution might be, and I don't think very many people are willing to do that at this point in time, because if they find that they are contributing to it than that necessitates change, and we don't like that very well'.

What is the system of subjection and qualification and are there tensions?

In this case, subjection refers to how farmers are subjected to a specific social order and qualification refers to the role that farmers feel they must play in this order. Farmers in the Midwest operate within the social order of industrial capitalist agriculture. In this system, fossil fuel and chemical intensive methods are used to maximise crop yields and economic return. As one farmer from IA described, 'It used to be that farming was a way of life, now farming is a high risk, high capital demanding business'. This system encourages farmers to make decisions based on economic logic: 'profit driven, you know, productivity driven, that's the way I think you need to be if you want to be in business' (IN farmer). Some farmers expressed that they feel this system is the best or only way. For example, a farmer from IA explained, 'We do need to live with the economic system that we have' and a farmer from IN stated, 'the free market determines. . . that's the best way'. Other farmers felt trapped in this system. Upstream and downstream actors determine the prices of inputs and outputs and farmers decisions are constrained. A farmer from IA explained:

'Everything I buy is retail and I have no control over the pricing of my end product. . . I have no control over that . . . I cannot build in a margin of profit. I cannot say well I'm gonna mark up my corn 20 per cent to cover my costs here'.

In the industrial capitalist system, profitability is the top priority. Other social goals, including environmental protection, become secondary: 'it's down to whatever works best economically. The environmental side then, probably kinda takes it in the shorts . . . generally the economics win out' (IN farmer). When asked about reducing nitrogen fertiliser (a significant source of GHG emissions), 74 per cent of farmers responded that they could not reduce application rates and 87 per cent of these

farmers stated this was because of possible reductions in yield and profitability. In general, US agricultural policies and programs have supported the industrial capitalist system. High yield and input intensive agriculture have been reinforced through farm support programs. While farm support programmes have shifted away from direct payments, yields still play a role in determining land prices, loans, and insurance rates: 'we've been fortunate to have a good proven yield on our farm and . . . it does help our premium on our crop insurance, so I want to grow the best crop I have out there' (IA farmer).

Respondents expressed that their roles as farmers related to maintaining a business/making money, feeding the world, and being a good environmental steward. The role of maintaining a profitable business was most common and matches the dominant social order that farmers are subjected to (described above). Approximately 44 per cent of respondents mentioned that their primary role is to run a profitable business. The following quotations illustrate examples of these comments:

'As an Iowa farmer, we're trying to run a business. Our business is to grow crops, feed people and it's a business, so make some money'. (IA farmer)

'What the economy is asking me to do. I'm doing what I'm supposed to as a farmer'. (IN farmer)

'Produce the most corn that I can, and grow just corn and soybeans, or even just corn'. (IA farmer)

About 10 per cent of farmers expressed that it is their duty to grow food to feed the world's increasing population. As a farmer from IA explained, 'We have to produce food for people. That is our work. We're supposed to feed the people'. This was described as a very honourable role that farmers were proud of. Farmers expressed that they were helping the global population survive: 'Everybody talks about feeding 7 billion people. Well, most of us we take that as gospel, well yeah, that's what we're trying to do, you know, no matter where they are' (IN farmer). Only a few farmers acknowledged that Midwest corn is primarily used for cattle feed, ethanol, or corn syrup.

Almost eight per cent of respondents indicated that stewardship was an important role for farmers. As a MI farmer stated, 'You know, I'm not a tree hugger guy by any means, but I think it's our responsibility to be good stewards of our land and do what's right'. Most farmers who mentioned stewardship also explained how farmers are now better stewards than they used to be: 'as an agricultural society, we are constantly learning to be better stewards of the land' (IN farmer). Several respondents stated that most farmers are good stewards. A farmer from MI explained: 'the vast majority of the producers are trying to be good stewards, use the right amounts of fertiliser for their farms. And I'd say well into the upper 90 per cent do that'. Farmers explained that stewardship was part of their upbringing and is passed down through generations to protect farmland.

Farmers expressed conflicts between their roles to maximise profits and environmental stewardship. When talking about responding to climate change or reducing nitrogen fertiliser, farmers described trade-offs and the challenges of balancing these goals. A farmer from IN explained how reducing the use of chemicals would threaten

food supplies: 'We can decide how many people to starve if we quit using herbicide . . . You gotta balance that'. Another IN farmer explained, 'I think we have to try to figure out how we can feed the world and how we can leave this earth in a better place than what we found it'. When asked about reducing nitrogen fertiliser as a climate change mitigation strategy, one MI farmer described how environmental regulations would threaten yields and food supplies: 'there may be regulations on how much we apply from the EPA. Hopefully it doesn't come down to that and then start affecting everybody's yield. Then it will be a food issue'. It was clear to farmers that the current economic system does not support environmental stewardship. Even farmers who wanted to adopt mitigation practices felt constrained by the dominant social order:

'I think most farmers are in tune with wanting to do the right thing for the environment, the right thing for the climate. But . . . our margins are thin enough now that we have to look at these type of changes . . . is it something we can add and it's not going to hurt us, not only short-term but long-term, as far as the financial picture'. (IN farmer)

What affirmations and sanctions influence climate change beliefs?

Interviews indicate that farmers' climate change beliefs have been influenced and supported over time by the rhetoric of conservative/Republican elites. Farmers identified politicians and individuals in the media as influential in forming their climate change beliefs. For example, one farmer from IN described getting his information on climate change from Rush Limbaugh (a very conservative radio show host) and the climatologist on the Rush Limbaugh show. Others shared that climate change was a hoax or a scam: 'Al Gore made two billion dollars on that whole scam' (IA farmer). Several farmers stated that the media needed to 'look at both sides' of the issue, a key phrase of climate change deniers (McCright and Dunlap 2003, 2010).

Approximately eight per cent of farmers interviewed raised the idea of falsified science in support of climate change and the issue of 'Climate-gate'. As described by one IA farmer: 'I believe if memory serves me, a researcher in Europe, it was found that he had fabricated much of the scientific data that had led to the scientific understanding of global warming'. Climate-gate was highly publicised by conservative elites and media outlets despite exoneration of the scientists involved (Leiserowitz *et al.* 2013). Farmers were unaware of or did not mention how the issue had been resolved, but used it as an argument to discredit climate science. Several other farmers made more general comments about distrusting scientists or scientific information about climate change because it may be fabricated to make money or serve specific political agendas.

As described earlier, 23 per cent of respondents indicated that climate change was a result of a natural cycle and that humans had no impact on climate change. This idea has remained a central tenet of movements opposed to climate change policy and has been continuously restated by conservative elites in the media. Many of these farmers, who do not believe in anthropogenic climate change, also referred to conservative ideology to support their position. They made comments in support of free-market capitalism and against government intervention that may reduce individual

or economic freedom. As mentioned earlier, farmers shared fears about policies that would redistribute wealth, tax the rich, or make energy expensive. These 'anti-reflexivity' statements suggest that these farmers' views have been shaped by the rhetoric of conservative ideologues.

Despite these affirmations for climate change denial, about 15 per cent of farmers participating in this study mentioned how politicised the issue of climate change has become and some suggested that politics and specific agendas need to be left out of future discussions. For example, a farmer from IN explained:

'To be honest with you, there's too much politics involved in the whole issue. Not that the issue doesn't exist, but they need to take the political side away from it and get their eyes on the ball and deal with it in the proper respect'.

Even farmers who expressed agreement with conservative ideology shared a sense of frustration, a sense of not knowing who to trust or believe, and wanting to move beyond the politics. As one IA farmer exclaimed, '[It's either] we've got to do something, or it's the biggest hoax ever perpetuated on us. And there is no middle ground'. Another farmer from IN stated, 'people have an agenda ... the facts are abused and misused ... There's propaganda that goes both ways'. This recognition and frustration suggests that some farmers may be losing faith in political elites, moving away from party rhetoric, and may be more open to forming their own opinions.

Farmers' own experiences with environmental change may represent the most significant sanction challenging the denial of anthropogenic climate change. As a farmer from MI stated, 'if anybody's paying attention to the climate it's a farmer'. Of the total interview respondents, approximately 43 per cent suggested they had personally experienced different conditions, events, or processes due to climate change. Only 11 per cent said they had not had these experiences and the remaining respondents were not sure. Some farmers mentioned there is less snow than 30–50 years ago, but most comments focused on extreme weather events, especially large amounts of precipitation over short time periods that result in soil erosion, fertiliser loss, and crop damage. Comments from farmers about their experiences suggests that climate change is starting to seem like a serious threat:

'I don't know any place that's not suffering more droughts than they used to or more extreme weather than they used to. Our weather is certainly more extreme. We're getting dumped on'. (IA farmer)

'I certainly consider climate change... when one year we have it so hot and dry you can't hardly grow anything, and the next year is so wet you can't get anything planted or harvested'. (MI farmer)

Farmers suggested that denying climate change did not match with the reality they are now experiencing. One farmer from IA stated: 'I think people are more willing to accept the idea that something is changing because we are having these extremes'. Extreme weather events make climate change an increasingly serious issue for farmers, especially as livelihoods are threatened. As a farmer from IA stated, 'There has been a lot more crop failures recently because of the extreme weather'.

Lastly, interview responses indicate that the current system of affirmations and sanctions results in confusion about climate change and inconsistencies among farmers. Approximately 28 per cent of farmers contradicted themselves at different points during their interview. Most of these incidences were farmers who stated early in the interview that they did not believe humans had any influence over climate change and then later stated that farmers could help mitigate climate change. For example, a farmer from IN claimed, 'If climate is changing I don't think that it's human induced' and later stated, 'I think more no till would help climate change, I think we are releasing a lot of carbon into the atmosphere anytime tillage is done'. Others stated that humans had no influence on climate change, or they were not sure, but later discussed ways farmers or society in general could reduce GHG emissions. Lastly, some respondents said climate change was caused by 'natural cycles' but later blamed China or non-agricultural sources of GHG emissions. This suggests that not only are farmers exposed to conflicting messages about climate change but that arguments to support a disbelief in anthropogenic climate change may be weak, waning, or increasingly difficult to support.

Discussion

Returning to the logic of change presented by Therborn (1980), findings from this study indicate that most farmers interviewed believed that climate change exists (and humans play some role) and that climate change was harmful for agriculture; however, many farmers did not see that another agricultural system (that significantly reduces GHG emissions) is possible. In addition, most farmers believed their primary role is to maximise production and profitability in line with the industrial capitalist social order. Lastly, personal experiences with environmental change and frustration with the politics of climate change suggests that farmers may be questioning and re-evaluating conservative positions.

Findings illustrate that the denial of anthropocentric climate change is not pervasive among US farmers. The idea of anthropogenic climate change was accepted by almost 60 per cent of interview respondents. Many farmers thought the role of humans was likely small, but still believed human actions influence climate change. These findings provide a more nuanced understanding compared to previous studies. For example, in their survey of Midwest farmers Arbuckle and others' (2013) examined response choices that included: mostly human caused, mostly a natural cycle, and both human and natural causes equally. This categorisation did not allow for the response that 24 per cent of respondents agreed with in this study: climate change is mostly natural but humans also play a role.

In contrast to previous studies, findings in this study indicate that many farmers believe they have experienced events related to climate change and view climate change as a real threat. While past studies suggest that climate change may be difficult for farmers to perceive through first-hand experience (Schneider *et al.* 2000; Haden *et al.* 2012; Safi *et al.* 2012), over 40 per cent of farmers in this study stated they had experienced events that they linked to climate change. Also in contrast to previous studies (Rejesus 2012; Gramig *et al.* 2013; White and Selfa 2013), most

farmers in this study believed climate change will be harmful for agriculture and indicated that the associated risks with soil erosion and crop failure are serious. This suggests that farmers' perspectives on climate change may be shifting as they experience additional floods, droughts, heat waves, and other climate related events.

While most farmers in this study think climate change is real, is caused in some part by humans, and will be harmful for agriculture, a significant finding is that many farmers do not think it is possible for the agricultural system to significantly change to reduce GHG emissions. Farmers expressed a willingness to adopt mitigation practices that make economic sense, but were resistant to the idea of additional changes that may not fit with the dominant social order. According to Therborn (1980), if people are not convinced that another system is possible they will not work to change it. Farmers' inability to see an alternative system likely stems from how little choice they have in the current system where corporate actors dictate food production rules and standards constrain how farmers can produce food (Goodman 2003; Murdoch *et al.* 2000). In support of system justification theory (Feygina *et al.* 2010), these farmers expressed resistance to change and felt that the current system was inevitable and in many ways the best system. This represents a significant obstacle to climate change mitigation efforts.

Findings indicate that the qualification-subjection relationship remains strongly matched and tied to the dominant social order. Farmers in this study expressed a notion of being 'locked in' to the current social order of capitalist agriculture at the expense of other social goals. Concentration of power in agriculture reinforces a system that maximises profits at the expense of farmers, consumers, and the environment (Konefal *et al.* 2005; Stuart 2010; Stuart and Worosz 2012). Farmers also indicated that their role as a yield and profit maximiser was prioritised above a stewardship role. This suggests that the current system of qualification-subjection remains strong and may hinder ideological transformation (Therborn 1980). Despite some tensions related to stewardship, there was a clear harmony among most farmers between subjection and qualification. However, this harmony may not last. Most farmers believe they make a positive contribution to society and are proud of this contribution. If their contribution to climate change contradicts this notion, tensions between stewardship and economics are likely to increase and challenge conservative ideology.

Findings related to affirmations and sanctions indicate that certain factors may be complicating or shifting farmers' perspectives on climate change. While some farmers still distrust climate science and liberal propaganda, many indicated that both sides of the politicised debate are not to be trusted. They expressed frustration with how political elites discuss climate change and were ready to have new conversations about climate change. McCright *et al.* (2014a, 2014b), argue that political elites have a strong influence on climate change beliefs and polarisation is unlikely to change without conservative elites accepting climate change. However, findings from this study suggest that increased frustration may result in the disregard of elite opinions. While some may question conservative elites position on climate change, as shown through these findings, other farmers repeated conservative positions on climate change and later contradicted themselves. This suggests that some farmers hang on to party rhetoric despite having alternative or nuanced perspectives. These finding

are supported by social identity theory (Unsworth and Fielding 2014): some farmers may be hanging on to group positions despite alternative beliefs.

These findings suggest that because farmers are increasingly experiencing climate change and are recognising negative and serious impacts, their positions on climate change may shift in the future. Experiencing extreme weather events was reported widely and directly linked to a belief that climate change is a serious issue. Returning to Therborn (1980), the 'material matrix' or in this case the biophysical realities of climate change increasingly operates as an ideological determinant. As farmers' material realities contradict with conservative political elites they may disregard these elites and eventually turn away from conservative ideology. Extreme weather for farmers may truly be the 'determinant in the competition and clash between different ideologies ...' (Therborn 1980, p. 34). However, as revealed by Houser (2016), a continued framing of climate change experiences around 'natural cycles' may allow farmers to increasingly acknowledge climate change as real, while continuing to dismiss the causal role of humans. It remains to be seen at what point it becomes too risky for farmers to deny anthropogenic causes. As farmers experience more climate related events and suffer through soil erosion, drought, and crop failure, they may increasingly support the idea of anthropogenic climate change and mitigation actions.

Conclusion

Scholars and activists increasingly recognise that we cannot adequately address climate change without changing the dominant socioeconomic system (e.g., Feygina *et al.* 2010; Weis 2010; Klein *et al.* 2014). However, conservative and specifically neoliberal ideologies continue to deter the intervention necessary to address climate change through defending industrial capitalism and reinforcing the logic that corporations and free-market, pro-growth economics are beneficial and necessary (Feygina *et al.* 2010; McCright and Dunlap 2011a,b; Klein *et al.* 2014). Part of the neoliberal agenda has also been to extinguish the notion that alternatives are possible and, while certain tenets of neoliberalism may be contradicted, a lack of recognition about alternatives represents a significant barrier to addressing social problems (Morgan 2013).

Findings from this study reveal that farmers, who could play a significant role in climate change mitigation, feel constrained within the current system to maximise yields and profits and cannot visualise an alternative system where climate change mitigation is a priority. This suggests that those working on climate change and other social issues should attempt to make alternatives more widely known to the public (Gibson-Graham 2008), including farmers. Farmer-owned co-operatives, Community Supported Agriculture (CSA), and food hubs represent just a few ways that farmers can participate in alternative economic arrangements and have more freedom to support a range of social goals (Hauter 2012), including climate change mitigation. Climate change mitigation efforts in agriculture will be more successful if farmers understand that alternative economic arrangements are possible and that the dominant system can change.

In addition to identifying challenges to climate change mitigation efforts, this study also reveals a growing awareness about the realities of climate change among US farmers. As put by Weis (2010, p. 336), there is a ‘budding consciousness at the levels of both production and consumption which suggests that the contradictions of industrial capitalist agriculture are becoming more widely visible’. He also states that climate change represents the most fundamental contradiction associated with industrial capitalism. Findings from this study affirm this growing consciousness. Farmers indicated that they believe in climate change, that climate change is serious, and that they would like to participate in mitigation efforts. The challenge remains identifying ways to change current policies and economic relationships in ways that encourage and reward climate change mitigation.

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