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The Sustainable Farm Bill: A Proposal for Permanent Environmental Change

by William S. Eubanks II

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Editors' Summary

A thorough analysis of the U.S. Farm Bill highlights the grave implications of buttressing our nation's industrial agricultural system with ever-larger subsidies. By encouraging large-scale, monoculture megafarms, a subsidized industrial agricultural system leads to severe environmental consequences such as water pollution from fertilizer and pesticide runoff, soil erosion, and effects on wildlife and biodiversity, such as fragmented habitats and species decline. To combat these trends and slow or reverse environmental degradation caused by industrial farming, Farm Bill reform discussions should be recentered on subsidies to scale up sustainable farming.

The following Article aims to inform policymakers and the public about the single most important statute affecting the United States today. Specifically, this legislation has the most significant environmental impact of any statute enacted by the U.S. Congress. No, this Article does not focus on the Clean Air Act, the Clean Water Act, the National Environmental Policy Act, the Endangered Species Act, or any of the myriad environmental protection statutes enacted in the early 1970s in response to the alarming destruction of the natural environment. Rather, this Article focuses on a piece of legislation that affects *all* aspects of the natural environment, not just one specialized facet like the statutes listed above. In addition to this statute's impacts on the environment, this legislative enactment has far-reaching implications for the most salient issues facing our nation today. The statute drives public health policy in the United States and is a predominant reason that our nation suffers from record levels of obesity, heart disease, diabetes, and asthma. At the same time, this statute implements policies that result in severe malnutrition and hunger, both domestically and abroad. Additionally, this legislation encourages overproduction, trade distortion, and depression of world market prices, which directly and immediately drive immigration toward the United States from the developing world. Lastly, this statute strips rural communities of their senses of identity, cultural values, and traditional heritage. For all of these reasons, it is time to inform the public about this statute so that a new-found awareness can lead to much needed reform of the current policy system.

Most people will be surprised to learn that the statute referenced above is the U.S. Farm Bill. How can something called the Farm Bill affect all of the sectors of society mentioned above? This question demonstrates one of the inherent problems with attempting to resolve the difficult conflicts created by the Farm Bill: the statute is much more than a mere bill for farmers, but its deceptive name prevents the public from recognizing its true costs and implications. Writer Michael Pollan argues that Farm Bill reform must start "with the recognition that the 'farm bill' is a misnomer; in truth, it is a food bill [among other things] and so needs to be rewritten with the interests of [the public] placed first."[1] Thus, the time is now to once again summon the courage demonstrated by environmentalist Rachel Car

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1. Michael Pollan, *You Are What You Grow*, N.Y. Times Mag., Apr. 22, 2007, *available at* http://www.nytimes.com/2007/04/22/magazine/22wwlnlede.t.html?pagewanted=1&_r=1.

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son in the 1960s and apply her message to the new cause of reforming our nation's Farm Bill:

> We urgently need an end to these false assurances, to the sugar-coating of unpalatable facts. It is the public that is being asked to assume the risks . . . The public must decide whether it wishes to continue on the present road, and it can do so only when in full possession of the facts.[2]

In order to gather the full possession of facts with regard to the Farm Bill, this Article seeks to provide comprehensive information regarding the Farm Bill's effects on American society.

Section I of this Article analyzes the history of the Farm Bill and generally discusses the far-reaching impacts of the Farm Bill in its current form. Section II scrutinizes the vast off-farm environmental degradation caused by the Farm Bill's insistence on an industrialized agricultural system. Section III recenters the discussion on Farm Bill reform by proposing an innovative policy solution that can single-handedly solve many of the problems identified in the preceding sections.

I. How Did We Get Here? History of the U.S. Farm Bill

The United States has a rich agricultural history that still influences the public's perception of domestic agriculture in the 21st century. Soon after our nation declared independence from England in 1776, Thomas Jefferson and other political leaders encouraged a "national agrarian identity."[3] Jefferson envisioned the United States as a democracy comprised of yeomen farmers whose impeccable virtues would propel the young nation to stability.[4] When Jefferson became president in 1801, 95% of the nation's population worked full-time in agriculture.[5]

By the early decades of the 20th century, the commercialization of agriculture, coupled with the multitude of employment options in America's capitalist economy, led to a decreased proportion of Americans in the agricultural sector. In just over a century from 1801 to around 1910, the percentage of our nation's citizens that farmed full-time had dropped from 95% to only 45%.[6] Within a few decades, however, those remaining farmers suffered severely from the Great Depression. During the early to mid-1930s, nearly 40% of the nation's population, including a large portion of the farming population, was grinding out an impoverished subsistence as bank foreclosures and economic downturn resulted in difficult times in the United States.[7] At this point in time, one in four Americans still lived on a farm.[8] Although poverty affected all sectors of society, many scholars contend that the farming economy was the hardest-hit because of the convergence of bank closures, home foreclosures, drought, dust storms, and floods.[9] These economic and meteorological woes were the visible culprits that led to the "farm crisis," but the underlying cause for the farm crisis escaped scrutiny because it was obscured from public view. The farm crisis was "triggered not by too little food, but by too much."[10] The nation's overzealous planting during the 1920s, combined with innovative advances in both mechanization and soil inputs, led to vast overproduction of most crops.[11] This immense surplus benefited "distributors, processors, and monopolists who were increasingly dominating the food system," but seriously curtailed the profits of farmers as domestic and global crop prices fell dramatically.[12] As the crop prices fell below their respective costs of production, farmers could no longer stay afloat: the total farm income dropped by two-thirds between 1929 and 1932; 60% of farms were mortgaged in hopes of surviving; and by 1933, the price of corn registered at zero and grain elevators refused to buy any surplus corn.[13]

Recognizing the importance of farmers in preserving our nation's food supply, the federal government acted quickly to enact a farm bill to temporarily protect small farms. This response to the farm crisis, called the Agricultural Adjustment Act of 1933,[14] "emerged as one of the most ambitious social, cultural, and economic programs ever attempted by the U.S. government."[15] As part of President Franklin D. Roosevelt's New Deal agenda, the 1933 Farm Bill ambitiously sought to do many things: bring crop prices back to stability by weaning the nation from its affinity for agricultural overproduction; utilize surplus crops productively to combat widespread hunger and provide nutritional assistance to children in the form of school lunch programs; implement strategies to prevent further erosion and soil loss from poor land conservation policies and weather events; provide crop insurance and credit assurances for subsistence farmers; and build community infrastructure for rural farming towns.[16] In essence, the 1933 Farm Bill was designed to save small farming in America, and it signaled a return to the Jeffersonian ideal of an agrarian democracy.

At the time, most Americans hailed the Farm Bill as a great success. Farmers, even those who had criticized the bill initially, were delighted when "[g]ross farm income increased by 50%" within three years of the Farm Bill's enactment.[17] This increase, however, did not come without a price; most of the farm income increases were artificial market supports in the

2. Rachel Carson, Silent Spring 13 (Mariner Books 2002) (1962).
3. Dennis Keeney & Loni Kemp, A New Agricultural Policy for the United States 6 (2003), *available at* http://www.mnproject.org/pdf/A%20New%20Agriculture%20Policy%20for%20the%20U.S.%20by%20Dennis%20Keeney%20%20Lo..pdf.
4. *See id.*
5. Daniel Imhoff, Food Fight: The Citizen's Guide to a Food and Farm Bill 33 (2007).
6. *Id.*
7. *Id.*
8. *Id.*
9. *Id.* at 33-34.
10. *Id.* at 34.
11. *Id.*
12. *Id.*
13. *Id.*
14. Agricultural Adjustment Act of 1933, ch. 25, 48 Stat. 31 (codified as amended in scattered sections of 7 U.S.C.). The text of the original Act is available at http://www.nationalaglawcenter.org/assets/farmbills/1933.pdf.
15. Imhoff, *supra* note 5, at 34.
16. *Id.* at 34-36.
17. Alan Brinkley, American History: A Survey 404 (10th ed. 1999).

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form of government subsidies.[18] Focused solely on day-to-day survival after struggling through the Great Depression, small farmers—then still the backbone of the American agrarian system—failed to grasp the imminent and unintended consequences of the initial Farm Bill's introduction of commodity subsidies. Although Farm Bill subsidies originally provided price supports for over 100 crops,[19] rapid changes were on the horizon since the determination of which crops to subsidize fell into the hands of those with political and economic power. The decisions made by those in power have resulted in the gradual narrowing of commodity subsidies to a select handful of crops, distortion of the agricultural market by artificially supporting only these select crops, and the slow, painful death of small farming in the United States. This "death" has transformed rural America into a wasteland of large commercialized farms and abandoned fields that once served as symbols of hope to the families that depended on their plentiful yields.

Although well-intentioned at the outset, the Farm Bill's subsidy program has gradually snowballed into a legislative package of subsidized commodities that increasingly benefits the largest of agricultural producers. Since the 1933 Farm Bill was enacted as a *temporary* fix to an emergency farm crisis, Congress is required either to pass a new Farm Bill every five to seven years when the previous bill expires or allow the bill to lapse into pre-Farm Bill agricultural policy whereby the market is not distorted by governmental subsidies.[20]

By 1949, five million farms remained in the United States. These farms "were largely homogenous: similarly sized with a fair degree of surrounding habitat, raising a diversity of crops, including livestock (for meat, dairy, and fertilizer), honeybees (for pollination and honey), and other products."[21] In fact, over 100 unique crops received partial price supports in the way of federal subsidies, which gave farmers choices regarding what and how to cultivate.[22] This quickly changed, however, as both the Green Revolution[23] led to plant breeding and hybridization and military technology developed during World War II led to new pesticides, herbicides, and agricultural mechanization.[24] These modern advances increased yields consistently, which resulted in overproduction and depressed crop prices reminiscent of the farm crisis during the Great Depression.[25] Unlike the earlier farm crisis, however, the government did not swoop in to protect the small farmer. Instead, larger farms that had the ability to stay afloat despite decreased crop prices began to exploit the weaker, smaller farms by purchasing foreclosed farms at below-market rates and by joining forces with other large farms and food processors to create the first agribusiness lobby.[26]

Without farmers' rights advocates to protect the small farmer in the 1970s, the largest mechanized farms and agricultural processing companies banded together with federal legislators from the southeastern and upper midwestern states.[27] This collaboration quickly demonstrated the inherent problem with our nation's inequitable senatorial distribution: each state receives two important votes in the U.S. Senate on behalf of its constituents, but each constituent in sparsely populated states has a much higher per capita representation in the Senate than does a constituent in a densely populated state.[28] Based in sparsely populated midwestern states, the growing agribusiness lobby capitalized on this constitutional mandate to manipulate the agricultural policy system to its benefit. Specifically, this lobby worked with the most important, but controversial, figure in the 1970s agricultural arena to craft federal agribusiness-favorable farm policies.

President Richard M. Nixon appointed Earl Butz to serve as his second Secretary of Agriculture.[29] Secretary Butz is mostly remembered today for his public insults of Pope Paul VI in 1974, numerous racist remarks, and his conviction for tax evasion.[30] However, few remember the most indelible

18. *Id.*
19. Imhoff, *supra* note 5, at 38.
20. The National Agricultural Law Center, Farm Bill Definitions, http://www.nationalaglawcenter.org/assets/farmbills/glossary.html (last visited Apr. 13, 2009) (illustrating that a new Farm Bill is passed every five to seven years).
21. Imhoff, *supra* note 5, at 38.
22. *Id.*
23. In the early 1960s, the "Green Revolution" led to a tripling in grain yields (namely of the wheat, rice, and corn that prove to be the most heavily subsidized crops today) due to scientific advances in the field of crop hybridization. Although the crop yields increased substantially, many argue that the consequences for rural life were devastating; *See* Richard Manning, *The Oil We Eat: Following the Food Chain Back to Iraq*, Harper's Mag., Feb. 2004, at 37, *available at* http://www.harpers.org/archive/2004/02/0079915. For example, Richard Manning argues that

> [t]he accepted term for this strange turn of events is the green revolution, though it would be more properly labeled the amber revolution, because it applied exclusively to grain—wheat, rice, and corn. Plant breeders tinkered with the architecture of these three grains so that they could be hypercharged with irrigation water and chemical fertilizers, especially nitrogen. This innovation meshed nicely with the increased "efficiency" of the industrialized factory-farm system. With the possible exception of the domestication of wheat, the green revolution is the worst thing that has ever happened to the planet. [For example], it disrupted long-standing patterns of rural life worldwide, moving a lot of no-longer-needed people off the land and into the world's most severe poverty.

Id. at 41.

24. Imhoff, *supra* note 5, at 38.
25. *Id.*
26. *Id.* at 39.
27. *Id.*
28. For example, the U.S. Census Bureau estimates the combined 2008 populations of Iowa, Kansas, and Nebraska at 7,588,121. When divided by their six senators, these three farming states have one senator, and thus one vote on each senatorial bill, for every 1.26 million citizens. *See* U.S. Census Bureau, Annual Estimates of Resident Populations, http://www.census.gov/popest/states/NST-ann-est.html (last updated Mar. 18, 2009). In contrast, the Census Bureau estimates the combined 2008 populations of California, New York, and Texas at 80,573,937. *See id.* When divided by the six senators representing these states, constituents in these states only have one senator, and thus one vote on each critical senatorial bill, for every 13.42 million citizens. This discrepancy defies the "one person, one vote" concept of the American democratic system because it inequitably gives constituents in sparsely populated states incredible power—on the magnitude of 10 times in the current example—to determine crucial policies that impact all of our nation's citizens equally. Although in fairness it must be noted that highly populated states have more members in the U.S. House of Representatives than their sparsely populated counterparts, it must also be emphasized that the number of members a state has in the House is apportioned on a per capita basis. The net effect is that citizens of sparsely populated states have equal voting power in the House, since *all* U.S. citizens are represented on a per capita basis, but the same citizens of sparsely populated states have considerably magnified voting power in the Senate as compared to their counterparts from highly populated states.
29. Imhoff, *supra* note 5, at 38.
30. *Id.*; *Quiet Please*, Time, Dec. 9, 1974, *available at* http://www.time.com/time/magazine/article/0,9171,908948,00.html; *Exit Earl, Not Laughing*, Time, Oct. 18, 1976, *available at* http://www.time.com/time/magazine/

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imprint that he left on the American landscape: the encouragement of large-scale megafarms that prioritize crop yields over environmental protection. Although his agricultural legacy is not surprising considering the fact that Secretary Butz served as a board member for many of the burgeoning agribusiness companies before his appointment as Secretary of the U.S. Department of Agriculture (USDA),[31] the speed with which he altered the nation's agricultural framework is incredible. Secretary Butz first called on American farmers to "Get Big or Get Out,"[32] which visibly clashed both with the Jeffersonian agrarianism that stabilized the nation in its formative years and with the initial Farm Bill's goal of protecting the small rural farmer in order to secure our nation's food supply. As part of this policy, Secretary Butz proclaimed that "farming 'is now a big business' and that the family farm 'must adapt or die' by expanding into large operations reliant on industrial pesticides, herbicides, and fertilizers."[33] This ruthless "adapt or die" mentality gave the growing agribusiness industry ammunition to overpower unprofitable small farms that could not compete in a mega farm-dominated market.

In 1972, Secretary Butz pushed even more aggressive policies as he urged farmers to "plant from fencerow to fencerow" to maximize yields of commodity crops regardless of the consequences.[34] Thus, "[f]armers who had maintained wild or semi-wild borders around and between fields (in accordance with the best practices [recommended by] former administrations), tore out shelterbeds, windbreaks, filter strips, and contours."[35] Forests were decimated and critical wetlands were drained, frequently with direct assistance and financial support from the USDA.[36] In addition, the heightened use of toxic chemicals on farms caused the nation's watersheds to become increasingly polluted and resulted in a sharp decline in plant and animal health.[37] Agricultural "progress" began to be measured in the 1970s and beyond solely by commodity crop yield increases, which disguised many of the effects of moving the nation to large-scale industrial farming, such as environmental degradation and lack of a diverse and nutritious food supply for the nation's citizens.[38]

Although Secretary Butz reigned over the USDA for only five years before his resignation in 1976, his policies forever transformed both the agricultural system of our nation and the rural landscape once healthfully dotted by profitable small farms. During the last years of Secretary Butz's reign and in the years following his resignation, his goal of shifting agriculture to a commercialized industry was fully realized. For example, New Deal programs such as loan-based market regulations—mainstays in past Farm Bills that protected the family farmer by issuing government-backed loans that need not be repaid if drought, flood, or other unforeseeable events struck—were stripped from the 1973 Farm Bill "in favor of farm crop payments based on maximizing yields."[39] Trying to survive under the USDA's ever more important subsidy system that emphasized maximum crop yield, many farms began to grow in size as they plowed marginally productive lands.[40] Despite their efforts, many family farms were unable to survive the "adapt or die" mandate of Secretary Butz because they simply did not have the requisite financial resources and labor capabilities. Therefore, these farms did only what they could: they died. As part of this painful death, foreclosures and bankruptcies skyrocketed, rural suicides increased, and a farm exodus paralyzed the nation's agricultural regions.[41]

The USDA made a significant transformation when it gutted New Deal loan programs that kept farms afloat even when crop prices were falling.[42] Although subsidies had been part of the Farm Bill since 1933, the change in the 1970s from loans to direct payments "was revolutionary [because] the new subsidies encouraged farmers to sell their corn at any price, since the government [and thus taxpayers] would make up the difference."[43] Agribusiness lobbied for this shift to direct payments because large commercial farms, grain dealers, and food processing companies recognized the agricultural potential that existed in an ever-globalizing world.[44] Their common goal was to "ensure a steady supply of cheap commodity crops that they could trade internationally and process into value-added products."[45] This goal was much easier than anticipated because the largest of grain processors, namely Cargill[46] and Archer Daniels Midland (ADM), exerted considerable influence over the Farm Bill drafting process and actually wrote large industry-favorable portions

article/0,9171,946703,00.html; *Butz Released 5 Days Early*, N.Y. Times, July 25, 1981, *available at* http://query.nytimes.com/gst/fullpage.html?res=9400E1D9163BF936A15754C0A967948260.

31. Tom Philpott, *The Butz Stops Here: A Reflection on the Lasting Legacy of 1970's USDA Secretary Earl Butz*, Grist, Feb. 7, 2008, http://www.grist.org/article/the-butz-stops-here (last visited Apr. 13, 2009).
32. Imhoff, *supra* note 5, at 38.
33. *Earl Butz, 98; Agriculture Secretary Forced From Office Over Racist Joke*, L.A. Times, Feb. 3, 2008, at B9, *available at* http://articles.latimes.com/2008/feb/03/local/me-butz3.
34. *Id.*; Imhoff, *supra* note 5, at 38.
35. Imhoff, *supra* note 5, at 38-39.
36. *Id.* at 39.
37. *Id.*
38. *Id.*; Carolyn Dimitri et al., USDA, The 20th Century Transformation of U.S. Agriculture and Farm Policy 5 fig.4 (2005), *available at* http://www.ers.usda.gov/publications/eib3/eib3.pdf. Figure 4 of the USDA report shows that the number of commodity crops produced per farm remained steady for the first half of the 20th century at approximately four to five crops per farm before declining sharply in the 1970s to less than three crops per farm. *Id.* In 2002, the number dipped even more steeply as the average neared only one commodity crop produced per farm. *Id.*
39. Agricultural and Consumer Protection Act of 1973, Pub. L. No. 93-86, 87 Stat. 221(codified as amended in scattered sections of 7 U.S.C.); Imhoff, *supra* note 5, at 39. The text of the 1973 Act is available at http://www.nationalaglawcenter.org/assets/farmbills/1973.pdf.
40. Imhoff, *supra* note 5, at 39.
41. *Id.*
42. *See* Michael Pollan, The Omnivore's Dilemma: A Natural History of Four Meals 52 (2006).
43. *Id.*
44. Imhoff, *supra* note 5, at 39.
45. *Id.*
46. Pollan, *supra* note 42, at 63 (citing Cargill as the largest privately held corporation in the world); Forbes, America's Largest Private Companies, http://www.forbes.com/lists/2007/21/biz_privates07_Americas-Largest-Private-Companies_Revenue.html (last updated Nov. 8, 2007) (listing Cargill as the largest privately held corporation in the United States in terms of employees and the second largest in terms of revenue).

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of Farm Bills in the 1980s.[47] With the industry-favorable commodity subsidy program firmly in place due to intense congressional pressure by Cargill, ADM, and other corporate giants, the transition from a predominantly family-based agricultural system to a commercial megafarm system was complete.

One reason that many Americans fail to grasp the importance of the Farm Bill and its commodity subsidy program, an understanding that is essential if reform is ever to occur, is that American taxpayers are disconnected from the programs supported by federal taxes. If taxpayers realized that a substantial chunk of their tax dollars provided subsidies to large corporations and wealthy megafarms for crops that are not in demand in our nation, taxpayers would be outraged. Therefore, it is important for the public to understand the commodity subsidy program and the impacts of that program in a fair light.

"[W]hat began in the 1930s as a limited safety net for working farmers has swollen into a far-flung infrastructure of entitlements" for the largest farmers and processors.[48] Today, just five crops—corn, cotton, rice, soybeans, and wheat—control the commodity subsidy market.[49] Most Americans will be shocked to find out that American taxpayers spent $172 billion on commodity subsidies in a single decade between 1997 and 2006.[50] Despite the fact that "*thousands* of plant and animal species are cultivated for human use," more than 84% of the $172 billion spent to subsidize our nation's agriculture during that period went solely to these five crops.[51] Corn farmers alone receive more than $4 billion annually from government subsidies, making corn the largest crop in terms of subsidies.[52] Another fact that shocks the conscience is how agribusiness continues to receive billions of tax dollars despite record profits at megafarms: "[i]n 2005 alone, *when pretax farm profits were at a near-record $72 billion*, the federal government handed out more than $25 billion in aid [to farms], almost 50 percent more than the amount it pays to families receiving welfare [in the United States]."[53]

Not surprisingly, these massive government handouts end up in the hands of the same wealthy agribusiness industry that helped to write the Farm Bill's commodity policies. More than one-half of all subsidies, equaling nearly $13 billion each year, go to seven states that heavily produce the five predominant commodity crops.[54] With the exception of Texas and Illinois, these states tend to be sparsely populated, which gives the politically active agribusiness industry amplified congressional power to control national farm policies because of the inequitable senatorial distribution discussed above. Further exposing the inequity of the system, the wealthiest 10% of farm subsidy recipients, namely large corporations, non-farming homeowners, and absentee landowners, receive approximately 67% of all subsidy payments under the Farm Bill.[55] The remaining American farmers, numbering two million, receive little to no assistance in the form of subsidy payments and have been forced to "survive primarily on off-farm income."[56] Although many Americans have a false perception that the government provides financial support to family farms, three in five farmers receive no subsidies[57] while the richest 5% of farmers each receive a whopping average of $470,000 annually.[58] In fact, "equating the farm bill with 'saving the family farm' adds insult to injury [for small] farmers who receive no payments at all."[59] Thus, it is necessary for the American public to recognize that, despite the initial Farm Bill's aim to protect small farmers, the goals have shifted dramatically over the past few decades and this shift has resulted in unintended adverse consequences that systematically devastate our natural environment.

II. The Environmental Impacts of Subsidized Commercial Agriculture

This section focuses predominantly on the environmental impacts of a subsidized industrial agricultural system.[60] Unquestionably, our current industrial agricultural system would be unable to operate without large inputs of water, fertilizers, pesticides, and fossil fuels. Thus, it is important to start with a discussion of the Green Revolution because of the structural change that this transformation brought to American agriculture by making these inputs mainstream. What started as Norman Borlaug's research project in Mexico in 1943 became the U.S. agricultural standard within decades.[61] Borlaug bred "high-yielding varieties" of corn, rice, wheat, and other grains to produce much larger crop yields than had been previously attained.[62] This was

47. Pollan, *supra* note 42, at 52; Imhoff, *supra* note 5, at 39 ("Cargill and Archer Daniels Midland were essentially writing the Farm Bills").
48. Dan Morgan et al., *Farm Program Pays $1.3 Billion to People Who Don't Farm*, Wash. Post, July 2, 2006, at A01, *available at* http://www.washingtonpost.com/wp-dyn/content/article/2006/07/01/AR2006070100962.html.
49. Imhoff, *supra* note 5, at 59.
50. Morgan et al., *supra* note 48.
51. Imhoff, *supra* note 5, at 59 (emphasis added); Environmental Working Group, Subsidies on Autopilot: Farmers Receiving Record Crop Prices and Earning Record Incomes, http://farm.ewg.org/sites/farmbill2007/autopilot.php (last updated Nov. 1, 2007).
52. Imhoff, *supra* note 5, at 17.
53. Morgan et al., *supra* note 48 (emphasis added).
54. Imhoff, *supra* note 5, at 59; Environmental Working Group, *supra* note 51 ("Just seven states will collect half of all the direct payment subsidy over the next five years: Iowa, Illinois, Texas, Nebraska, Kansas, Minnesota, and Arkansas.").
55. Imhoff, *supra* note 5, at 59; Morgan et al., *supra* note 48. In fact, the federal government has paid more than $1.3 billion since 2000 to "individuals who do no farming at all," including many unknowing landowners that suddenly started receiving six-figure checks from the government because their land was farmed years ago by previous owners. Morgan et al., *supra* note 48.
56. Imhoff, *supra* note 5, at 59.
57. *Id.* at 23.
58. Editorial, *The Charm of the Farm*, Wash. Post, Oct. 19, 2005, at A20.
59. Imhoff, *supra* note 5, at 23.
60. It should be noted that the Farm Bill has attempted to address on-farm conservation measures through conservation programs over the past two decades. However, these programs have largely failed because of a lack of funding, conflicts of interest, a poor conservation payment structure, and a failure of environmental laws to include enforcement mechanisms against the agriculture industry for violation of those laws. A more in-depth look at these programs can be found in the author's unabridged version of this Article in the *Stanford Environmental Law Journal*, published at William S. Eubanks II, *A Rotten System: Subsidizing Environmental Degradation and Poor Public Health With Our Nation's Tax Dollars*, 28 Stan. Envtl. L.J. __ (2009).
61. Norman Borlaug, Nobel Lecture (Dec. 11, 1970), *available at* http://nobelprize.org/nobel_prizes/peace/laureates/1970/borlaug-lecture.html.
62. Int'l Food Policy Research Inst. (IFPRI), Green Revolution: Curse or Blessing 2 (2002), *available at* http://www.ifpri.org/pubs/ib/ib11.pdf.

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made possible because selective breeding allowed the chosen grains to mature more quickly and to adapt to year-round growing seasons.[63] These hybridized crops generally accomplished Borlaug's goal of creating sufficient crop yield growth over time to outpace population growth, which led to his Nobel Peace Prize in 1970.[64] However, despite the historical achievement of attaining constant increases in crop yields, there is much more to the story of the Green Revolution that is often missing from the history books.

Attaining dramatically improved yields of crops is not simply a function of breeding seeds and planting those seeds.[65] In fact, these hybridized plants were only successful in creating higher yields because of their saturation of water, chemical fertilizers, toxic pesticides, and ultimately fossil fuels.[66] Due to the Green Revolution's heavy dependence on these items, the American agricultural landscape has been forever changed. Rather than consisting of rural communities of similarly sized crop-diverse farms like those that existed prior to the 1950s, American agriculture today is an industrialized system whereby water, chemicals, and fossil fuels are converted into cheap commodity crops. Not coincidentally, the most significant environmental impacts from industrial commodity crop agriculture are impacts to the water, land, wildlife, and air derived from agriculture's heavy dependence on inputs that affect these facets of the environment. The immense environmental impacts of this vast structural shift are discussed in detail below.

A. The Effects of Commodity Agriculture on Our Nation's Water

Water is an appropriate starting point for discussion since consumption of water is essential for human survival. Americans expect sanitary drinking water at the flick of a faucet. In addition to drinking water, our society is dependent on water for household uses as well as industrial and manufacturing uses. As a basic element of our daily lives, water is easily taken for granted by the American public because of its apparent omnipresence. This perspective is changing, however, as our nation struggles both with the quantity and quality of our water resources. Since the Green Revolution began, commercialized commodity crop agriculture has become responsible for a large portion of both the reductions in quantity and in quality of the nation's water.[67] Quick steps must be taken to alter our agricultural policies and practices or the growing numbers of disputes over water scarcity will become commonplace and could lead to severe societal instability and deleterious health consequences.[68]

Estimates indicate that total water use in the United States exceeds 400 billion gallons each day.[69] Agricultural irrigation is by far the largest use of freshwater and accounts for more than one-third of all U.S. water usage at a withdrawal rate of more than 135 billion gallons a day from our nation's surface and groundwaters.[70] With the Green Revolution and its emphasis on increased crop yields came extremely water-intensive agricultural practices, requiring large-scale irrigation systems.[71] These practices have gradually been incorporated into American agricultural policy because of the profitability of high-yield Green Revolution crops for mega-farms and food processors. To prevent future water scarcity from halting our farming system, agricultural policies must be tailored to encourage low-water farming strategies. Current policies instead favor industrialized commodity crop farming, which requires constant watering on less than ideal agricultural lands.[72] Rather than only cultivating the prime agricultural soils near lush rivers, our current Farm Bill subsidies tempt farmers to grow hybridized corn, soybeans, and other commodity crops many miles from rivers and other water sources where farms could not survive financially in the absence of federal subsidies.[73] The result is mass diversion of water across miles and miles of land, which results in unneeded water usage to create an immense surplus of hybridized commodity crops. Because of agriculture's large role in American water consumption, farming is responsible, at least in part, for the increasing number of water disputes arising in the United States.

Since the summer of 2007, for example, the states of Alabama, Florida, and Georgia, have been embroiled in a bitter conflict over the allocation of water in the Apalachicola Chattahoochee-Flint River Basin.[74] Although this conflict has existed for decades, the increasing scarcity of water in these states has resulted in a sense of urgency not previously seen in this debate.[75] The two greatest factors in this water

63. *Id.*
64. Borlaug, *supra* note 61.
65. *See* IFPRI, *supra* note 62.
66. Peter Rosset, *Lessons From the Green Revolution*, Inst. for Food & Dev. Pol'y, Apr. 8, 2000, http://www.foodfirst.org/media/opeds/2000/4-greenrev.html.
67. IFPRI, *supra* note 62, at 4 ("The Green Revolution has also been widely criticized for causing environmental damage . . . . Groundwater levels are retreating in areas where more water is being pumped for irrigation than can be replenished by the rains."); Susan S. Hutson et al., U.S. Geological Survey, Estimated Use of Water in the United States in 2000 (2004), *available at* http://pubs.usgs.gov/circ/2004/circ1268/. Susan Hutson and her colleagues explain:

> Irrigation remained the largest use of freshwater in the United States and totaled 137 [billion gallons per day] for 2000. Since 1950, irrigation has accounted for about 65 percent of total water withdrawals, excluding those for thermoelectric power . . . . [T]he percentage of total irrigation withdrawals from ground water has continued to increase, from 23 percent in 1950 to 42 percent in 2000. Total irrigation withdrawals were 2 percent more for 2000 than for 1995, because of a 16 percent increase in ground-water withdrawals and a small decrease in surface-water withdrawals.

Hutson et al., *supra*, at 1.
68. *See, e.g.,* Global Policy Forum, Water in Conflict, http://www.globalpolicy.org/security/natres/waterindex.htm (last visited Apr. 14, 2009) (discussing past, present, and potential future water disputes, and noting increases in violence and public health crises when water disputes occur).
69. Hutson et al., *supra* note 67, at 1.
70. *Id.*
71. Rosset, *supra* note 66.
72. *Id.*
73. *Id.*
74. *See* J.B. Ruhl, *Water Wars, Eastern Style: Divvying Up the Apalachicola-Chattahoochee-Flint River Basin*, J. Contemp. Water Res. & Educ., June 2005, at 47, *available at* http://www.ucowr.siu.edu/updates/131/10_ruhl.pdf.
75. *Drought Issues in the Southeast: Hearing Before the H. Transp. & Infrastructure Comm. and the Subcomm. on Water Resources and the Env't,* 110th Cong. (2008) (testimony of Sam D. Hamilton, Se. Reg. Dir., U.S. Fish and Wildlife Serv.), *available at* http://www.fws.gov/laws/Testimony/110th/2008/HamiltonSoutheastDrought.html.

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dispute are "increased public supply demands associated with the Atlanta region and *increased agricultural withdrawals*."[76] As this example illustrates, water scarcity is no longer an issue only for the western United States. A primary reason for this change is the Green Revolution's introduction of hybridized crops that are heavily dependent on water.[77] Thus, water shortages are becoming more frequent as our freshwater resources are stretched thinner and thinner by the year; in fact, at least 36 states—most of which are outside of traditionally dry regions of the country—are anticipating water shortages in the next five years.[78] In an effort to prevent water scarcity and the inevitable societal fallout, it is imperative that our national leaders target the agricultural industry and mandate much better water use practices in order to conserve the precious water resources that are still available after decades of commercialized farming have brought many of our streams and rivers to a trickle.

As dire as water quantity is, so too is water quality. Unlike growers implementing sustainable agricultural practices, commodity crop farmers use a volatile cocktail of toxic chemical fertilizers to grow corn, cotton, rice, soybeans, and wheat.[79] This is an outgrowth of the Green Revolution, where higher crop yields resulted from hybridized crops. These higher crop yields only existed, however, with inputs of these potent fertilizers.[80] These fertilizers were created as byproducts of military tinkering and are typically composed of high percentages of phosphorus and ammonium nitrate, which is the principal ingredient used in explosives.[81] These "[c]hemical fertilizers circumvent the naturally occurring process of 'fixing' nitrogen to the soil by combining nitrogen and hydrogen gases under immense heat and pressure [with the use of fossil fuels] in the presence of a catalyst."[82] Although fertilizers have made agriculture much more effective in terms of yields, there are serious drawbacks as seen by the following environmental consequences of fertilizers.[83]

For example, much of the fertilizer applied to agricultural fields ends up as runoff that is leached into streams and rivers.[84] Not only do these toxic chemicals ultimately move downstream implicating public health concerns, but these fertilizers also pollute water bodies and harm aquatic species and fishing communities that rely on those water bodies.[85] Eutrophication, a condition of too much nitrogen or phosphorus, is a serious problem that occurs when rising concentrations of these chemical nutrients result in increased algal growth.[86] As this algae dies, it takes oxygen out of the water for its process of decomposition.[87] Therefore, as more algae is created from increased chemical nutrient levels in the water, less oxygen is available for phytoplankton and other organisms in the aquatic ecosystem.[88] When the oxygen slips below a certain level, the water takes on the effects of hypoxia, or a shortage of oxygen.[89] A hypoxic area quickly becomes a dead zone because fish and other mobile organisms leave due to the lack of oxygen and all other organisms die off and cause a food chain collapse.[90]

The largest example of hypoxia in the United States is the Gulf of Mexico Dead Zone, which is now longer than the distance between Washington, D.C., and Hartford, Connecticut.[91] This dead zone is largely the result of commodity crop production and fertilizer application in the Corn Belt of the United States near the Mississippi River and other rivers that ultimately discharge into the Gulf of Mexico.[92] Approximately two-thirds of the nitrogen entering the Gulf comes from industrial agricultural practices in the form of fertilizers or manure runoff.[93] The USDA itself acknowledges the gravity of this problem and recommends "induc[ing] changes in the application and management of nitrogen fertilizer on farm fields."[94] However, until such changes are put into practice, the impacts to the Gulf of Mexico Dead Zone and others like it will continue to be astonishing: the aquatic ecosystems will be devastated; local residents will have difficulty securing seafood for personal consumption; and fishing communities will suffer as fish catches dwindle.[95]

Aquatic ecosystems and water bodies are further degraded by sediment. When land is tilled, soil is loosened and much of that loose topsoil is eventually carried into streams and rivers by rain or irrigation systems.[96] This sediment causes numerous problems for aquatic species that live, eat, and reproduce in lakes, rivers, and estuaries downstream of agricultural areas.[97] Specific concerns with sedimentation include more shallow streambeds and thus less water for fish and other organisms, "lost reservoir capacity, increased

76. *Id.* (emphasis added).
77. Rosset, *supra* note 66.
78. *See, e.g.,* David Gutierrez, *Thirty-Six U.S. States to Face Water Shortages in the Next Five Years*, Nat. News, Mar. 31, 2008, http://www.naturalnews.com/022915.html.
79. Pollan, *supra* note 42, at 41.
80. IFPRI, *supra* note 62, at 2.
81. Pollan, *supra* note 42, at 41.
82. Jodi Soyars Windham, *Putting Your Money Where Your Mouth Is: Perverse Food Subsidies, Social Responsibility, and America's 2007 Farm Bill*, 31 Environs Envtl. L. & Pol'y J. 1, 8 (2007).
83. Fertilizers have dramatically increased yields from the Green Revolution onward. There are, however, less environmentally damaging agricultural alternatives that do not require fertilizers but have attained yields equivalent to or higher than conventional hybridized crop yields in recent years. These sustainable farming systems will be discussed at length in Section III.
84. *See, e.g.,* Organisation for Econ. Co-operation & Dev., Environmentally Harmful Subsidies: Policy Issues and Challenges (2003); Jason Clay, World Agriculture and the Environment: A Commodity-by-Commodity Guide to Impacts and Practices (2004).
85. R. Eugene Turner et al., *Corn Belt Landscapes and Hypoxia of the Gulf of Mexico*, *in* From the Corn Belt to the Gulf: Societal and Environmental Implications of Alternative Agricultural Futures 10 (Joan Iverson Nassauer et al. eds., 2007).
86. *Id.*
87. *Id.*
88. *Id.* at 10.
89. *Id.*
90. *Id.*
91. *Id.* at 11.
92. *Id.*
93. Marc Ribaudo, *"Dead Zone" in the Gulf: Addressing Agriculture Contribution*, Amber Waves, Nov. 2003, at 8, *available at* http://www.ers.usda.gov/amberwaves/november03/Findings/deadzone.htm.
94. *Id.*
95. *See, e.g.,* Turner et al., *supra* note 85.
96. Alfred M. Duda, *Environmental and Economic Damage Caused by Sediment From Agricultural Nonpoint Sources*, 21 Water Resources Bull. 225, 225-34 (1985).
97. *Id.*

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channel and reservoir dredging, increased water treatment, reduced recreational activities, and increased flood[ing]."[98] Although the public generally does not think of soil as a pollutant, "[a]gricultural cropland sediment is recognized as the largest nonpoint water pollutant[99] by volume in the United States."[100] In fact, according to a 1974 study, more than two billion tons of sediment enter our nation's water each year.[101] In the mid-1980s the annual cost of this sediment damage was estimated at $4-5 billion and is likely much higher today due to inflation.[102] Although sustainable farming practices can prevent or at least minimize soil erosion and soil runoff into our nation's water, current Farm Bill policies do not generally encourage such practices. Starting with the Green Revolution, the American agricultural system favored large-scale monocultures of hybridized crops to maximize yields and profits.[103] These monocultures, with no diversity of crops to hold the soil in place, have played a large part in the severe sedimentation problem. If future sediment damage is to be limited in U.S. waters, these monocultures must transition into well-planned polycultures.

Another problem with commercialized farming of commodity crops is the use, and often overuse, of pesticides. With the Green Revolution, chemical pesticides became necessary for reaching the maximum yields of hybridized crops.[104] Pesticides, the general term for both insecticides[105] and herbicides,[106] are used to combat pests that commonly disturb agricultural crops. There are more than 1,600 pesticides currently available on the market, some of which were developed "as nerve gases during the Second World War" and are unsurprisingly very toxic to the insects and plants they target and have the "potential to kill birds and other wildlife."[107] For years, "[t]he movement of pesticides into surface and groundwater" has contaminated human drinking water and aquatic ecosystems.[108] Further, "[t]he sediments dredged from U.S. waterways are often so heavily contaminated with pesticides that there may be problems in disposing of them on land."[109] Agricultural pesticide use has led to "loss of fish productivity in contaminated freshwater such as the Great Lakes, losses of crustacea that provide human food in contaminated estuaries, and . . . decreased pollination" as bees and other pollinating insects are accidentally killed by the pesticides.[110] Thus, the environmental toll of heavy pesticide use is wreaking havoc on our nation's water resources and endangering our invaluable aquatic ecosystems.

The last water-centered concern of commercialized agriculture is manure. Unlike the three water pollutants discussed above, animal waste does not predominantly derive from farms themselves. Instead, most of the untreated animal waste comes from concentrated animal feeding operations (CAFOs), which are included in this Article as a type of megafarm because: (1) CAFOs came into existence alongside the emergence of commodity crop megafarms; (2) CAFOs are only possible because of the sheer surplus of corn grown on American farmland that can feed such large groups of animals for meat production; and (3) CAFOs are usually regulated through the Farm Bill and other agricultural policies.[111] Although the environmental degradation caused solely from CAFOs could fill an entire Article, I will provide a brief glance at how corn-dependent CAFOs foul America's waters.

Prior to the Green Revolution, farms were smaller on average and utilized on-farm livestock manure for fertilization purposes.[112] Additionally, few large-scale livestock operations existed because farms preferred having livestock on site for diverse uses, and large operations were nearly impossible because of the land required to feed livestock sufficient amounts of grass.[113] In today's industrial agriculture system, things have changed greatly as a result of the invention of hybridized grains such as corn that maximize yields when grown in vast monocultures.[114] In fact, an astonishing 66% of the current corn crop in the United States, which is grown with water-polluting fertilizers and pesticides, is fed to livestock in CAFOs solely for the production of meat.[115] By feeding these animals corn instead of grass, livestock owners have

98. William Boggess et al., *Sediment Damage and Farm Production Costs: A Multiple-Objective Analysis*, 2 N. Cent. J. Agric. Econ. 107, 107 (1980).
99. EPA defines nonpoint source pollution as follows:
> Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. These pollutants include: excess fertilizers, herbicides, and insecticides from agricultural lands [in addition to s]ediment from improperly managed . . . crop and forest lands.

U.S. EPA, What Is Nonpoint Source (NPS) Pollution? Questions and Answers, http://www.epa.gov/owow/nps/qa.html (last updated Mar.7, 2008).
100. Boggess et al., *supra* note 98, at 107.
101. *Id.* at 107 n.1.
102. The President's Council on Sustainable Dev., Sustainable Agriculture: Task Force Report 1 (1997), *available at* http://clinton2.nara.gov/PCSD/Publications/TF_Reports/ag-top.html.
103. Rossett, *supra* note 66.
104. *Id.*
105. *See* William E. Palmer et al., North Carolina Cooperative Extension Service, Wildlife and Pesticides—Peanuts, *available at* http://ipm.ncsu.edu/wildlife/peanuts_wildlife.html. Insecticides are targeted to kill unwanted insect species while leaving the desired crop relatively unharmed. In practice, however, insecticides kill unwanted insects and also drift into nearby wildlife habitats, thus endangering larger animals. Wildlife deaths are known to occur more frequently from insecticide use when the insecticide is applied in intervals shorter than 10 days. *Id.*
106. *See* Clive A. Edwards, *The Impact of Pesticides on the Environment*, *in* The Pesticide Question: Environment, Economics, and Ethics 13, 15 (David Pimentel & Hugh Lehman eds., 1993).
107. *Id.* Herbicides are targeted to kill unwanted plant species while leaving the desired crop relatively unharmed. These chemicals are quite dangerous, however, as seen with the use of the defoliant herbicide Agent Orange during the Vietnam War and the severe health effects of such use on humans and animals. *See* Inst. of Med., Veterans and Agent Orange: Health Effects of Herbicides Used in Vietnam (1994), *available at* http://www.nap.edu/openbook.php?isbn=0309048877.
108. *See* Edwards, *supra* note 106, at 39 (emphasis omitted).
109. *Id* (emphasis omitted).
110. *Id.* at 40.
111. *See* Imhoff, *supra* note 5, at 51.
112. *Id.* at 38.
113. *See id.*
114. Rosset, *supra* note 66.
115. C. Ford Runge, King Corn: The History, Trade, and Environmental Consequences of Corn (Maize) Production in the United States 6 (2002), *available at* http://worldwildlife.org/cci/pubs/KingCorn1.pdf ("Roughly 66 percent of global corn production is consumed by animals").

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been able to transition to large CAFOs because there is less need for open land when a readily available supply of corn can be brought in from subsidized corn farmers.[116] Many of the larger CAFOs have thousands of animals in very small quarters, which creates a large concentration of excrement.[117] Due to poor sanitation and the lack of reinforced waste lagoons, large volumes of waste often spill into the local rivers during rainstorms, creating public health emergencies.[118]

For example, a waste lagoon burst in 1995 in North Carolina, releasing 35 million gallons of hog excrement sludge into the New River, killing nearly 10 million fish and endangering North Carolina's residents.[119] Despite spills like this, the 2002 Farm Bill granted subsidies to corporate feedlots authorizing the use of tax dollars to pay for 75% of the building costs for animal sewage facilities.[120] Although Congress' recognition of the animal waste problem is welcome, it is unreasonable for American tax dollars to pay for the construction of animal waste facilities for large feedlots—something that should be the responsibility of a feedlot operator *prior* to construction of such a large facility.[121] Instead of protecting the environment with these subsidies, our government is diverting "precious Farm Bill conservation dollars . . . to build and fortify manure lagoons on corporate feedlots."[122] This backward system must be changed if our nation plans to protect both our valuable waters and the public's health.

Based on the foregoing discussion, it is critical that our national agricultural policy quickly respond to the devastating environmental consequences of industrial commodity crop agriculture. More effective farming practices exist, such as contour farming[123] and on-farm manure use,[124] that have the ability to achieve high crop yields without the use of harmful fertilizers and pesticides while simultaneously minimizing sedimentation from runoff and controlling animal waste. Until practices of this sort are incorporated into a unified national policy, our nation's waters and the 300 million Americans who rely on these waters will continue to pay the environmental costs while agribusiness muddies our streams and rivers with pollution.

B. The Effects of Commodity Agriculture on Our Nation's Land and Soil

Of the 2.3 billion acres of land in the United States, more than 1.03 billion acres are croplands, pastures, or rangelands used and managed by our nation's farmers and ranchers.[125] Cropland alone makes up 442 million acres, which is one out of every five acres of land in the United States.[126] As discussed earlier, agricultural policies stemming from the Green Revolution have resulted in increased farming on marginal lands, which inherently leads to high levels of soil erosion.[127] In addition to soil problems associated with the cultivation of highly erodible lands, soil erosion has resulted from the disappearance of perennial agriculture[128] and the rise of single-crop monoculture.[129] Since the Farm Bill encourages the maximum production of commodity crops, many farmers grow corn and other subsidized annual crops without rotating in a valuable mix of non-commodity crops and perennials that can bolster the health of the land by returning nutrients to the soil and preventing erosion.[130] Further, the constant

116. *See, e.g.,* Henning Steinfeld et al., Livestock's Long Shadow: Environmental Issues and Options (2006).
117. *See id.*
118. *See id.*
119. Laura Orlando, *McFarms Go Hog Wild*, Dollars & Sense, July/Aug. 1998, *available at* http://www.thirdworldtraveler.com/Environment/McFarm_HogWild.html.
120. Imhoff, *supra* note 5, at 51.
121. *Id.*
122. *Id.*
123. *See* Rebecca L. Goldman et al., Stanford Univ., Managing U.S. Agricultural Lands for Ecosystem Services 2, http://woods.stanford.edu/docs/farmbill/Managing_US_Agricultural_Lands_for_Ecosystem_Services.pdf (last visited Apr. 15, 2009) (stating contour farming "reduces the rate of runoff from agricultural systems by growing crops at 90-degree angles to the water flow" and "promotes a number of ecosystem services, including fertile soils, water purification, and flood mitigation").
124. *See* Imhoff, *supra* note 5, at 51; Gary Gardner, *Recycling Organic Wastes*, *in* State of the World 1998: A Worldwatch Institute Report on Progress Towards a Sustainable Society, ch. 6 (1998), *available at* http://www.worldwatch.org/system/files/ESW980.pdf. Composted manure, which farmers relied heavily on before the Green Revolution, allows nutrients to be returned to the soil and is essential for "crop production . . . to remain abundant." Gardner, *supra*, at 3.Today's organic agricultural systems also rely on composted manure, which "can be used to replenish soils." *Id*. Unfortunately, "the common practice in conventional agriculture is to rely primarily on manufactured fertilizer," thus the "acceptance of the ancient appreciation of organic material will be an important step toward building sustainable cities and farms." *Id*. at 3, 18.
125. Agric. Task Force & The Chi. Council on Foreign Affairs, Modernizing America's Food and Farm Policy: Vision for a New Direction 49 (2006) [hereinafter Task Force], *available at* http://www.thechicagocouncil.org/UserFiles/File/Task%20Force%20Reports/Agriculture%20Task%20Force%20report.pdf; The President's Council on Sustainable Dev., *supra* note 102, at 6.
126. Task Force, *supra* note 125, at 49 fig. 9 (quoting USDA Economic Research Service).

Land Use	Millions of Acres	Percent
Grassland (pasture and range)	587	25.9
Forest Use	651	28.8
Cropland	442	19.5
Special Uses (parks, wilderness, wildlife, related)	297	13.1
Misc. (deserts, wetlands, and barren lands)	228	10.0
Urban	60	2.7
TOTAL	2265	100

127. Imhoff, *supra* note 5, at 23.
128. *See* Craig Elevitch, Leaves to Live By: Perennial Leaf Vegetables (1998), *available at* http://www.agroforestry.net/pubs/perennial_vegetables.html. As a sampling, here are a few perennial vegetables that are not only nutritious but also lacking on our grocery store shelves because annuals such as corn and wheat have generally reduced the number of available perennials: asparagus, artichokes, rhubarb, water cress, chives, and some sweet potatoes. *See also* Anne Simon Moffat, *Agricultural Research: Higher Yielding Perennials Point the Way to New Crops*, 274 Science 1469 (1996). Perennial agriculture allows plants with roots that grow each year to grow as part of the normal agricultural cycle. Annual agriculture, such as corn or soybean cultivation, requires planting of seeds yearly and leads to the elimination of the rooted perennial plants in the soil that have evolved over time as the most efficient and productive crops for that specific soil type.
129. *See* Moffat, *supra* note 128; Elevitch, *supra* note 128.
130. *See* Pollan, *supra* note 42, at 198 ("The benefits of a food chain rooted in a perennial agriculture are so many and so great."). A project in Kansas is looking into these benefits through a "long-term project to 'perennialize' many of our principal grain crops (including corn) and then grow them in polycultures," which maximizes the environmental protection benefits such as reducing greenhouse gas (GHG) emissions. *Id*.

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survival mode created by the Farm Bill forces farmers to cultivate their fields without opting for fallow seasons to rest the fields. In a matter of years, these devastating practices can render once profitable cropland completely worthless.

Furthermore, better soil management practices are needed to sequester carbon. In addition to the loss of organic matter when erosion occurs from poor tilling methods, carbon dioxide (CO_2) is also released.[131] Soil absorbs and stores CO_2.[132] When soil is then tilled, especially by large machines that rip at the soil, pebbles, and other underground materials, the tilled organic matter in the soil absorbs oxygen from the air.[133] Once exposed to oxygen, this organic matter decomposes and releases CO_2 into the atmosphere.[134] When erosion occurs, it carries the already decomposing topsoil away and exposes a new layer of topsoil to the decomposition process.[135] Soil scientists note, "accelerated erosion reduces the ecosystem carbon pool, accentuates carbon emissions, and must be controlled effectively."[136] Since the atmospheric levels of CO_2 are setting historic records with dangerous climatic consequences,[137] it is important to require more sustainable farming methods that can store carbon in the soil while also using the soil productively for cultivation.[138] These methods exist in the form of no-till farming, cover cropping, crop rotation, and residue mulching, but are almost nonexistent in the bulk of American farming that is solely focused on maximizing commodity crop production.[139] In fact, studies have shown that these methods can likely sequester two to six times as much soil carbon as the typical conventional system used in the United States today.[140] As will be discussed later in this Article, these sustainable farm management practices have much promise to reshape our nation's agricultural system in a more environmentally sensitive way. To do so, however, will require our policymakers to align the Farm Bill with the nation's environmental interests before we are left with a barren wasteland of once productive fields.

C. The Effects of Commodity Agriculture on Our Nation's Biodiversity and Wildlife Habitat

Our nation is experiencing an incredible downward trend in wildlife habitat and biodiversity as increased agriculture leads to habitat fragmentation, toxic poisoning, species decline, and occasional species disappearance.[141] In fact, "84% of all endangered or threatened plants and animal species were listed in part due to agricultural activities."[142] Hundreds of the nearly 1,300 species listed as threatened or endangered were listed solely because of pesticide use.[143] Countless other species owe their listing to agriculture-driven habitat destruction and fragmentation that can make species survival nearly impossible.[144] Regardless of the farming-based reason for such a listing, it is important to recognize that human agriculture affects wildlife and biodiversity since we are all part of the same interdependent ecosystem.

One biodiversity problem posed by industrial agriculture is the loss of wetlands, which are vital habitats for many different types of wildlife.[145] Large farms often convert wetlands and wildlife habitat to croplands for commodity crop production.[146] This conversion "is a classic market failure in which the costs to the farmer of converting the land to cropland do not include the costs imposed on society of reduced wildlife populations and reduced ecological services provided by the land."[147] As wetlands dwindle, so too do the important services provided by these ecosystems.[148] In fact, "the lower 48 states had an estimated 220 million acres of wetlands and streams in pre-colonial times, but 115 million acres of them had been destroyed by 1997."[149] These wetlands and "creek corridors are probably the single most important wildlife linkages, as they connect all other habitats and lie at the heart of an ecosystem."[150] Further, "over 80% of species use aquatic habitats at some point in their life cycle."[151] Although modest progress was made in the past decade to restore wetlands under the Farm Bill's Wetlands Reserve Program,[152] more substantial steps must be taken in the Farm Bill to implement strategies to protect existing wetlands by prohib-

131. Rattan Lal et al., *Ecology: Managing Soil Carbon*, 304 Science 393 (2004).
132. *Id.*
133. *Id.*
134. *Id.*
135. *Id.*
136. Rattan Lal et al., *Response to Comments on "Managing Soil Carbon"*, 305 Science 1567, 1567 (2004), *available at* http://www.sciencemag.org/cgi/content/full/305/5690/1567d.
137. *See, e.g.,* Intergovernmental Panel on Climate Change (IPCC), Climate Change 2007: Synthesis Report (2007), *available at* http://www.ipcc.ch/ipccreports/ar4-syr.htm.
138. *See* David Pimentel et al., *Environmental, Energetic, and Economic Comparisons of Organic and Conventional Farming Systems*, 55 Bioscience 573 (2005).
139. *Id.*; Lal et al., *supra* note 131.
140. Food & Agric. Org. of the United Nations (FAO), Low Greenhouse Gas Agriculture: Mitigation and Adaptation Potential of Sustainable Farming Systems 7 (2008), *available at* ftp://ftp.fao.org/docrep/fao/010/ai781e/ai781e.pdf.
141. *See* Pollan, *supra* note 42, at 47 (Industrialized agriculture is working "to the detriment of countless [species as, among other things, fertilizers and pesticides] poison[ ] the marine ecosystem. . . . By fertilizing the world, we alter the planet's composition of species and shrink its biodiversity.").
142. Defenders of Wildlife, Comments for the Development of USDA Recommendations for the 2007 Farm Bill (70 Fed. Reg. 35221 (June 17, 2005)), at 1 (2005), *available at* http://familyfarmer.org/sections/pdf/farmbillforum.pdf.
143. Brian Litmans & Jeff Miller, Center for Biological Diversity, Silent Spring Revisited: Pesticide Use and Endangered Species (2004); *available at* http://www.biologicaldiversity.org/publications/papers/Silent_Spring_revisited.pdf.
144. *Id.*
145. Tim T. Phipps, *Commercial Agriculture and the Environment: An Evolutionary Perspective*, N.E. J. Agric. & Res. Econ. 143, 147 (1991), *available at* http://ageconsearch.umn.edu/bitstream/29024/1/20020143.pdf.
146. *Id.*
147. *Id.*
148. Imhoff, *supra* note 5, at 49 n.46.
149. John Heilprin, *U.S. Reports an Increase in Wetland Acreage: Bush Administration Figures Are Disputed as Being Misleading*, S.F. Chron., Mar. 31, 2006, at A2.
150. Imhoff, *supra* note 5, at 49 n.46.
151. *Id.*
152. *Id.* at 125 ("Wetlands increased annually at a rate of nearly 70,000 acres per year between 1997 and 2003.").

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iting conversion to cropland and to restore former wetlands to enhance the ecosystem filtering capabilities of the nation's wetlands system.

Further, as a consequence of both the Green Revolution's dependence on chemicals and Secretary Butz's "fencerow to fencerow" planting strategy, plant and animal species are finding it more difficult to survive the onslaught of agricultural insecticides, herbicides, and fertilizers, while also attempting to live in ever-smaller and more fragmented habitats. The impact of pesticides and other chemicals on aquatic species was discussed above, but these toxic substances also dramatically affect land species by impacting their rates of reproduction and potentially leading to death.[153] Agricultural pesticides have led to a number of animal deaths in species that are not typically thought of as threatened by pesticides, namely eagles, hawks, owls, ducks, geese, and fish at all levels of the aquatic food chain.[154] As more marginal lands are converted to commodity crop production, pieces of wildlife habitat are siphoned off chunk by chunk. Survival by dodging pesticides is made even more difficult for animal species as habitat modification fragments their home range into smaller pieces, which limits the number of animals of reproductive age and can thus threaten the viability of the species in that region.[155]

Although many species could be used to demonstrate the severe impacts to wildlife from agricultural chemicals, wetland conversion, and habitat fragmentation, the discussion will now center on the honeybee because of the key role that this species plays in our food production cycle. Despite the honeybee's importance, there is an apparent lack of public concern regarding the potential collapse of the honeybee species because of the attenuated nature of our current food production system. More than 25% of the food items eaten in the United States depend on pollination, including apples, broccoli, almonds, onions, pears, carrots, blueberries, and over 100 other crops.[156] These "insect-pollinated crops contributed an estimated $20 billion to the U.S. economy in 2000," and the value would reach nearly $40 billion if products such as milk and beef, which rely indirectly on pollinated alfalfa, were included in the calculation.[157] The main pollinator in the United States, the European honeybee, declined by more than 50% between World War II and 2004, and this "Colony Collapse Disorder" hit new records in 2006 and 2007 as some beekeepers reported hive losses of up to 90%.[158] Overapplication of ever-stronger pesticides is one of the four most likely rationales proposed by the U.S. Environmental Protection Agency (EPA) to explain the near disappearance of this extremely important pollinating species.[159] Evidence shows that the honeybee is not alone in its rapid decline: "the continent's thousands of native pollinators have suffered from the fragmentation of habitats and the extensive use of pesticides."[160] It is time for our policymakers to recognize the significance of biodiversity and the interconnection of wildlife and biodiversity with our agricultural food system. These species are important not only for ecosystem stability, but they are also instrumental in providing a secure and diverse food supply. Thus, our national agricultural policies must shift from protecting megafarms and their margins of profit to protecting species, biodiversity, and a well-maintained ecosystem that benefits humans, plants, and animals alike.

D. The Effects of Commodity Agriculture on Our Nation's Air Quality

The hybridized crops used in American farming since the Green Revolution are heavily dependent on large amounts of fossil fuels.[161] Although gasoline and diesel tractors pre-dated the Green Revolution, they were not common until the Green Revolution spurred large grain-based monocultures in need of efficient tractors.[162] Since that time, industrial agriculture's heavy dependence on fossil fuels has reached the point where about 8% of the world's current oil output is used for agriculture.[163] Unlike more sustainable agricultural methods, fossil fuel-dependent farming produces large amounts of air pollutants. In addition to the greenhouse gas (GHG) emissions discussed in conjunction with climate change below, agriculture is responsible for almost all NO_x emissions in the United States.[164] The amount of air pollutants emitted by machine-intensive industrial commodity crop farming is compounded by the vast array of Clean Air Act exemptions for farms and CAFOs that allow farms to escape any enforceable emissions limits under the Act.[165] Poor air quality from agriculture is further exacerbated by the sheer number of miles traveled by fossil fuel-powered trucks, airplanes, and boats that are used to deliver agricultural goods and food items to local supermarkets.[166] Since the Farm Bill encourages regionalized

153. *See* Edwards, *supra* note 106, at 38-39.
154. *Id.* at 38.
155. *See* T. Luke George & David S. Dobkin, *Introduction: Habitat Fragmentation and Western Birds*, Stud. Avian Biology, No. 25,:at 4 (2002).
156. Imhoff, *supra* note 5, at 132; J. Kim Kaplan, *Colony Collapse Disorder: A Complex Buzz*, Agric. Res., May/June 2008, at 8, 8, *available at* http://www.ars.usda.gov/is/AR/archive/may08/colony0508.pdf (explaining that honeybees alone "add[ ] more than $15 billion in value to about 130 crops [including] high-value specialty crops like berries, nuts, fruits, and vegetables").
157. Imhoff, *supra* note 5, at 132.
158. *Id.*; Kaplan, *supra* note 156, at 8 (Research shows that, on average, "beekeepers [in 2007] lost about 35 percent of their hives compared to 31 percent in 2006."); U.S. EPA, Pesticide Issues in the Works: Honey Bee Colony Collapse Disorder, http://www.epa.gov/pesticides/about/intheworks/honeybee.htm (last updated Jan. 29, 2009).
159. U.S. EPA, *supra* note 158.
160. Imhoff, *supra* note 5, at 132.
161. Rosset, *supra* note 66.
162. Iowa State University Center for Agricultural History and Rural Studies, Tractors, Combines, and Science: Technological Innovation in Twentieth Century Agriculture, http://www.history.iastate.edu/agprimer/Page27.html (last visited Apr. 15, 2009).
163. *See, e.g.,* Kimball Cariou, *What Will We Eat When the Soil Is Gone?,* People's Wkly. World Newspaper, May 19, 2008, *available at* http://www.pww.org/article/articleview/13074/1/266/.
164. Imhoff, *supra* note 5, at 103. *See also* Johannes Kotschi & Karl Müller-Sämann, Int'l Fed'n of Organic Agric. Movements, The Role of Organic Agriculture in Mitigating Climate Change: A Scoping Study (2004).
165. *See* Nicolai V. Kurminoff, *Public Policy Solutions to Environmental Externalities From Agriculture*, *in* The 2007 Farm Bill and Beyond 115, 119 tbl.1 (Bruce L. Gardner & Daniel A. Sumner eds., 2007), *available at* http://www.aei.org/docLib/20070516_Summary.pdf.
166. Imhoff, *supra* note 5, at 17.

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agricultural monocultures[167] to the exclusion of more sustainable local polycultures,[168] the average food item now travels "approximately 1,500 miles from farm to table."[169] Until the public recognizes the true air quality costs of regionalized monocultures and large-scale transportation of farm goods, Congress will likely continue to write the Farm Bill to favor this unbalanced agricultural system that pollutes our air and leads to serious public health concerns.

E. How Climate Change Will Further Strain These Already Degraded Natural Resources

Anthropogenic climate change is causing and will continue to cause severe climatic disturbances around the globe.[170] To date, many of the anticipated effects of climate change have occurred at alarming rates that are much more rapid than first predicted by climate scientists.[171] Since climate change is in large part caused by the burning of fossil fuels that emit GHGs such as CO_2, methane, and ozone,[172] it is imperative that the United States quickly shift our nation from fossil fuels to more sustainable and renewable energy sources.[173]

Few of our federal policymakers have perceived the link between agriculture and climate change. Currently, "the Farm Bill has no Climate Change title" to address farming's contribution to climate change or to incentivize sustainable agricultural practices that can mitigate the impacts of climate change.[174] Further, "few, if any, [Farm Bill] programs are currently tailored to changes in rainfall cycles, sea levels, air and water temperatures, and vegetation patterns, which scientific consensus insists will inevitably reshape agriculture and life as we know it."[175] Thus, it is time to modernize the Farm Bill to account for the inevitable impacts of climate change and to lessen those impacts before it is much too late.

To take these important steps to address climate change, our nation's agricultural policy must withstand some restructuring. All of the environmental degradation caused by commodity crop agriculture discussed above—declining water quantity and quality, soil erosion, cultivation of marginal lands, conversion of wetlands and wildlife habitat to cropland, loss of biodiversity, and air pollution—will ultimately be worsened as atmospheric CO_2 increases and climate change unleashes more drastic climatic extremes.

First, industrial megafarm cultivation of commodity crops is very fossil fuel-dependent, which has led some observers to quip that Americans are literally "eating oil."[176] A snapshot view of industrial agriculture at a few critical points in the farming process easily supports that view: (1) nitrogen fertilizers, "the backbone of high-yield industrial agriculture,"[177] are synthesized from natural gas and consume approximately 30% of the energy used in U.S. agriculture; (2) gasoline- or diesel-powered tractors till the land and spread seeds; (3) electricity is used constantly to power irrigation pumps and laser-guided farm equipment; (4) gasoline- or diesel-powered combines collect the crops during harvest; (5) the crops are driven, usually by diesel-powered trucks, to a feedlot or processing plant across the country; (6) the processing plant uses high volumes of electricity to turn the crops into a television dinner or snack food; and (7) diesel-powered trucks drive the food items to their final destinations.[178] Due to this heavy dependence on fossil fuels, industrial agriculture now accounts for 20% of U.S. fossil fuel consumption to "grow, process, and distribute food."[179] Excluding the fossil fuels used in transportation, it takes an average of "10 calories of petroleum to yield just one calorie of industrial food."[180] A mere bushel of corn, the most prized commodity crop under the Farm Bill, requires about two-thirds of a gallon of gasoline to produce.[181] The true climate costs of this fossil fuel-dependent agriculture system are high: agriculture now accounts for 15% of worldwide GHG emissions, while specifically accounting for almost 25% of CO_2 emissions and approximately two-thirds of methane emissions.[182]

This fossil fuel dependence is true not only for megafarm commodity crop production, but also for CAFO livestock production that relies on commodity crops such as corn.[183] In addition to the fossil fuels used to cultivate and transport the necessary corn feedstock, animals in CAFOs are responsible for large methane emissions because of the volume of waste produced.[184] Although CO_2 is more publicized in the media, methane is 20 times more effective at trapping heat in the atmosphere than CO_2 and is thus very dangerous in

167. For example, Farm Bill subsidies force farmers on soil that can support corn and other commodity crops to farm these crops while marginalizing fruits and vegetables to a few coastal areas. This has resulted in vast corn and wheat production in the Midwest, cotton production in the South, fruit production in Florida, and vegetable production in California. This regionalized system creates a need for massive transportation to make sure that each corner of the nation has plentiful amounts of fruits, vegetables, and other crops instead of relying on local polycultures teeming with nutrition and crop diversity.
168. *See generally, e.g.,* Thomas A. Lyson, Civic Agriculture: Reconnecting Farm, Food, and Community (2004) (providing examples of farmers in the northeastern United States that have viably maintained robust polycultures by creating and utilizing local markets, which require much less transportation for distribution of goods).
169. Imhoff, *supra* note 5, at 17.
170. *See, e.g.,* IPCC, *supra* note 137.
171. *See, e.g., Massive Ice Shelf on Verge of Breakup*, CNN, Mar. 26, 2008, http://www.cnn.com/2008/TECH/03/25/antarctic.ice/index.html?iref=newssearch.
172. *See, e.g.,* IPCC, *supra* note 137.
173. In a March 2008, speech before the Washington International Renewable Energy Conference, former climate change opponent President George W. Bush acknowledged the genuine threat posed by climate change and the immediate need to transition the nation from fossil fuels to more renewable sources of energy to mitigate the threat posed to the United States by climate change. Martin LaMonica, *Bush Commits to Renewable Energy for Climate Change, Energy Security*, CNet News, Mar. 5, 2008, http://www.news.com/8301-11128_3-9886334-54.html.
174. Imhoff, *supra* note 5, at 116.
175. *Id.*
176. *Id.* at 102.
177. *Id.* at 103.
178. *Id.* at 102-03.
179. *Id.* at 102.
180. *Id.*
181. *Id.* at 103.
182. *Id.*; Kotschi & Müller-Sämann, *supra* note 164.
183. *E.g.*, The Humane Soc'y of the U.S., An HSUS Report: The Impact of Animal Agriculture on Global Warming and Climate Change (2008), *available at* http://www.hsus.org/web-files/PDF/farm/animal-agriculture-and-climate.pdf.
184. U.S. EPA, Methane: Sources and Emissions, http://www.epa.gov/methane/sources.html (last updated Oct. 19, 2006).

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the long term.[185] Therefore, this industrial farming chain that is addicted to fossil fuels is not sustainable in light of climate change and rising oil prices. As such, Congress must act to address our oil dependency in the agricultural sector by incentivizing better farming practices—such as reduced tillage, perennial pastures, and increased soil cover—that will be discussed below, as strategies to address environmental degradation generally and the effects of climate change specifically.[186]

Second, the United States must face the facts regarding ethanol production before it is too late. Although the United States should seek cleaner and more renewable forms of energy than fossil fuels, corn-based ethanol is a poor source on which to base our fuel supply. For example, ethanol only delivers two-thirds of the energy content of gasoline and thus only two-thirds of the traveling power.[187] Further, ethanol production results in a 30% energy loss because of the amount of fossil fuels needed to plant, irrigate, plow, and transport the corn-based ethanol from the Midwest to its final destination.[188] It is simply more sensible to burn the fossil fuels than to use those same fossil fuels, and more of them, to produce ethanol.[189] Thus, although ethanol sounds like a great solution for a cleaner fuel, the actual production of ethanol entirely negates any reduction in fossil fuel consumption that might have been realized by ethanol use in the United States.[190] Several new studies are confirming that all forms of biofuel, not just ethanol, are having the unintended effect of "dramatically accelerating global warming, imperiling the planet in the name of saving it."[191]

Despite these concerns, the 2002 Farm Bill included an energy title for the first time in the bill's history which unsurprisingly did three things: (1) provided large subsidies for megafarm corn producers willing to cultivate the raw materials for our nation's biofuel; (2) granted tax incentives to large corn ethanol farmers; and (3) imposed tariffs to protect American ethanol farmers from foreign competition from cheaper sugarcane biofuel producers.[192] In 2005, only three years after the passage of the 2002 Farm Bill, 14% of the American corn crop was already being used for ethanol production; this percentage of the domestic corn crop in ethanol production is expected to nearly double by 2012.[193] As more farmers convert domestic cropland into ethanol production to maximize their Farm Bill subsidies, the environment stands to take an increasingly dramatic blow as more marginal lands are farmed with less ecologically sensitive farming practices.[194] While environmental degradation may be the most serious long-term effect of ethanol production, the most salient short-term impact of such production is that "biofuels are jacking up world food prices and endangering the hungry."[195] This ethanol boom has created a "global emergency [where s]oaring corn prices have sparked tortilla riots in Mexico City, and skyrocketing flour prices have destabilized Pakistan."[196] Experts at the United Nations contend that biofuel production is a "silent tsunami" that is "threatening to plunge more than 100 million people on every continent into hunger."[197] Therefore, it is critical that Congress immediately deemphasize ethanol production and instead adopt new agricultural policies that promote nutritional food production and environmental protection while addressing renewable energy in more sensible sectors of society outside of agriculture. Once these types of sustainable policies are implemented, our nation's food supply will be much more secure, our nation's environment and natural resources will likely demonstrate very positive trends, and our domestic agriculture will no longer be one of the largest contributors to global climate change. If our nation can bring this societal transformation to fruition, agriculture will embark upon a new era that can truly be labeled as a "green" revolution built on sustainability.

III. Toward a More Just Agricultural Policy: Subsidizing Sustainable Agriculture

> We have to produce food differently. The ADM/Cargill model of industrial agribusiness is heading toward its Waterloo. As oil and gas deplete, we will be left with sterile soils and farming organized at an unworkable scale. Many lives will depend on our ability to fix this. Farming will soon return much closer to the center of American economic life. It will necessarily have to be done more locally, at a smaller and finer scale, and will require more human labor.[198]

185. U.S. EPA, Methane, http://www.epa.gov/methane/ (last updated Apr. 27, 2007).
186. Imhoff, *supra* note 5, at 116 (Better farming practices like small-scale organic farming, as documented in studies conducted in various nations, show that these "farming systems consume 30 to 70% less energy per unit of land than conventional farming systems."); Kotschi & Müller-Sämann, *supra* note 164.
187. Imhoff, *supra* note 5, at 103 & n.112 (the lower heating value of ethanol is 75,700 British thermal units (BTU) per gallon while the lower heating value of gasoline is 115,500 BTU per gallon). *The Ethanol Myth: Consumer Reports' E85 Tests Show That You'll Get Clean Emissions but Poorer Fuel Economy . . . If You Can Find It,* Consumer Rep., Oct. 2006, *available at* http://www.consumerreports.org/cro/cars/new-cars/news/2006/ethanol-10-06/overview/1006_ethanol_ov1_1.htm.
188. Imhoff, *supra* note 5, at 103.
189. *Id.*
190. *Id.*
191. Michael Grunwald, *The Clean Energy Scam*, Time, Mar. 27, 2008, *available at* http://www.time.com/time/magazine/article/0,9171,1725975,00.html.
192. Task Force, *supra* note 125, at 66.
193. *Id.* at 66-67.
194. Michael Grunwald concisely summarizes the problem:
> [U]sing land to grow fuel leads to the destruction of forests, wetlands and grasslands that store enormous amounts of carbon . . . Deforestation accounts for 20% of all current carbon emissions. So unless the world can eliminate emissions from all other sources—cars, power plants, factories, even flatulent cows—it needs to reduce deforestation or risk an environmental catastrophe. That means limiting the expansion of agriculture, a daunting task as the world's population keeps expanding. And saving forests is probably an impossibility so long as vast expanses of cropland are used to grow modest amounts of fuel. The biofuels boom, in short, is one that could haunt the planet for generations—and it's only getting started.

Grunwald, *supra* note 191.
195. *Id.*
196. *Id.*
197. Press Release, United Nations World Food Programme (WFP), WFP Says High Food Prices a Silent Tsunami, Affecting Every Continent (Apr. 22, 2008), *available at* http://www.wfp.org/english/?ModuleID=137&Key=2820.
198. James H. Kunstler, *Ten Ways to Prepare for a Post-Oil Society*, The Canadian, Jan. 12, 2008, *available at* http://www.agoracosmopolitan.com/home/Frontpage/2008/01/12/02127.html.

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Despite what many scientists and farmers think to be the best available farming practices for environmental protection, our nation's agricultural policies under the Farm Bill have strayed quite far from these practices to placate the agribusiness and food processing industries. As discussed above, this system is ravaging every facet of our natural environment.

Fortunately, there are diverse policy solutions available to revise this system and remedy past wrongs. The remainder of this Article will emphasize one promising policy solution that can mitigate and potentially solve the major problems of industrial commodity crop agriculture in the United States: subsidizing sustainable agriculture to normalize the market. Although a truly free market without subsidies would be ideal,[199] such as the system currently operating in New Zealand,[200] the vast subsidy infrastructure currently embedded in the Farm Bill would be difficult to pull out from under the feet of farmers that depend on those subsidies to survive. As seen in previous sections, more than 70 years of Farm Bill policy have led to vast changes in the American agricultural system by forcing capital allocation and aggregation in large farms and a few select crops. Therefore, instead of immediately eliminating the Farm Bill subsidies on which many farms now rely for survival, Congress should shift a fair portion of these subsidies to farmers implementing sustainable agricultural methods. Farm Bill conservation programs have had a major flaw of only targeting large commodity crop growers. A more workable policy solution, however, would be to offer these subsidy incentives to *all* farmers based on their farming practices, regardless of what crops they cultivate. This would create a much more just system than the current subsidy framework that excludes 60% of American farmers from any subsidies whatsoever.[201]

Coincidentally, farmers that never see Farm Bill subsidies are typically the same farmers that grow our nation's healthy fruits and vegetables. California provides a vivid example of the current failures of the Farm Bill's subsidy program. "With 2,000 miles of waterways, nearly 30,000 farms, and over $30 billion in annual on-farm revenues," California is the leading state in terms of annual agricultural sales.[202] Despite topping the nation's agricultural sales, more than 90% of California's farmers receive no agricultural subsidies.[203] Of the few farmers that do receive Farm Bill subsidies, most are cotton and rice farmers.[204] How important are these neglected Californian farmers to the American marketplace? Californian farmers are invaluable to our nation's agricultural system because the state "contributes more than 12.5% of the total U.S. agricultural market value and nearly half of all fruits, nuts, and vegetables."[205] By ignoring these farmers and precluding them from receiving Farm Bill subsidies, Congress is prioritizing monocultures of corn, cotton, rice, soybeans, and wheat at the expense of sound agricultural, nutritional, and environmental practices.[206]

Sustainable agriculture, however, can change these policies for the better. First, a definition for "sustainable agriculture" is appropriate since the term can be somewhat amorphous in a vacuum. According to leading sustainable agriculture scholar Dr. James Horne, sustainable agriculture "encompasses a variety of philosophies and farm techniques [that] are low chemical, resource and energy conserving, and resource efficient."[207] Although it did little to encourage such agriculture, the 1990 Farm Bill defined sustainable agriculture as:

> an integrated system of plant and animal production practices having a site-specific application that will, over the long term, satisfy human food and fiber needs; enhance environmental quality and the natural resource base upon which the agricultural economy depends; make the most efficient use of nonrenewable resources and on-farm/ranch resources; integrate, where appropriate, natural biological cycles and controls; sustain the economic viability of farm/ranch operations; and enhance the quality of life for farmers/ranchers and society as a whole.[208]

As most agricultural experts note, it is important to understand that "[s]ustainable agriculture does not mandate a specific set of farming practices."[209] Rather, sustainable practices vary from place to place depending on the ecosystem, precipitation, and other factors, but "[t]here are myriad approaches to farming that may be sustainable."[210] The more important overarching goal of sustainable agriculture is the "stewardship of both natural and human resources . . . includ[ing] concern over the living and working conditions of farm laborers, consumer health and safety, and the needs of rural communities."[211]

Despite the promise of sustainable agriculture to solve the numerous problems discussed above, the Farm Bill has been surprisingly silent as to how to encourage such practices. This is likely due to pleas from certain campaign contributors that are also the largest beneficiaries of Farm Bill subsidies: agribusiness and food processors. As early as 1994, the President's Council on Sustainable Development chartered a Sustainable

199. *See, e.g.,* Eliot Coleman, Four Season Farm, Beyond Organic, http://www.fourseasonfarm.com/main/authentic/beyond.html (last visited Apr. 16, 2009). Many scholars such as Eliot Coleman believe that any nationalized system of agriculture—conventional or organic—is inefficient. Thus, these critics advocate for a localized agricultural system with no national standards, subsidies, or framework for regulating agriculture. While I agree that this might be the ultimate goal, I think that intermediate steps such as the proposed sustainable agriculture subsidies must occur first in order to shift the system away from the current unjust framework of Farm Bill subsidies solely for large commodity crop producers. *Id.*

200. Imhoff, *supra* note 5, at 80-83. New Zealand is one of the few nations that has eliminated agricultural subsidies altogether. In 1984, New Zealand eliminated all subsidies for farming and the results have been very positive. In fact, New Zealand has seen "an energizing transformation of the food and farming sectors [and p]rofitability, innovation, and agricultural diversity have returned to farming." Both farm output and farm income are on the rise in New Zealand. *Id.*

201. *Id.* at 59.

202. *Id.*

203. *Id.*

204. *Id.*

205. *Id.*

206. *Id.*

207. James E. Horne & Maura McDermott, The Next Green Revolution: Essential Steps to a Healthy, Sustainable Agriculture 55 (2001).

208. The President's Council on Sustainable Dev., *supra* note 102, at 3.

209. Horne & McDermott, *supra* note 207, at 59.

210. *Id.*

211. *Id.*

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Agricultural Task Force composed of agricultural experts to present strategies that could alleviate the problems identified in this Article.[212] In the mid-1990s, the Task Force made key policy recommendations that were intended to serve as critical updates to the Farm Bill.[213] Ignored for more than a decade, it is now time for Congress to listen to those experts and other proponents of sustainable agriculture in order to address the most serious environmental problems triggered by the Farm Bill.

A. Sustainable Agriculture Already Exists on a Small Scale

Of the nearly $20 billion in annual Farm Bill subsidies, 84% currently go to the five primary commodity crops of corn, cotton, rice, soybeans, and wheat.[214] Shifting a large portion of these subsidies to farmers who implement sustainable farming practices would greatly impact the market by bringing supermarket prices of sustainably farmed goods down while nudging supermarket prices of foods based on industrially farmed corn and soybean up to more reasonable levels, i.e., prices that more closely reflect the market prices that would appear in the absence of heavy Farm Bill subsidies. A critical step would involve tapping into the knowledge of scientists, USDA agricultural experts, and nonprofit advocates in order to set specific and concrete standards of what constitutes a sustainable agricultural practice for purposes of receiving subsidies.[215] Although this step would likely be controversial, it is clear that such subsidies are needed to better protect the natural environment.[216]

Great examples of agricultural methods that could potentially fall under sustainable agriculture for subsidy purposes are no-till farming, cover cropping, crop rotation, residue mulching, elimination of most or all agrochemical fertilizers, significant water usage reduction, nitrogen fixing through on-farm manure use, measurable energy reduction per acre farmed, non-use of pesticides and herbicides that break down slowly in the environment, greater use of integrated pest management, contour farming, and local market sales to reduce transportation, among others.[217] Each of these farming practices promotes sustainability by eliminating harmful inputs into the soil, reducing pollution into our ecosystems, or preventing some harmful result that would otherwise be achieved in the absence of such a practice. Not only would these practices create a healthier environment in which we all live because of the reduction in environmental pollution, but these farming practices would also have the simultaneous effect of producing a healthier food product for the consumer.[218]

Many readers are probably thinking that sustainable agriculture sounds very similar to organic agriculture. Organic produce is typically cultivated using sustainable agricultural methods and is then certified by a qualified entity such as the USDA.[219] There is a very important and distinct difference, however, between sustainable agriculture and organic agriculture: sustainable agricultural practices *always* have the goal of preserving the environment because sustainability is the foundation.[220] Since what constitutes "organic produce" is merely a construction of a certifying entity such as the USDA, it is important to remember that the standards imposed by these entities are always subject to change and may not reflect sound agricultural, environmental, or health-based decisionmaking because of the influence of agribusiness or other interested parties.[221] Since the beginning of our National Organic Program, "The [S]ecretary of [A]griculture went out of his way to say that organic food is no better than [industrial-farmed] conventional food."[222] To appease agribusiness interests that rely on Farm Bill-supported industri-

212. The President's Council on Sustainable Dev., *supra* note 102.

213. To begin working toward achievement of agricultural sustainability in the United States, the Task Force reached consensus on nine key policy recommendations: (1) integrate pollution prevention and natural resource conservation into agricultural production; (2) increase the flexibility for participants in commodity programs to respond to market signals and adopt environmentally sound production practices and systems, thereby increasing profitability and enhancing environmental quality; (3) expand agricultural markets; (4) revise the pricing of public natural resources; (5) keep prime farmlands in agricultural production; (6) invest in rural communities' infrastructure; (7) continue improvements in food safety and quality; (8) promote the research needed to support a sustainable U.S. agriculture; and (9) pursue international harmonization of intellectual property rights. *Id.* at 3-8.

214. Imhoff, *supra* note 5, at 59.

215. This is a very important step that would have to be developed thoroughly prior to implementation. In addition to setting concrete standards for sustainable agricultural practices, experts and regulators would also have to create a defined spectrum on which the environmental and public health benefits of a farmer's sustainable practices can be measured in order to receive one's fair share of subsidies. For example, a large corn farm in Iowa might allege that it uses a single practice deemed "sustainable" by the regulatory scheme such as crop rotation, which benefits both the soil and local water sources as runoff is reduced. Although this farm would likely receive subsidies for undertaking this practice because it is "sustainable" and benefits the environment, the farm would likely receive considerably less in subsidies than a similarly-situated large corn farm that instead decides to diversify its crops, reduce pesticide use, utilize integrated pest management, *and* begin selling to local markets to reduce transportation and fossil fuel use. Despite the fact that both are benefiting the environment and public health, the second farm clearly has undertaken sustainable practices that are not only greater in number, but more importantly, greater in positive impact to the natural environment and public health. Due to this difference in magnitude, the second farm would be rewarded with greater subsidies for its efforts.

216. *See, e.g.,* Michael Pollan, *The Food Issue: An Open Letter to the Next Farmer in Chief*, N.Y. Times, Oct. 9, 2008, *available at* http://www.nytimes.com/2008/10/12/magazine/12policy-t.html. In fact, the 2008 Farm Bill might have taken the first step toward such a sustainable subsidy system with the creation of the Conservation Stewardship Program, which rewards farmers for making wise agricultural decisions that provide off-farm benefits. Despite the program's promise, however, commentators note that legislators "need to move this approach from the periphery of our farm policy to the very center." *Id.* Until such a system becomes the foundation of the Farm Bill, our nation will not maximize its agricultural potential to "grow crops and graze animals in systems that will support biodiversity, soil health, clean water and carbon sequestration." *Id.*

217. *See* Pimentel et al., *supra* note 138. *See generally* Horne & McDermott, *supra* note 207.

218. *See, e.g.,* Alyson E. Mitchell et al., *Ten-Year Comparison of the Influence of Organic and Conventional Crop Management Practices on the Content of Flavonoids in Tomatoes*, 55 J. Agric. & Food Chemistry 6154 (2007), *available at* http://pubs.acs.org/cgi-bin/sample.cgi/jafcau/2007/55/i15/pdf/jf070344+.pdf?isMac=706237 (concluding that sustainable organic farming practices with tomatoes resulted in much higher levels of healthy flavonoids as compared to nitrogen-fertilized, conventionally produced tomatoes).

219. USDA, Agricultural Marketing Service, National Organic Program, http://www.ams.usda.gov/AMSv1.0/ams.fetchTemplateData.do?template=TemplateA&navID=NationalOrganicProgram&leftNav=NationalOrganicProgram&page=NOPNationalOrganicProgramHome&acct=nop (last updated Mar. 20, 2009).

220. Horne & McDermott, *supra* note 207.

221. *See* Pollan, *supra* note 42, at 178-79.

222. *Id.* at 178.

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alized farming, the USDA Secretary made clear his opinion that "[t]he organic label is a marketing tool [and] is not a statement about food safety . . . nutrition or quality.[223]

Based on the mounting evidence gathered from recent studies, however, sustainably farmed organic produce appears to outpace its industrially farmed conventional counterparts in terms of health benefits.[224] In fact, many consumers have become aware of both the health benefits and the environmental benefits of buying organic: in 2007, nearly $25 billion in U.S. sales were attributed to organics.[225] Despite this accomplishment, less than 3% of current agricultural sales are for organic products,[226] due to the price distortion caused by Farm Bill subsidies that prioritize nonorganic commodity crops and make them appear cheaper at the market than their organic counterparts. The USDA and agribusiness have attempted for years to use subsidies as a way to keep commodity crops cheap as compared to organic alternatives,[227] but a new trend seems to be starting that might be just as disturbing—large agribusiness companies such as Monsanto, Wal-Mart, and Cargill are recognizing the gaining success of organic agriculture and are joining the market.[228] Although this is positive in theory because it should lead to larger overall production of nutritious organic foods farmed with sustainable methods, it also provides an avenue for agribusiness to commandeer organic standards in the same way that it has the Farm Bill.[229] It is not far-fetched to think that some of these larger companies will manipulate the USDA's organic standards in a bait-and-switch format that would result in "organic" produce that closely mirrors current conventional produce from industrial farming. In fact, many scholars claim that this has already occurred in the 12 years since the emergence of national organic standards.[230] Therefore, the public must stay vigilant in protecting the integrity of organic standards as part of a new push to subsidize sustainable agriculture and the benefits of such agriculture.

B. Expected Success of Scaling Up Sustainable Agriculture With Farm Bill Subsidies

By moving away from corn and commodity crop subsidies in favor of paying farmers for employing some of the sustainable agricultural methods enumerated above, Congress will foster a much more effective piece of legislation that is more aligned with the original goals of the Farm Bill. As seen with our nation's massive corn production tied solely to subsidies, farmers will farm wherever the money is. If sustainable agriculture is what results in subsidies, sustainable agriculture will likely be what farmers undertake on their farms in order to survive. Further, all available data indicates that many farmers genuinely want to grow healthier foods, maintain their communities, and conserve their natural ecosystems, but they have been pressured to farm corn and other commodity crops because that is where past profits could be garnered.[231] Although most farmers in the United States do not want Farm Bill subsidies eliminated or phased out,[232] farmers "show[ ] strong support for programs focused on conservation" and seem very concerned about the status of the natural environment.[233] This is not surprising considering the interdependent relationship between healthy farms and a healthy environment: long-term farm health requires a highly functioning local ecosystem that can sufficiently supply all of a farm's needs. To prevent degradation of this important ecosystem, which suffers from "the tragedy of the commons"[234] under the current Farm Bill subsidy regime, the proposed sustainable agriculture subsidy system will pay farmers to protect this common pool resource.

A related issue is whether farmers are willing to transition from solely growing corn or other commodity crops to planting a diversity of healthier crops under a sustainable

223. *Id.* at 179.
224. *Id.*; Mitchell et al., *supra* note 218; *Study Hails Organic Food Benefits*, BBC, Oct. 29, 2007, http://news.bbc.co.uk/2/hi/uk_news/england/tyne/7067226.stm (one of the largest studies of sustainably farmed organic agriculture ever conducted has found up to 40% more of healthful antioxidants in organic fruit and vegetables as compared to non-organic competitors farmed alongside their organic counterparts).
225. Press Release, Organic Trade Association, U.S. Organic Sales Show Substantial Growth (May 6, 2007), *available at* http://www.organicnewsroom.com/2007/05/us_organic_sales_show_substant_1.html (last visited Apr. 16, 2009).
226. *Id.*
227. Pollan, *supra* note 42, at 178-79.
228. *See id.* at 145-84. *See generally* Samuel Fromartz, Organic Inc.: Natural Foods and How They Grew (2007) (discussing the multibillion-dollar organic food business where more than one-half of all organic sales now come from only the largest 2% of organic farms owned by Kraft, General Mills, Monsanto, and other corporations).
229. *See* Pollan, *supra* note 42, at 145-84.
230. See, for example, Coleman, *supra* note 199, who states:

> Now that the food-buying public has become enthusiastic about organically grown foods, the food industry wants to take over. Toward that end the USDA-controlled national definition of "organic" is tailored to meet the marketing needs of organizations that have no connection to the agricultural integrity "organic" once represented. We now need to ask whether we want to be content with an "organic" food option that places the marketing concerns of corporate America ahead of nutrition, flavor and social benefits to consumers.

See generally Fromartz, *supra* note 228 (highlighting the controversies surrounding organic certification that have been caused in large part due to the emergence of big corporations in the organic market and the stark contrasts between these corporations and the small growers that initially sparked the organic movement); Joel Salatin, Holy Cows and Hog Heaven: The Food Buyer's Guide to Farm Friendly Food (2005) (encouraging consumers to purchase foods from local buyers as opposed to purchasing organic foods from large corporations).
231. Nat'l Pub. Pol'y Educ. Comm., The 2007 Farm Bill: U.S. Producer Preferences for Agricultural, Food, and Public Policy v-viii (2006), *available at* http://www.ag.uidaho.edu/AERS/PDF/2007_farm_bill_us_producer_preferences.pdf (illustrating that many farmers support the current commodity subsidy program despite the fact that such a program undermines other values highly supported by the same farmers such as environmental protection, financial payments for small farms, compliance with WTO rules, and better food safety). *See also* Timothy A. Wise, *Identifying the Real Winners From U.S. Agricultural Policies* 9 (Global Dev. & Env't Inst., Working Paper No. 05-07, 2005), *available at* http://ase.tufts.edu/gdae/Pubs/wp/05-07RealWinnersUS-Ag.pdf (concluding that, despite revenues garnered through subsidized corn and soybean production in the past, "diversified family farms [would be much] more competitive relative to [food processors and] industrial livestock operations" if agricultural subsidies were altered so that the price of crops "more accurately reflected costs [paid by the farmer]").
232. Nat'l Pub. Pol'y Educ. Comm., *supra* note 231, at vi.
233. *Id.* at vi-vii.
234. *See* Garrett Hardin, *The Tragedy of the Commons*, 162 Science 1243 (1968) (explaining that a "tragedy of the commons" occurs when a common resource, *e.g.,* an ecosystem, air, or water, is degraded by individual users of that resource, *e.g.,* farmers, as each user maximizes his personal benefit while sharing the burden of his resource use, *e.g.,* pollution, among all of users of the commons).

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agriculture subsidy program. It seems that farmers would be willing to do so both financially and for the viability of their farms and families. Financially speaking, every consumer dollar spent on a corn-based product in the supermarket results in only four cents reaching the farmer that produced that corn because of the large number of middlemen such as Cargill, ADM, Coca-Cola, and PepsiCo.[235] This is starkly different for whole foods such as green vegetables, fruits, and eggs, where the respective farmer receives 40 cents for every supermarket dollar spent.[236] Thus, it makes financial sense for farmers to indulge in the cultivation of healthier produce and whole foods once sustainable agriculture subsidies are put into place because these farmers will receive a significantly higher percentage of supermarket sales and because of the offsetting economic effect of being able to feed one's family with the farm's nutritious and diverse crops.

As far as the environment is concerned, sustainable agriculture will greatly help to repair local ecosystems, boost farmers' yields as the ecosystem improves, and mitigate the degradation caused by decades of mechanized agriculture under the Farm Bill. As farmers well know, sustainable agriculture includes polycultures and crop rotations that are essential to protect soils from erosion and streambeds from sedimentation.[237] Farmers have long recognized the need for better farming practices to enhance environmental protection.[238] When the USDA has given farmers flexibility to diversify their crops into polycultures and yet retain their full commodity subsidies, many farmers have taken advantage of this flexibility and planted non-commodity crops on nearly one-half of the land available for diversification.[239] Additionally, sustainable agricultural systems do not rely heavily on harmful chemical inputs of fertilizers or toxic pesticides that pose serious threats to both humans and wildlife.[240] Further, studies indicate that sustainable farming systems "use 30% to 70% less energy per unit of land than conventional systems, a critical factor in terms of climate change and eventual fossil fuel shortages."[241] Since subsidizing sustainable agriculture will result in more polyculture and thus more robust and diverse local food supplies, less transportation will be needed and will result in "reduced energy consumption, less processing and packaging, and higher nutritional values" which are lost during storage and transportation.[242]

Finally, rural farming communities will be able to sustain some semblance of their past strength, which author and agriculturist Wendell Berry argued could only be regained with a "revolt of local small producers and local consumers against the global industrialism of the corporation."[243] Thus, the time is now for a revolution—a truly "green" revolution against our nation's unjust agricultural policies that can only end when the Farm Bill once again protects our nation's farmers, the natural environment, and ultimately, the American public.

IV. Conclusion

The Farm Bill originated as a temporary fix to protect small farmers during the farm crisis of the early 1930s. Although it met its primary goal of bringing the nation back to stability, the tide gradually turned as profit-seeking corporations co-opted the Farm Bill and excluded the small farmer that the bill initially sought to protect. For nearly the past half-century, agricultural subsidies for a select few commodity crops have wreaked havoc on every facet of our nation's natural environment as industrial farming has taken hold.

The scars and bruises left on our nation's environment in the wake of poor farming policies will take years to heal. Although there is no "silver bullet" that can immediately reverse these vast problems, incentivizing sustainable agriculture shows much promise because it has the potential to touch so many sectors of society, and because it has the ability to nurture our nation's environment, health, and communities in the best interest of the public. Thus, the public must pressure Congress to reform the Farm Bill and act on behalf of their constituents rather than agribusiness. In the words of Rachel Carson:

> We urgently need an end to these false assurances, to the sugar-coating of unpalatable facts. It is the public that is being asked to assume the risks . . . The public must decide whether it wishes to continue on the present road, and it can do so only when in full possession of the facts.[244]

Now that this Article has exposed all of the "unpalatable facts," the public must decide whether it wishes to continue on the present road. The present road is more of the same: Farm Bill subsidies for corn and other commodity crops, immense environmental destruction, and an ever-worsening public health crisis. In contrast, the road less traveled is an alternative system built on sustainable agriculture, environmental stewardship, improved health and quality of life, and protection of farm communities. The second road will likely require more effort and public support due to anticipated resistance from the powerful few that benefited from the prior system. Despite this obstacle, however, in the immortal words of poet Robert Frost, opting to take the road less traveled would make all the difference.[245]

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235. Pollan, *supra* note 42, at 95.
236. *Id.*
237. *See generally* Pimentel et al., *supra* note 138.
238. *See* The President's Council on Sustainable Dev., *supra* note 102, at 5.
239. For example:

> In 1990, Congress passed legislation that allowed farmers who had signed up for a particular commodity program—for example, the wheat program—to plant some of their land in a crop other than that specified by the program. In response, farmers reduced the number of acres under monoculture and diversified their crops. By 1994, approximately 42 percent of the land on which farmers were allowed to grow whatever they chose was planted in crops other than those specified by the commodity program in which the farmers were enrolled.

Id.
240. Imhoff, *supra* note 5, at 143.
241. *Id.*
242. *Id.*
243. Pollan, *supra* note 42, at 254.
244. Carson, *supra* note 2 at 13.
245. *See* Robert Frost, *The Road Not Taken*, *in* Mountain Interval (1916), *available at* http://www.bartleby.com/119/1.html.