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High tech farming, local food systems, food aid, or strict environmental regulation? How the American Dust Bowl can teach us to deal with drought

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High tech farming, local food systems, food aid, or strict environmental regulation? How the American Dust Bowl can teach us to deal with drought

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Abstract

This paper examines responses to the American Dust Bowl in the 1930s as a way of exploring how society today may be able to respond to today's droughts and pending "food crises". With regards the debate over solutions to the Dust Bowl, four broad themes emerge. First, some argued that solutions would be found by engineers and farmers who would develop new ways of watering dry fields. A second group believed that inappropriate political and economic incentives had led to the bad farming practices that caused wide-spread erosion. To this group, the best solutions were managerial and included governmental regulation of farm management. A third group focused on the welfare of individuals, arguing that creating a social safety net to protect marginalized families was the highest priority. Finally, there were commentators who advocated for communitarian, local, and ecological food systems. Today, the situation is similar in that many commentators believe that climate change will render many of the world's food producing regions unproductive and this may trigger mass migration and widespread poverty. Today, as well, the same four perspectives are present and many commentators disagree on whether we should rely on technological, local, managerial or welfare based solutions. Exploring the similarity of the discourses between today's food crisis and the one that hit American society 80 years ago reveals that advocates of the four different camps are motivated by very different principles. Briefly, proponents of technological solutions base many of their arguments on the assumption that human ingenuity is capable of producing extremely productive food systems. The managerial arguments, by contrast, are based on the idea that the natural environment can be rationally and efficiently managed using scientific principles. The social welfare narrative is based on the assumption that it is our collective responsibility to protect the poor and marginalized. Finally, the communitarian narrative argues that local food sovereignty is a prerequisite for sustainable food systems. The primary contribution this paper makers, therefore, is to expose these deeply held ontological tensions as a way of arguing that policy makers today must de-politicise arguments and use elements of all four narratives when designing programs to ensure we do not face a repeat of the crisis of the 1930s.

Key Words

Food security; climate change; drought; policy

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1. Introduction

In the summer of 2012 the US Corn Belt suffered under the worst drought in at least 50 years decimating corn yields and sending commodity prices skyrocketing. The drought of 2012 came on the heels of the 2010 and 2011 drought when the American south parched under a massive heat wave and loss of rainfall. Both droughts hit just as unemployment soared and the economy struggled to recover from the 2008 financial crises (Fernandez, 2011). Commentators declared the 2010-11 drought the worst in 100 years, Texas Governor Rick Perry repeatedly declared the state a disaster zone, and Time Magazine ran the headline “Forget [Hurricane] Irene, the drought in Texas is the catastrophe that could really hurt” (Hylton, 2011). Climate modelling suggests that the region is entering a drying phase that could last decades and that agriculture in the southern USA may never return to the intensity known during the last 30 years (Seager et al., 2007).

This is not the first time that America has faced the combined effects of an agricultural catastrophe during an economic crisis and many of the events from the 1930s bear a striking resemblance with these more recent trends. For instance, in the early 20th century, short-sighted economic policies helped contribute to a massive economic boom. But when the business cycle shifted, this economic growth proved to be an illusion and America descended into the lost decade of the Great Depression.

Similarly, early in the 20th century, new agricultural technologies (such as the tractor) allowed for an agricultural explosion that boosted yields and flooded markets with grain. But this was also an illusion since the productivity was bought at the cost of the ecological resilience of the US Great Plains. Excessive cultivation in the decades leading up to the Dust Bowl meant that the native prairies were ploughed with little regard for erosion control, making the region especially vulnerable to drought (Worster, 2004). In the 1930s, when the region was hit by a cyclical downturn in the rainfall, millions of acres of land became unproductive and hundreds of thousands lost their homes (Opie, 2000). Faced with monumental challenges on both ecological and economic fronts, Americans in the 1930s debated how to fix the nation’s foundations (Zinn, 1966). This debate was loudest amongst policy makers

and politicians but was also echoed by the general public, through the media, and even found its way into cultural works. The Dust Bowl became the inspiration for a number of masterpieces of film, photography, music and landscape painting. Most importantly for today, however, is that the legacy of the Dust Bowl reveals large differences in opinion about how a society can and should respond to the effects of such a crisis. These debates – and these strategies – are still as relevant today as they were 80 years ago. In light of the similarities between the 2010s and the 1930s, therefore, the purpose of this paper is to systematically explore how policy makers, activists, the media and cultural figures described both the causes and solutions to the crisis in the 1930s. Using this analysis, I will then describe how debates about the modern food crisis are similar. This paper will conclude by showing that the narratives present in both the 1930s and today reveal deeply held, and quite divisive, ontological beliefs about how to foster a sustainable food system.

2. Background to the Dust Bowl

There is a large literature on the 1930s that, when taken together, consistently describes the Dust Bowl as a massive agricultural collapse triggered by a series of years of low rainfall. In combination with high winds, these drought years caused extremely wide spread erosion (Lockeretz, 1978; Opie, 2000; Worster, 2004). Overall, estimates suggest that by 1938, 10 million acres lost the top five inches of soil, while another 13.5 million acres lost at about half as much (Worster, 2004). As this land became unproductive, hundreds of thousands lost their homes, triggering the massive outmigration that was captured by novelist John Steinbeck in The Grapes of Wrath. For those who remained on farms in Kansas, Texas and Oklahoma, life on the land was extremely hard (Egan, 2005).

Most historians and commentators point out, however, that the Dust Bowl was not simply a natural disaster but was made worse by agricultural practices. For instance, the years before the Dust Bowl saw an increase in the ploughed area, and this was important because ploughed land traps less moisture than perennial grasslands, hence as the cultivated area grew, the region became more sensitive to drought. The increase in the ploughed area was itself caused by three factors. First, the generation of farmers in the Great Plains between 1910 and 1930 was the first to have access to tractors and this allowed a relatively small number of farmers to

plough huge areas of land. Second, the Homesteader Acts, which encouraged the development of the US western frontier, created incentives to increase the area being ploughed. Third, a drop in commodity prices in the late 1920s pushed farmers to increase the land they were cultivating to maintain farm income.

Combined, these factors drove a wave of cultivation that the historian Donald Worster calls “the last great plough up” where “sodbusters” broke virgin prairie soil exposing millennia of accumulated organic matter to weathering by wind and rain. In particular, historians point to the period between 1914 and 1919 when the cultivated area in Kansas alone grew by 13 million acres and 1925-30 when another five million acres of grassland were ploughed (Opie, 2000 see page 90). For as long as the weather was conducive to crop growth, ploughing extra land meant that harvests grew. But this cultivation created ideal conditions for a widespread loss of top soil when the rains stopped falling (Lockeretz, 1978).

More recent analyses of the Dust Bowl confirm the broad contours of this description. For instance, NASA, and other groups of scientists, provide rainfall reconstructions for the region, showing that the 1930s were indeed quite dry and that the period from about 1910-1930 was above average in precipitation (NASA, 2004; Schubert et al., 2004). Similarly, recent computer modelling work has reconstructed the magnitude of the rainfall anomaly in the 1930s suggesting that farming practices had a further effect on the impact of the drought. This is because ploughed soil has a higher albedo than prairie vegetation, hence, there was a feedback between the farming practices and rainfall patterns that made the drought of the 1930s more sever in meteorological terms than it would have been if the native vegetation had remained (Cook et al., 2009).

Finally, and when seen from the perspective of the time, it is clear that the citizens of 1930s America believed that they were living in the midst of a massive agricultural collapse. There are dozens of media accounts from the 1930s that leave us a very strong impression that a combination of ecological, socio-economic, and policy forces led hundreds of thousands of impoverished people to depend on an agro-ecosystem that had lost resilience (e.g. see: Associated Press, 1935; MacLeish, 1935). Since this was also a time when there were relatively few formal social safety nets (both the Republican Administration under President Hoover and the Roosevelt

Administration ignored the Great Plains until the mid 1930s (Worster, 2004)), there is also a sense in both the contemporary academic literature, as well as media reports from the 1930s, that there was very little capacity amongst the formal institutions present in 1930s America to provide much in the way of meaningful support (Milwaukee Journal, 1935). Hence, people believed that their agricultural system proved unable to adapt when the weather turned against them and the fabric of rural life quickly unravelled[1].

3. Four Narrative Depictions of the Dust Bowl

Faced with the perception that they were living through a major crisis, politicians, journalists, and cultural figures debated how American society ought to respond. From these responses, the following four broad themes emerge.

3. 1 Narrative 1. Technocratic and Individualistic

In the popular press from the 1930s, it is clear that many witnesses to the Dust Bowl thought that the problem could be fixed with technology. One of the most popular of such techno-fixes involved trying to trigger rainfall with explosives, and a common 1930s scene in rural Kansas and Texas was farmers launching rockets loaded with TNT into the air in the hopes that rain clouds would emerge. This, of course, had no effect on precipitation (Egan, 2005; Worster, 2004). A second common

[1] It is important to note that there are some scholars who contradict this depiction of the 1930s. For instance, Cunfer (Cunfer G. 2005. On the Great Plains: agriculture and environment. Texas A&M University Press.). presents a contrary account, suggesting that the Dust Bowl was not as significant a problem as most today believe. As evidence for this, Cunfer shows there were a similar number of dust storms in the decades before the 1930s as there were during the "crisis" suggesting that soil erosion was no more problematic in the 1930s than the decades before. Cunfer goes on to show that farming quickly returned relatively quickly to the Great Plains in the 1940s and 50s and he uses these data to suggest that the crisis did not have lasting effects. Finally, Cunfer also suggests that a heightened sense of crisis was created by the Roosevelt administration who used images of erosion, dust storms, and environmental refugees as a convenient form of propaganda that demonstrated the importance of the New Deal policies to the public. Similarly, Gregory (Gregory J. 1989. American Exodus: The Dust Bowl Migration and Okie Culture in California. New York: Oxford University Press, Gregory J. 2004. The Dust Bowl Migration. In: Mink G, O'Connor A, editors. Poverty in the United States: An Encyclopedia of History, Politics and Policy. Santa Barbara: ABC-Clio.). also provides an unorthodox interpretation that casts questions on the issues of people displaced by the dust storms. In particular, he shows that the majority of the migrants from Oklahoma were actually urbanites who moved to California looking for work and not poor farmers displaced by the drought. While it is important to acknowledge the contribution these scholars have made to our understanding of these events, they are in a minority. In addition, for the purposes of this paper, what is important is that the people in the 1930s believed themselves to be living through a combined ecological and economic crisis.

technological approach was to plough more land in a similarly misguided belief that the “rain would follow the plough” (Passioura, 2007; Smith, 1947). This idea was promoted by a range of people, and was popularized by private land speculator Charles Dana Wilber who, in the century before the Dust Bowl, wrote an influential book on how the “Great American Desert” (as the prairies were then known) was destined for a rich agricultural future. The book is full of enthusiastic passages that take on an almost religious tone and exhort people to move into the prairies and invest their capital and labour:

> *Yet in this miracle of progress the plow was the unerring prophet...[of rain]. Not by magic, or enchantment, nor by incantations or offerings but instead in the sweat of his face, toiling with his hands, man persuade[s] the heavens to yield their ... dew and rain upon the land....* (Wilber, 1881 p. 70)

The faith in technical solutions was often associated with a similar faith in the power of individuals to come up with their own solutions and the merits of hard work. This perspective also went hand in hand with a distrust of collective action and government intervention. For instance, newspaper owner John McCarty illustrates this individualistic and technological view of the world. He used his columns in the Dalhart Texan (the most influential daily in the Texas panhandle) to rail against federal assistance, deriding those who accepted charity as “softies, tenderfeet and cry babies” (quoted in Egan page 141). Following “Black Sunday,” a massive dust storm that hit in 1935, McCarty formed the Last Man Club where members pledged to, “barring acts of God…, be the Last Man to leave the country.”

McCarty promoted the “rainmakers” like Tex Thornton, a travelling entrepreneur who took contracts for firing rockets laden with dynamite into the air. McCarty, declaring that the only thing that was wrong with Texas was a lack of rain, hired Thornton and his rockets to force the return of the rain clouds. First, however, he wrote in his newspaper: “I’m going to close the membership list [for the Last Man Club] with the first big rain because after we get a genuine soaker everybody will be wanting to stay…” (quoted in Egan, page 231). Of course, Thornton was unsuccessful but this did not dissuade people like McCarty from looking for technological fixes to the crisis.

This individualistic perspective that put its faith in innovation, technology, hard work and ingenuity was given artistic expression by the Kansas painter John Steuart Curry who used his canvases to depict rugged scenes of farmers standing firm against the chaos of nature. For instance, one of Curry's best known pieces, Tornado over Kansas (figure 1), has a farmer ushering his family into a storm cellar as a twister bears down. The farmer, however, is not panicking. Nor is his a victim. The suggestion Curry leaves us with is that after the ravages of nature have passed, the farmer and the family will emerge and so long they have access to resources, this family will rebuild and be as strong as before. Tornado Over Kansas won huge acclaim in Kansas, and Curry was commissioned to paint patriotic murals for the Kansas state legislature that were to depict the determined and individualistic spirit of the Kansas farmer[2].

Therefore, a key narrative about the Dust Bowl is one that promotes the benefits of an individual's hard work and where the ingenious use of technology was believed the source of the solution. Collective solutions, bureaucratic restrictions, and top-down management were seen by people who subscribed to this world view as the enemy.

3.2 Narrative 2. Bureaucratic and Managerial

John Stuart Curry was a pillar of the American school of landscape painting called Regionalism that grew up in the 1930s and was seen by art critics as a way of promoting an American (and often rural) identity that was distinct from the influences of Europe (Dennis, 1998). But many people disagreed with depicting rural American as a nation made up of rugged yeoman pioneers. One such Depression-era painter was Alexandre Hogue who rejected Regionalism and such romantic/political underpinnings (Smith, 2010 p. 126). Instead of the stalwart farmers who populate Curry's canvases, Hogue's work shows farmers, and farming practices, as short sighted, greedy and, ultimately to blame for the crisis. One, of his works, titled Erosion 2: Mother Earth Laid Bare (figure 2), depicts a field of exposed soil where the erosion gullies take the form of a woman's naked body. In the foreground, a

[2] There is an irony, however, and when Curry decided to assert his own artistic individuality by putting the radical abolitionists John Brown at the centre of one mural, the people of Kansas turned on him for dredging up this radical part of their state's history. The murals were never finished.

plough cuts deep into the earth. The implications are clear: Great Plains' farmers have raped the earth (White, 2006).

At about the same time as Alexandre Hogue was working on his canvases, a film maker named Pare Lorentz was helping to establish the American documentary film tradition with his work The Plow that Broke the Plain (Snyder, 1968). This documentary on the Dust Bowl also portrayed farming practices as to blame for destroying the top soil and making the region vulnerable to the ravages of drought. With a score composed by Virgil Thomas, and repeated images of ploughs cutting native prairie grass, open furrows with the soil blowing away, and ranks of tractors pulling large discs, The Plow that Broke the Plains laid the blame for the crisis squarely at the feet of the unsustainable farming practices that were common earlier in the century.

The people of Great Plains, especially those who subscribed to the assumptions of the first narrative tradition described above, were appalled at this depiction (Dunaway, 2005). Lorentz' movie was derided in the Texas and Kansas press, and a Texas legislator, Eugene Worlely, called for the film to be suppressed (Shindler, 1996, see page 50). Alexandre Hogue's work too came under fire: following publication of a series of Hogue's paintings in Life magazine, the Chamber of Commerce for Eastland Texas decried his work as disloyal to the state. The Dalhart Chamber of Commerce went further. They took up a collection to purchase Hogue's work called The Drought Survivors, a canvas that depicts a ruined farm, a derelict tractor half buried in sand, and dead livestock. The Dalhart businessmen planned to burn the painting in protest. Luckily, they lacked the $2000 to act on this plan (Seager, 2012).

Despite the controversy this depiction of the Dust Bowl caused amongst right wing commentators, it had considerable traction amongst certain circles. In particular, Roosevelt and other New Deal administrators found this an ideal way of depicting the problem in such a way as to justify strong governmental intervention. Pare Lorentz' film was actually paid for by the Roosevelt Administration. The Plow that Broke the Plains was the first in a series of films planned by the Roosevelt's staff to build confidence in the government's New Deal. This so upset mainstream

filmmakers that Hollywood cinemas refused to distribute the film since it was deemed closer to propaganda than either a documentary or entertainment.

Regardless of Hollywood's opinions, these cultural works appealed to Roosevelt and the administrators of the New Deal who used these depictions to help justify the creation of a number of agencies to control erosion and protect the soil. This included appointing an early pioneer in soil conservation, Hugh Hammond Bennett, to lead the newly formed Soil Erosion Service to manage grazing land (later the Soil Erosion Service was renamed the Soil Conservation Service). Also created at this time was the Drought Relief Service, which bought and slaughtered cattle in drought ravaged regions, and the Civilian Conservation Corps, which employed people to plant shelter belts of trees in erosion prone areas (Helms, 2009).

As such, the debate over Lorentz' movie and Hogue's canvases reveals a second broad thematic narrative that was used to depict the problem and propose solutions: if short sighted economic incentives led farmers to use unsustainable farming, then government regulation, based on a more scientific understanding of the Great Plains, should lead to better farming practices that would ensure better management. Lorentz' and Hogue's work, therefore, fit into a narrative that good management could be promoted by government regulation and oversight. Whereas the first narrative described in this paper was based on a belief in an individual's ingenuity and hard work, this second narrative was based on a faith in collective, top-down, management.

3.3 Narrative 3. Social Welfare

A third, distinct, narrative about the Dust Bowl did not focus on who or what was to blame but sought to protect the victims. This "social welfare" narrative is in marked contrast with both the technological/individual and the managerial/bureaucratic narratives already described. This is because the implications of the social welfare narrative were that society must establish a social safety net that would help the poor and marginalized who had lost everything.

This narrative is both implicitly and explicitly found in a great number of cultural works from the time. For instance, The Grapes of Wrath tells of the Joad family, poor Oklahoma farmers who migrated to California after losing their farm. Dorothea

Lange's famous photograph is similar: The Migrant Mother (figure 3) shows a poverty-stricken Oklahoma migrant with three of her children. Similarly, Woody Guthrie's album The Dust Bowl Ballads develops these themes as well. It is a collection of folk songs that describes the hardship and misery of the time from the perspective of the victims. In all three of these iconic cultural works, our attention is not drawn to the problems of farm management or promise of technology. Rather, our focus is placed on the experience of those poor people who lost everything.

The logic of this narrative was also used during the Dust Bowl by the Roosevelt Administration to justify the creation of the Resettlement Administration. This was a wing of government that had the mandate to relocate unemployed urban people and people who lived on land deemed hopelessly degraded onto custom built "Greenbelt" communities that were to become engines of economic growth and the source of new employment opportunities. The Greenbelt program was one of Roosevelt's most ambitious strategies. This was the ultimate expression of the social welfare state's agenda and was placed under the administration of Rexford Tugwell, arguably the most left-leaning and radical of Roosevelt's advisors (Parsons, 1990). By late 1937, the federal government owned three such satellite towns, which were home to approximately six thousand people. But of course, this entire plan was extremely controversial. It was so top-down and authoritarian that many right wing politicians compared it with totalitarian and fascism. This comparison has continued into the present day and one modern scholar explicitly compares the work of the Resettlement Administration with similar policies then being undertaken by the fascist government in Italy (Ghirardo, 1989). Ultimately, the Greenbelt community scheme proved so unpopular and unworkable that this plan was abandoned and Rexford Tugwell resigned under a barrage of criticism from both Roosevelt's political opponents and a court decision that deemed the program unconstitutional (Chichester, 2011).

One core aspect of the logic of this social welfare narrative is that it is society's collective responsibility to look after people who, through no fault of their own, are victims of circumstances beyond their control. As a result, many of those who contributed to this narrative took pains to highlight the "blameless" aspect of the victims of the Dust Bowl. For instance, the story of Dorothea Lange's photograph of

the migrant mother illustrates how important the idea of victimization is to this narrative.

Dorothea Lange was a government employee paid through a New Deal program to document the Dust Bowl. According to her notes, she was heading home after a day of photographing workers from Oklahoma in Californian agricultural fields when she spotted a migrant family of pea-pickers living in a very rudimentary tent (Curtis, 1986). She parked her car and set up her equipment, taking a series of six pictures from a range of angles and approaches. The first photograph is a long shot and includes the mother (age 33), a teenage daughter, two young children, and an infant at the breast. Lange's notes from the day suggest there were seven children in all. In the next five images, Lange moves closer to the mother and the three younger children. At some point she obviously talks with them and poses them deliberately. The final image, which is the famous one, has the mother in a Madonna-like pose, feeding the infant, and is framed by the two middle children who appear about four and six years old. In this image, the mother appears both a victim of circumstances far beyond her control but also has a nobility and clarity of purpose that gives this portrait its iconic status.

The emotional appeal of this photograph is similar to Steinbeck's Grapes of Wrath in that it appeals directly to the audience through its use of religious imagery. Furthermore, the way that Lange used the other children in the picture is deliberate. In particular, the absence of the teenage daughter, who appears in the early shots, but is removed from the setting in the final photograph, is significant. If the teenager had been included, it would have suggested that the mother herself had been a teenage mother, and, therefore, perhaps of suspect morals and virtue. Therefore, if she had included the teenage girl, Lange may have inadvertently invited the audience to question the extent to which the mother was a true "victim". This is because if the mother herself had been a teenage mother, then she would not have been as worthy of the sympathies of the American middle class in the 1930s who looked down on teenage pregnancy. Similarly, the fact that no father is present in the Migrant Mother portrait also is important. At least two other of Lange's portraits have women and infant but also men (presumably husbands) relaxing next to them under the shade of the tree. These photographs do not have the emotional impact of the Migrant Mother partly because they raise thorny issues of who is truly a victim, of

laziness and a middle class assumption that poor people are poor because they failed to apply themselves. According to one modern art critic, "...while middle-class viewers were sympathetically disposed to the needs of impoverished children, teenagers [and husbands] posed thorny questions of personal responsibility..." (Curtis, 1986 p. 9). Hence it is the Migrant Mother portrait, which carefully avoids these contentious debates, that has stood the test of time and become one of the iconic images from the 1930s.

3.4 Narrative 4. Communitarian and Ecological

A fourth narrative depiction of the Dust Bowl is presented by Grant Wood's painting Stone City Iowa (figure 4). Grant Wood is probably the best known of the Regionalist painters, the school of art that helped forge a rural American identity and to which John Stuart Curry belonged (Dennis, 1998). Wood's best know work, American Gothic, is the somewhat strange portrait of the odd looking farming couple with the husband leaning on a pitchfork. In Stone City Iowa, Grant depicts a rural hamlet, nestled in a diverse and productive agro-ecosystem. The buildings are tidy and well managed, the fields are productive, and there is a pleasing mixture of grassland, arable farming, wood lots, horticulture and livestock. This painting both spoke to and helped define an American idyll based around an idealized community that lived in harmony with nature.

This painting, therefore, contains a number of key elements important to the final narrative. In particular, this painting depicts a community that subsisted at a local scale. These ideas were picked up by a range of cultural, scientific, and political figures. The poet Archibald MacLeish, who was well connected with the Roosevelt government and would later be appointed to become the head librarian for the Library of Congress, wrote an important essay in the November 1935 issue of Fortune Magazine where he recounts these communitarian and ecological ideas by describing the natural ecology of the Great Plains as if it were a single organism. MacLeish also stresses the connection between humanity and natural systems in a number of places, including by opening his essay with the Old Testament book of Isaiah (40:6) quotation: "All flesh is grass."

MacLeish's essay also heaps criticism on modern mechanized and large-scale agriculture. In particular, he singles out Thomas Campbell an early adopter of tractors who bought or leased 100,000 acres that he cultivated immediately before the Dust Bowl. According to MacLeish, people like Campbell ignored the ecological integrity of the land and, in the pursuit of large scale profits, established on a form of agriculture that was out of scale with what the environment could sustain. MacLeish's article is full of descriptions of the link between society and ecological systems and foreshadows the Deep Ecology movement that was beginning to pick up support amongst intellectuals of the time.

This focus on community and ecology was also depicted by a range of Depression era philosophers including Frederic Clements, Paul Sears and one of the founders of modern environmentalism, Aldo Leopold. These writers all "characterize nature as a delicately balanced organism..." (White, 2006 page 69) and highlight the risk that humans pose in upsetting the natural world.

Today, by far the best known of these writers is Aldo Leopold who was personally inspired by the Dust Bowl and based much of his classic A Sand County Almanac on land that had been ravaged by bad agricultural practices and drought earlier in the century. In 1935, Leopold bought what he described as a worn out piece of land that he spent weekends on with his wife and children. Together, they turned the property into an ecological experiment, which included planting 40,000 trees to try and rehabilitate the degraded soil. Droughts destroyed most of their initial trees but the family continued to turn the property into a living laboratory where Leopold (and now the Aldo Leopold foundation) demonstrate the principles of deep ecology (Aldo Leopold Foundation, 2010; Leopold, 1949).

Figure 1. John Steuart Curry, “Tornado Over Kansas,” oil on canvas, 1929. Collection of the Muskegon Museum of Art, Michigan, Hackley Picture Fund Purchase, 1935.4

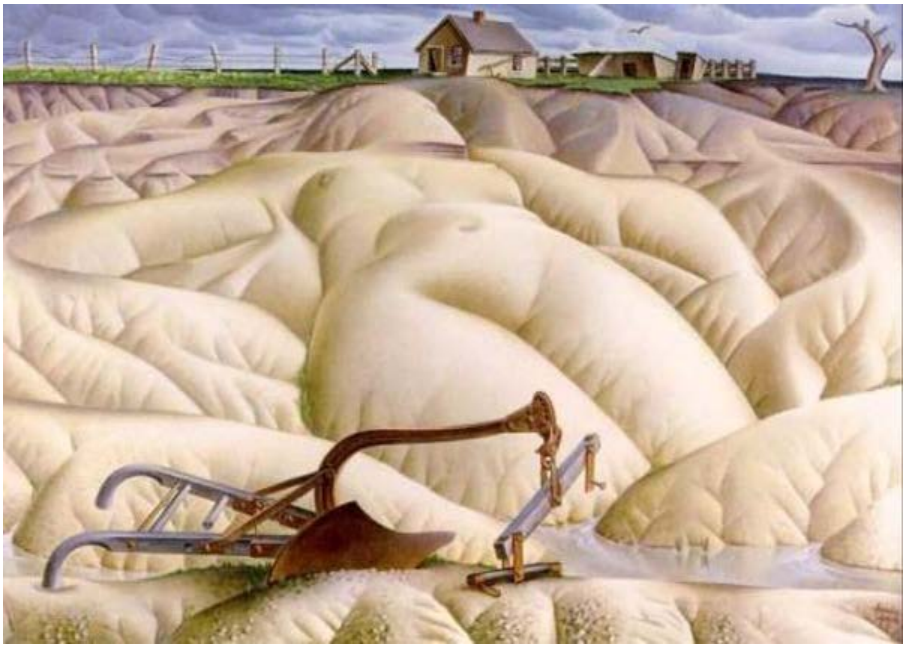

Figure 2.Alexandre Hogue *Erosion No. 2 - Mother Earth Laid Bare.* 1936 Museum purchase, 1946.4, © 2012/2013 Philbrook Museum of Art, Inc., Tulsa, Oklahoma

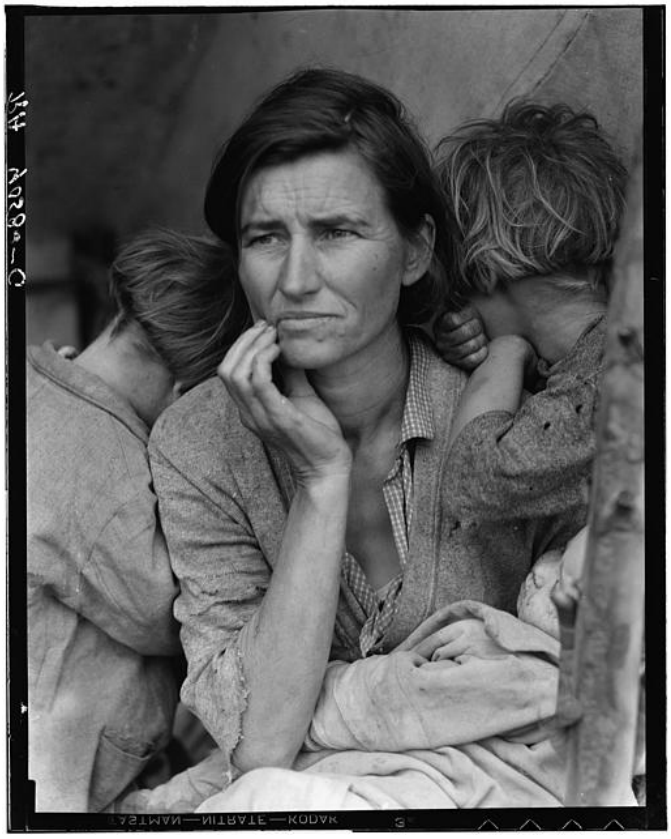

Figure 3. Dorothea Lange, *The Migrant Mother. "*Destitute peapickers in California; a 32 year old mother of seven children. February 1936." (retouched version) **Location:** FSA/OWI - J339168 (the original photographic print has been replaced by a copy print) (Also available on microfilm and microfiche: Microfilm LOT 344; Chadwyck-Healey Far West fiche #29:E11.)

Figure 4. Grant Wood (American, 1892-1942) *. Stone City. Iowa*, 1930, oil on panel, Joslyn Art Museum, Omaha, Nebraska, Gift of the Art Institute of Omaha, 1930.35

4. An interpretive framework

The four narratives described in the previous section reflect deeply held underlying beliefs about how different people thought American society should confront the Dust Bowl. More specifically, the four narratives can be analyzed based on two dimensions. The first dimension is whether the solutions posited within each narrative are imposed formally and from the "top-down" or whether solutions come less formally and from the "bottom-up". For instance, the proponents of the technological narrative represent the "bottom-up" in that advocates assumed that solutions would come from unfettering scientists, farmers and entrepreneurs to innovate. Similarly, the proponents of the communitarian narrative argue that the best solutions are those that emerge organically when communities come together to find alternatives. By contrast, those who advocated for the solutions found in the welfare and managerial narratives proposed that programs, rules and interventions need to be imposed by an external agency from the top-down.

The second dimension is whether the specific strategies found within each narrative are focused on individuals or groups. For instance, the welfare and technological narratives are similar in that each focuses on the individual as the source of the solution. For the technological narrative, the secret is to allow the individual the freedom to innovate. For the welfare narrative, advocates argue that the key is to ensure that poor and economically marginalized people have access to the resources they need so that they can survive periodic crises before becoming independent again. This focus on the individual contrasts with the solutions proposed by those who promoted the managerial and communitarian perspectives. These commentators argued instead that the solutions to the crisis would come through some form of collective action aimed at shaping the behaviour of entire groups.

Categorizing the narratives along top-down / bottom-up and individual / group dimensions is illustrated in figure five. This framework roughly corresponds with the two-by-two matrixes proposed by Douglas and Wildavsky (1983) and Schwarz and Thompson (1990) on ways that people conceptualize nature and respond to

environmental risks. Like these two groups of authors' work, the framework proposed in figure 5 reveals that each of the four narratives are actually inspired by a different set of underlying principles, values and paradigms. Namely, that the technological narrative is dominated by the goals innovation, freedom and productivity. This narrative, therefore, shares many basic assumptions with neoclassical economics and laissez faire politics. The managerial and bureaucratic narrative assumes that environmental problems can be managed efficiently through rational scientific processes and assumes that "the environment" is relatively predicable. Third, the guiding principle of the welfare narrative is to ensure greater equality in terms of access to resources and is based on the assumption that people who become victims of forces beyond their control must be protected. The communitarian narrative's core paradigm stresses the importance of local sovereignty and this approach highlights the intimate and fragile bonds that link human society and the natural environment.

Understanding that these narratives are driven by fundamentally different beliefs helps reveal why those who promote the four narratives are deeply at odds with each other. Hence, understanding the perspectives on the Dust Bowl in terms of these core principles sheds some light on why the debate in the 1930s was so fierce and divisive. American society felt itself in the middle of a major crisis that was reshaping both the natural but also the social landscape. This sense of crisis drove some extreme positions that were based on fundamentally different principles. These principles then became manifest in the four narratives and let to the polarized and often antagonistic debate outlined above.

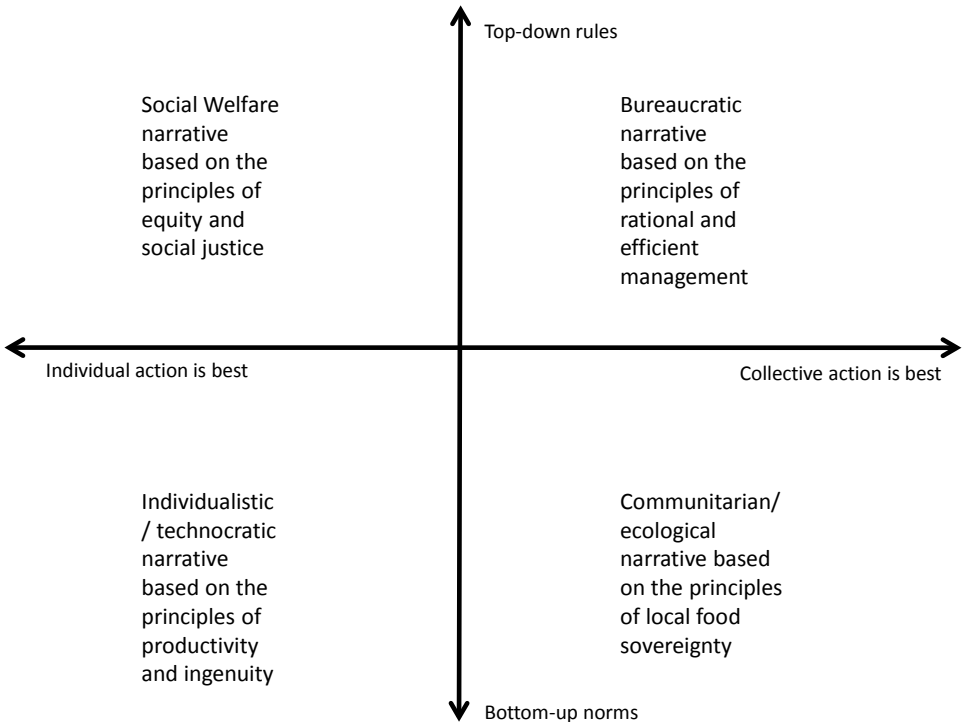

Figure 5. The four narratives adapted explained in terms of collective / individualistic action and bottom up or top town rule making. These two dimensions reveals four world-views that help explain what kind of strategies is deemed the best way of addressing a crisis.

5. The four narratives today

Since 2008, and sparked by concerns over climate change, the rising population, soaring commodity prices and wide spread food riots a lively debate has emerged on the challenges of maintaining global food security over the next generation (Foley et al., 2011; Godfray et al., 2010a; Godfray et al., 2010b). Briefly, there is a consensus that we must develop agricultural technologies, storage and distributions systems, and consumer habits capable of feeding 9 billion people in a way that does not sacrifice vital ecosystem services such as wildlife habitat and carbon sequestration. We must do this under climate change and rising energy costs. The seriousness of this issue is highlighted by the range of experts who have devoted their time to addressing this challenge. For instance, food security has been featured in a large number of extremely prominent places including special issues in both Science (Feb. 2010) as well as in The Philosophical Transactions of the Royal Society (September 2010) and at least one major governmental report (UK Government, 2011). However, while there is a consensus on the scale of the problem, there is no

consensus on the nature of the solution. And within the debate of the last five years, we can see the same four narrative traditions that defined the 1930s debate emerge once again.

For instance, today many authors suggest that technology, and in particular biotechnology, is necessary to allow the modern food system produce enough food to meet projected demands. According to this school of thought, so long as biotech research is funded and biotechnologies approved for use, we will have the tools to boost crop yields and meet future needs. Proponents of this approach argue that biotechnologies are also needed to create climate / pest resistant crops, and to improve the efficiency with which crops use nutrients. This may be especially important in Africa where yields have remained stagnant throughout the 20th century (Juma, 2010). For example, a large proportion of papers published as part of a special issue on food security in the journal Science contain the assumptions of this narrative theme. More particularly, Feoroff et al.'s (2010) primary recommendation is to reduce the regulatory barriers that hinder the development and dissemination of genetically modified crops. Jaggard, Qi and Ober (2010) agree and suggest that by "introducing novel or foreign genes" (page 2849) into the world's main cereal crops, it should be possible to boost yields by 50%, which should be enough to ensure the future of food security (However, Jaggar, Qi and Ober also admit that their projections are based on linear crop models that do not take into account the effects of extreme weather or soil degradation). Test and Langridge (2010)'s paper is similar and highlights the importance of plant breeding not only to improve yields but also create cultivars able to be productive in more diverse and extreme environmental and climatic conditions. Overall, these papers demonstrate that the authors are primarily concerned with issues of technology and productivity.

But other people disagree, arguing that biotechnology will only reinforce things that are wrong with mainstream food production today (Kimbrell, 2002). While this issue has been contentious for many years, it flared up again in 2012 when the UK government approved GM wheat trials at the Rothamsted Research Institute and this sparked massive anti-GM protests. If the protesters are correct in their concerns, tighter governmental regulations are needed to ensure that farmers who use good farming practices are rewarded while those who use unsustainable practices should go out of business. Using concepts like the "precautionary principle", this group

argues that governmental approval of GM crops should be withheld until adequate scientific evidence had amassed to demonstrate that this technology will do no harm (Myhr and Traavik, 2002; Tait, 2001). Furthermore, according to this perspective, one of the most important roles for governmental regulation is to make sure that the environmental, health and social costs of producing food are captured by the market (Zhang et al., 2007). This means that agricultural practices that cause problems like nutrient runoff, excessive carbon emissions, and residue pesticides must all be penalized either through taxes, enforced regulations or market measures that would pass the cost of these problems on to consumers (Benton et al., 2011; Panayotou, 1993, 1997). Commentators who belong to this group of critics point out that only a fraction of the costs of producing food are presently passed on to consumers (Le Goffe, 2000). Moreover, many argue that large-scale industrial production has amongst the worst externalities and is actually subsidized through currently policy such as the US farm bill (Mayrand et al., 2003).

Third, many argue that today we need a stronger social safety net to protect the poorest and most marginal. In terms of the food system, probably the most important (and one of the most neglected) aspect of the social welfare agenda is the importance of storing food as a buffer against poor harvests. This is crucially important because if a crisis hits an agricultural region and people are forced to abandon their homes (as happened in the case of the Migrant Mother during the Dust Bowl) then this agricultural system takes much longer to recover than if the people has been provided the resources to stay put, and maintain their farms and tools and other productive assets (Doocy et al., 2005; Fraser, 2007). Unfortunately, the world seems to have forgotten how to store food, global buffers have fallen and we regularly eat more than we produce (FAO, 2011). This “just-enough-just-in-time” approach to the food system is economically rational but may prove to be extremely fragile. Furthermore, the UN used to run a “strategic grain reserve” program where nations were funded to build the infrastructure to store grain that could be released onto the market during times of dearth. But the cost of this system, plus corruption and mismanagement (Devereux, 2002), undermined its effectiveness and when assessing the program in the 1990s the Food and Agricultural declared: “…for many countries the strategic grain reserve…tend[s] to exist in theory rather than in practice.” (Food and Agricultural Organisation, 1997 see section one, available on

line at: http://www.fao.org/docrep/w4979e/w4979e00.htm). But recently, senior policy officials have started calling for new investment in food storage to act as a safety net. For instance, Robert Zoellick, president of the World Bank, argued for this point recently:

> *The world tends to be wary of large food stocks, but where we have those we need to have good information about them so that we know how to deal with crises, particular weak in some of the developing countries, and in some areas where we know that there tend to be problems and we know that the infrastructure is weak, such as in the Horn of Africa, it may make sense to have food stocks perhaps run by the world food program so that we can get support where it is needed most quickly.*

(Zoellick, 2011. Available on line at: http://www.unmultimedia.org/tv/unifeed/d/16980.html)

Finally, there are many people today who accept the arguments of the communitarian and ecological narrative. This perspective is manifest in the local food movement and amongst many members of Slow Food International, which is a worldwide network of consumers committed to reforming the food system (Fraser and Rimas, 2010 see chapter 9). These people often argue that local food systems are more ecologically sustainable than mainstream agriculture (Fraser, 2006; Guptill and Wilkins, 2002; Soule and Piper, 1992). This point is debated by a range of authors from different point on the ideological spectrum (E.g. see: Badgley and Perfecto, 2007; Pretty, 1999) with proponents presenting evidence that small scale farming that promotes food sovereignty is necessary to counteract the problems of industrial agriculture (Altieri and Rosset, 2002), to those who use mathematical methods to demonstrate organic agriculture is sufficiently productive to meet the current human population without expanding the amount of cultivated land (Badgley et al., 2007). While many of these conclusions are contested (Connor, 2008), there are many other arguments in favour of local food systems. This include the idea that local food systems help maintain local "food sovereignty" thereby providing a buffer between urban consumers and the vagaries that may be caused by the global food system (Fraser et al., 2005). This aspect of local food systems is expected to grow in importance because, as we look towards a future of rising demand, climate change

and expensive energy, the global food system may experience considerable upheaval in the upcoming decades. Local food systems may help to protect people from any hardship that these shocks may bring. Lastly, history tells us that alternative food systems are important as reservoirs of ideas and methods that may become useful and rapidly grow in popularity as mainstream systems become unviable (Thirsk, 1997).

In summary, each of these four narrative traditions that was at work in the 1930s is still present today. In many ways, therefore, it seems that while the circumstances and details may vary, the basic underlying principles that define how experts debate these issues remain quite constant. The only logical conclusion to draw from this is to acknowledge that developing strategies to address an agricultural or food security crisis will require policy makers stepping aside from the polemic debate that pits those who promote efficient management against though who advocate for technologies that boost productivity, against those who want a better social welfare system, against those who advocate for more local food sovereignty. We need to take from this analysis, the understanding that it is not as if we are looking for a single set of policy prescriptions. Rather, we need to adopt a portfolio approach to policy making that acknowledges that while each of these four broad areas is necessary, none are complete and each bring with them certain limitations and weaknesses. A portfolio of policies must work to simultaneously try to create the opportunities for alterative food systems to flourish. It must also regulate the impact of farming on the environment. And it must set aside resources to establish the food storage infrastructure that will protect the poor and vulnerable. Finally, policy must enable bright people with good ideas to bring their ideas to market. Accomplishing all these things will require an explicit acknowledgement that tradeoffs are inevitable and we must seek to establish the checks and balances so that the merits of all four approaches are realized.

6. Conclusion

Overall, there is a strong scientific consensus: the world faces a major challenge over the next three or four decades. Unless we both develop new ways of producing food as well as more equitable diets and distribution systems, we are likely to see a significant rise in malnourishment, poverty and destitution. Many argue that this will

also bring with it the threat of political unrest, social instability, large scale migration, and the spread of disease. But while the next thirty years looks extremely unsettled, it is helpful to reflect on history, reminding ourselves that we have 10,000 years of experience producing food on farms and bringing it to cities. Out of this historic record, there is much to be optimistic of. The years, decades and generations of growth and prosperity are more common than the periods when starvation and collapse dominated. Time and time again, we have proven ourselves a resilient and adaptable species, able to develop both the technological and institutional innovations required to meet the needs of large scale populations. However, history also reminds us not to be complacent and there are those horrific examples – such as the Dust Bowl – where the way we deployed our technology and institutions undermined the sustainability of food systems. This paper has tried to explore one such example as a way of extracting the lessons that history may be able to teach us. From this analysis two broad conclusions stand out. The first conclusion is that there seems to be four broad approaches through which we can tackle the challenges to global food security over the next generation. These approaches are technological/individualistic, bureaucratic/managerial, communitarian/ecological, and social welfare based. The second broad lesson is that each of these approaches should be seen as part of a holistic solution but that developing an appropriate portfolio of strategies, strategies that draw across these four approaches, will require not just technical and political flexibility but ethical and moral flexibility too.

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