Florida A & M University Law Review

Volume 8
Number 2 *Climate Change and Global Food Security, The Third Annual Environmental Law and Justice Symposium Issue*

Article 11

Spring 2013

Up to Our Ears: Corn Overproduction, Its Environmental Toll, and Using the 2012 U.S. Farm Bill to Limit Corn Subsidies, Increase Environmental Protection Incentives, and Place Accountability on Crop Operations

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UP TO OUR EARS: CORN OVERPRODUCTION, ITS ENVIRONMENTAL TOLL, AND USING THE 2012 U.S. FARM BILL TO LIMIT CORN SUBSIDIES, INCREASE ENVIRONMENTAL PROTECTION INCENTIVES, AND PLACE ACCOUNTABILITY ON CROP OPERATIONS

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INTRODUCTION

When thinking of cornfields, the average consumer may picture tall green stalks as they sway in the wind on a small farm somewhere in Nebraska. The reality, however, is quite different. Today, the majority of corn production in the United States has shifted from family farms to much larger industrial farming operations, usually referred to as agribusinesses, which produce significantly more product than

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smaller family farms.[1] In 2012, approximately ninety-eight percent of America's food supply was produced by agribusinesses that rely heavily on agricultural chemicals and factory style production methods.[2]

These extreme methods are used because the government pays very well for corn through commodity, otherwise known as subsidy, programs. When enrolled in the subsidy programs, farmers can receive direct payments from the government for growing a variety of commodities, with the five most common types (corn, cotton, wheat, rice, and soybeans) accounting for approximately ninety percent of government payments.[3] Direct payments are cash payments given to producers regardless of production volume or commodity price.[4] With such great amounts of money available for corn, the current format of these programs has led to profuse amounts of corn being produced in what is now amounting to an overproduction crisis.

While copious corn production may be great for large agribusinesses, many serious drawbacks exist. As is often the case in other aspects of the economy, the environment bears the brunt of the damage from corn overproduction. The poor management of this crop has resulted in pollution that can have harmful effects both near the production area and also much farther away, where the cumulative impacts of the pollution can be severe.[5]

With such profits to be made by large corporate corn operations, there are inherent difficulties in reforming longstanding subsidies for a historically protected industry such as agriculture. More effectively controlling the pollution resulting from commodity crop production presents difficult policy issues.[6] Agricultural pollution is diffuse in its sources, is associated with a politically powerful sector, and imposes

1. Melanie J. Wender, Goodbye Family Farms and Hello Agribusiness: The Story of How Agricultural Policy Is Destroying the Family Farm and the Environment, 22 VILL. ENVTL. L.J. 141, 141 (2011).

2. Jodi Soyars Windham, Putting Your Money Where Your Mouth Is: Perverse Food Subsidies, Social Responsibility & America's 2007 Farm Bill, 31 ENVIRONS ENVTL. L. & POL'Y J. 1, 3 (2007).

3. JIM MONKE, CONG. RESEARCH SERV., RL 34594, FARM COMMODITY PROGRAMS IN THE 2008 FARM BILL 3 (Sept. 30, 2008).

4. *Id.* at 5.

5. LINDA K. BREGGIN ET AL., SUBSIDIES WITH RESPONSIBILITIES: PLACING STEWARDSHIP AND DISCLOSURE CONDITIONS ON GOVERNMENT PAYMENTS TO LARGE-SCALE COMMODITY CROP OPERATIONS ii (Envtl. Law Inst.,2012).

6. *Id.* at 30.

harms that tend to be invisible to the naked eye and difficult to quantify.[7]

This note examines the most serious concerns from corn overproduction, which involve the pollution from fertilizers and pesticides used by commodity crop operations in the American Midwest, as well as the resulting contamination and depletion of water resources. Part I discusses the corn overproduction crisis and the resulting environmental concerns. Part II reviews the U.S. Farm Bill and its evolution. Part III addresses the current state of the agricultural industry, including genetically engineered food and the debate regarding the use of corn as fuel. Part IV proposes amending the U.S. Farm Bill subsidy program to reduce overproduction, while adding environmental protection incentives and restrictions. In order to combat the negative effects of corn overproduction, the United States must first realize the massive amounts of pollution and water depletion caused by excessive corn cultivation and processing in the Midwest and then amend the U.S. Farm Bill to limit corn subsidies, increase environmental protection incentives, and place accountability on crop operations.

I. THE CORN OVERPRODUCTION CRISIS AND THE RESULTING ENVIRONMENTAL CONCERNS

Corn is not new to the American agricultural landscape. Due to the large number of corn producers in the industry, the individual producer is at a disadvantage in the market place. Individual producers are forced to maximize efficiency by intensifying production just to avoid failure.[8] High initial costs necessary to intensify and increase crop production have led to the formation of large corporate corn producing operations that developed concentration farming; this involves planting many acres with a uniform crop and greater plant density.[9] In addition, corn farmers have enjoyed ever increasing yields since the end of World War II thanks to petroleum-based fertilizers, pesticides, herbicides, and ever-more sophisticated hybridization.[10]

Today some of the most productive farmlands in the nation grow gargantuan quantities of one crop, corn, which is one of the most

7. Jeffrey Ernst Friedman, Agribusiness Contributions to Members of the House and Senate Agriculture Committees, MAPLIGHT (Nov. 14, 2011), http://maplight.org/content/72865.

8. Joseph C. Street, Agriculture and the Pollution Problem, 1970 UTAH L. REV. 395, 395 (1970).

9. *Id.*

10. Jedediah Purdy & James Salzman, Corn Futures: Consumer Politics, Health, and Climate Change, 38 ENVTL. L. REP. NEWS & ANALYSIS 10851, 10851 (2008).

energy-intensive, water-intensive, and pesticide- and-fertilizer-intensive crops.[11] This is largely because corn growers receive billions of dollars in agricultural subsidies from the federal government every year, which in effect creates a market for corn that would otherwise not exist on such a large scale.[12] Estimates suggest corn planting will cover 94 million acres in 2012, up from 91.9 million acres in 2011. As a comparison, Montana, the fourth largest state in the nation, covers roughly 93 million acres.[13] The monetary incentive coupled with the ability to easily generate such large yields has led to the current corn overproduction crisis.

An example of overproduction is evident in the corn-soybean rotations that were typical in the Corn Belt. This methodology encouraged more intensive corn production, with either two years of corn crops between soybean plantings, or continuous corn growth every year.[14] Liberated from the old biological constraints, the farm could now be managed on industrial principles, as a factory that transforms minimal inputs of acreage into incredible outputs of corn.[15] Growing corn, which from a biological perspective had always been a process of capturing sunlight to turn into food, has become an industrial process with grave consequence.[16] The problem with such intensive cultivation practices inherent in corn overproduction is the heavy fertilization and expanded use of agricultural chemicals in pesticides that, in a variety of ways, are significantly contributing to environmental pollution.[17]

A. Damage from Pesticides and Fertilizers

The process of cultivating corn has serious effects on the land on which it is grown. Most significantly, American corn production requires more pesticides and nitrogen fertilizer than any other crop.[18]

11. David Pimentel & Tad W. Patzek, Ethanol Production Using Corn, Switchgrass, and Wood; Biodiesel Production Using Soybean and Sunflower, 14 NAT. RESOURCES RES. 65, 66 (2005).

12. Mary Jane Angelo, Corn, Carbon, and Conservation: Rethinking U.S. Agricultural Policy in a Changing Global Environment, 17 GEO. MASON L. REV. 593, 595 (2010).

13. Jonathan Volinski, Shucking Away the Husk of a Crop Gone Wrong: Why the Federal Government Needs to Replant Its Approach to Corn-Based Ethanol, 25 TUL. ENVTL. L.J. 507, 514 (2012).

14. UNION OF CONCERNED SCIENTISTS, THE ENERGY-WATER COLLISION: CORN ETHANOL'S THREAT TO WATER RESOURCES 5 (2011).

15. Michael Pollan, What's Eating America, SMITHSONIAN MAGAZINE (July 2006), http://www.smithsonianmag.com/people-places/presence-jul06.html?c=y&page=2.

16. *Id.*

17. Street, *supra* note 8, at 395.

18. Volinski, *supra* note 13, at 512.

Scientific studies demonstrate that agricultural intensification using increased chemical fertilizers and pesticides, similar to what large corn operations employ, is directly linked to increased environmental damage.[19] The U.S. Department of Agriculture has analyzed the major contributions to pollution from agriculture-related industries and has identified pesticides and plant nutrients as the top two pollution sources, respectively.[20]

Although pesticides have been used in agriculture for hundreds of years, it was not until the latter half of the twentieth century that the development of synthetic chemical pesticides led to an explosion of global pesticide usage.[21] Currently, more than 1,600 pesticides are on the market.[22] Large single-crop production operations are intrinsically vulnerable to invasion by indigenous plants and animals such as weeds, insects, and rodents, making these pests a major liability to large scale corn operations.[23] Today, highly active specialized chemical pest controls have been developed to provide an immense advantage over other control measures, making them vital to enabling the overproduction of corn in the agricultural industry.[24]

The heavy use of pesticides, which by definition are intended to kill organisms or disrupt natural systems, poses significant risks to birds, aquatic life, and other wildlife.[25] Pesticides harm wildlife and aquatic organisms through direct contact to people and animals that are in farm fields when they are treated with pesticides, as well as from aerial drift[26] and runoff from farm fields into non-farm areas where wildlife species are present.[27] Furthermore, certain pesticides bio-accumulate in the food chain, exposing predatory species to highly concentrated pesticides in their food sources.[28]

These pesticides being released into the environment are particularly harmful to the public as well. Estimates suggest that sixty percent of all herbicides and thirty percent of all insecticides may

19. Angelo, *supra* note 12, at 598.

20. Street, *supra* note 8, at 396.

21. Angelo, *supra* note 12, at 599.

22. Wender, *supra* note 1, at 157.

23. Street, *supra* note 8, at 398.

24. *Id.*

25. Angelo, *supra* note 12, at 599.

26. Aerial drift is the airborne repositioning of pesticides away from the target cites and can result from aerial pesticide application or wind.

27. J.B. Ruhl, Farms, Their Environmental Harms, and Environmental Law, 27 ECOLOGY L.Q. 263, 293 (2000).

28. James M. Armitage & Frank Gobas, A Terrestrial Food-Chain Bioaccumulation Model for POPs, 41 ENVT'L SCI. & TECH. 4019, 4023 (2007).

cause cancer.[29] Furthermore, studies have shown a connection between the use of pesticides and breast cancer, prostate cancer, brain disorders, nervous system disorders, as well as other immune system disorders.[30] The long-term effects of exposure to these chemicals are currently unknown, but medical experts have acknowledged that infants and young children are the most at risk because of their body weight and metabolic characteristics.[31]

The problem with the use of agricultural chemicals in the overproduction of corn is that once they are used in great numbers, a cycle begins that requires the use of higher quantities of chemicals each year.[32] The use of fertilizers on sizeable corn operations destroys the soil's natural fertility process, requiring the farmer to use more and more "fertility in a bag" each year.[33] Each year more and more insects and pests become biologically resistant to these pesticides, meaning they will survive and reproduce to create an entirely new population of insects immune to the pesticide.[34] Since farmers lose more than thirty-seven percent of their crops annually to these pesticide resistant insects, farmers must then use even more of these chemicals to protect their crops.[35] Sadly, most of the pesticides never reach the crops and, instead, run off into water supplies.[36]

Plant nutrients, like those contained in fertilizer used by large corn operations, are the second highest contributor of agricultural pollution according to the U.S. Department of Agriculture.[37] Increased use of fertilizer is the single most important factor in raising plant production on limited acreage.[38] Farmers used seven million tons of fertilizer per year in 1960; however, they were using nearly twenty million tons of fertilizer per year by 1989.[39] Today farmers apply 119 pounds of fertilizer per acre of cropland, which amounts to approximately 157 pounds of fertilizer for every person in the United States.[40]

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29. Wender, *supra* note 1, at 157.
30. EPA, Pesticides: Health and Safety, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY http://www.epa.gov/pesticides/health/human.htm#healtheffects (last visited Nov. 15 2012).
31. Wender, *supra* note 1, at 157.
32. *Id.*
33. Windham, *supra* note 2, at 20.
34. *Id.*
35. Wender, *supra* note 1, at 157.
36. *Id.*
37. Street, *supra* note 8, at 396.
38. *Id.* at 397.
39. Windham, *supra* note 2, at 19.
40. *Id.*

Corn alone receives 40 percent of all the fertilizer in the agricultural industry. More intensive corn production means higher rates of fertilizer application, and with it, higher potential for nitrogen and phosphorus pollution, which seeps into the ground and surface waters.[41]

B. Contamination and Depletion of Water Resources

Half of the pollution in our nation's waters comes from pesticides, fertilizers, and other agricultural chemicals used by agribusinesses that seep into surrounding ecosystems and groundwater.[42] Phosphorus and nitrogen are the two nutrients that are most often associated with agricultural nutrient pollution.[43] Although much higher application rates may soon be needed to maximize some crop yields due to corn overproduction, problems are already occurring from current over-application and consequent excessive nutrient leaching or loss by runoff[44].[45] Runoff from agricultural chemicals is estimated to cause approximately $9 billion dollars of damage to surface waters in the United States every year.[46]

Pollution of groundwater and surface water by nitrates can be easily traced to agriculture and large crop operations, with both the heavy use of fertilizer and uncontrolled animal wastes contributing to this problem.[47] First, rain and irrigation water falls directly onto farm fields which certain agricultural chemicals including water-soluble pesticides and nutrients, then the nitrites found in fertilizers leach into groundwater rendering it unacceptable for drinking.[48] Groundwater then flows into surface water, contaminating it along with the runoff from large corn operations that contain a variety of pollutants, such as pesticides and fertilizers, which ultimately end up in surface water.[49]

Fertilizers used by large commodity crop operations to maximize yields usually contain nutrients such as phosphorus and

41. UNION OF CONCERNED SCIENTISTS, *supra* note 12, at 5.

42. Windham, *supra* note 2, at 19.

43. Terence J. Centner et al., Employing Best Management Practices to Reduce Agricultural Water Pollution: Economics, Regulatory Institutions, and Policy Concerns, 45 DRAKE L. REV. 125, 133 (1997).

44. Runoff is rainfall that is not absorbed by the soil that carries with it dissolved nitrogen and phosphorus from fertilizer and manure.

45. Street, *supra* note 8, at 397.

46. Windham, *supra* note 2, at 19.

47. Street, *supra* note 8, at 398.

48. Angelo, *supra* note 12, at 605.

49. *Id.*

ammonium nitrate.[50] Of the plant nutrients, phosphorus is particularly troublesome because its scarcity in the water is what prevents further plant growth.[51] Thus whenever a small increase in its concentration occurs, coupled with other nitrates from fertilizers, the result is often an algae bloom eventually leading to a fouled, oxygen-deficient, stagnant system.[52] As algae and other microorganisms take up the chemical nutrients, they bloom, and after they die the algae and microorganisms suck the oxygen out of coastal waters.[53] These resulting overgrowths of algae are commonly known as "dead zones," or large areas of water that are deprived of oxygen.[54]

The current corn overproduction crisis in the Midwest, and the fertilizer use associated with it, has implications for water quality from the Corn Belt to the Gulf of Mexico. A significant portion of such fertilizer is still making its way through the soil and water to the sea. Rain washes nitrogen and phosphorus pollution from corn fields into creeks, small rivers, large rivers, and then ultimately the ocean, as evidenced by the dead zone located in the Gulf of Mexico at the mouth of the Mississippi River, which threatens important fisheries.[55] Accounting for other dead zones that have appeared near major river mouths, such as Maryland's Chesapeake Bay, lifeless waters now cover more than 7,700 square miles during the summer months due to nutrient chemicals in fertilizer runoff from agricultural fields.[56]

In addition to affecting water quality, the corn overproduction crisis in the Midwest also threatens water quantity. Growing corn is a very water-intensive process where the exact amount of water needed varies by region (due to rainfall and availability of natural sources) and can range from 19 gallons per bushel of corn in Iowa, Illinois, Ohio, or Missouri to 865 gallons in North Dakota, South Dakota, Nebraska, and Kansas.[57] The high-yield goal of industrial corn production requires water-intensive agricultural practices that depend on large-

50. *Id.*

51. Street, *supra* note 8, at 398.

52. *Id.*

53. David Biello, Fertilizer Runoff Overwhelms Streams and Rivers- Creating Vast "Dead Zones", SCIENTIFIC AMERICAN (Mar. 14, 2008), http://www.scientificamerican.com/article.cfm?id=fertilizer-runoff-overwhelms-streams.

54. UNION OF CONCERNED SCIENTISTS, *supra* note 14.

55. *Id.*

56. Biello, *supra* note 53.

57. Volinski, *supra* note 13, at 512.

scale irrigation.[58] These commercialized commodity crop operations are responsible for significant reductions in water quantity as a direct result of irrigation.[59]

Irrigation for agriculture constitutes more than one-third of the freshwater use in the United States, making it the largest use in the nation.[60] An exacerbating problem is that many commodity crops, such as corn, are grown in parts of the country that do not have sufficient water resources for this type of intensive agriculture, which means water must be diverted long distances from water bodies to the fields.[61] In many Midwestern states, water consumed for crop irrigation accounts for approximately 75 percent of the total water consumed.[62]

Areas like Nebraska, where 72 percent of the corn is irrigated, place a gigantic strain on the already-stressed Ogallala Aquifer, which lies under the Great Plains. This aquifer supplies 30 percent of the nation's groundwater for irrigation, and is in danger of running dry.[63] The Ogallala Aquifer underlies approximately 225,000 square miles of Texas, New Mexico, Oklahoma, Kansas, Colorado, and Nebraska and has long been a major source of water for agricultural, municipal, and industrial development.[64] The depth of the aquifer and its natural rate of recharge vary from region to region.[65] The withdrawal of the groundwater to supply crop irrigation has now greatly surpassed the aquifer's rate of natural recharge, with some places overlying the aquifer already exhausting their underground supply.[66]

58. Peter Rosset, Lessons from the Green Revolution, FOOD FIRST/ INSTITUTE FOR FOOD & DEVELOPMENT POLICY (Apr. 8, 2000), http://www.foodfirst.org/media/opeds/2000/4-greenrev.html.

59. 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. 213, 252 (2009).

60. *Id.* at 253.

61. *Id.*

62. B. DELWORTH GARDNER, LEGAL IMPEDIMENTS TO TRANSFERRING AGRICULTURAL WATER TO OTHER USES 67 (Rodger E. Meiners & Bruce Yandle eds., 2003).

63. Renee Cho, Ethanol's Impacts on Our Water Resources, THE EARTH INSTITUTE (Mar. 21, 2011), http://blogs.ei.columbia.edu/2011/03/21/ethanol%E2%80%99s-impacts-on-our-water-resources.

64. Michael Glantz, Forecasting by Analogy: Societal Responses to Regional Climatic Change, IOWA STATE UNIVERSITY (1989), http://www.meteor.iastate.edu/gccourse/issues/society/ogallala/ogallala.html.

65. *Id.*

66. *Id.*

II. The History and Evolution of the U.S. Farm Bill

The U.S. Farm Bill has deep roots in United States history, growing out of historical events such as the Great Depression and World War II. During that time, one in four Americans lived on a farm, and the Depression hit the farm economy the hardest causing a food surplus that made crop prices fall below their costs of production, leaving farmers unable to stay afloat.[67] It was at that point Congress decided to intervene to assist the burdened farmers.

The most significant of the Depression-era agricultural enactments was the Agricultural Adjustment Act of 1933, and its successor the Agricultural Adjustment Act of 1938, which continue to serve as the foundation for the current commodity price and income support programs.[68] Faced with mounting farm foreclosures and collapsing prices, President Franklin D. Roosevelt oversaw the creation of a loan system where, in lean years when prices were low, farmers could take out government loans and stockpile corn until prices rose again, at which time the loan would be paid off.[69] If the market did not rise, farmers could give their corn to the government as payment for the loan resulting in a system that effectively smoothed out cyclical swings in supply and demand.[70] The acts were designed primarily to increase farm income and stabilize prices, which have been echoed in a succession of later legislative acts now commonly referred to as the "Farm Bills."[71]

After the problems of the 1930s, farm subsidies continued as a way to keep prices high and limit the amount produced by taking some land out of production and controlling the amount of crops making it to market. Essentially, the legislation aimed to control crop prices by decreasing supply, a feat achieved by paying farmers to produce less.[72] In 1972, however, a series of unrelated events, including grain sales to Russia coupled with a poor growing season, led to rapidly rising food prices.[73] In order to suppress the instability, Earl Butz, Secretary of Agriculture in the Richard M. Nixon Administration, dramatically shifted policy to ensure farmers were provided price support payments,

67. Wender, *supra* note 1, at 145.
68. Angelo, *supra* note 12, at 604.
69. Purdy & Salzman, *supra* note 10, at 10852.
70. *Id.*
71. Angelo, *supra* note 12, at 604.
72. Angelo, *supra* note 12, at 595.
73. Purdy & Salzman, *supra* note 10, at 10852.

as opposed to loans to be paid back when prices rose.[74] This encouraged farmers to grow the maximum amount possible of commodity crops like corn.[75]

Butz's policy shift, coupled with the technological advances, resulted in dramatic increases in per acre yields for crops.[76] Rather than limiting production, the new policies tied payment amounts to production levels, thereby incentivizing the maximum production of certain commodity crops for which subsidies were available, such as corn.[77] This encouraged the production of large, input-intensive, high-yield corporate corn operations where growers could benefit by substituting the heavily subsidized corn crop for their previous variety of vegetable crops and grazing lands.[78] Today, a majority of corn farmers have more than one thousand acres of corn and farm size continues to grow as industrial farmers buy out smaller farmers.[79]

This is exactly how the Farm Bills have created a corn overproduction crisis. These commodity subsidies became tied to production levels with a specified payment per bushel.[80] Since more bushels of corn meant more money, techniques were developed to maximize the per acre yield of corn where, currently, it is not uncommon for corn growers to yield 200 bushels, or five tons, of corn from a single acre of land.[81] This represents an approximately four-fold increase in per acre corn yield since the early 1990s.[82] To achieve such high yields it is necessary to plant a staggering 30,000 kernels of corn per acre and to rely on high inputs of fertilizer, pesticides, and irrigation water.[83]

Even though the corn production process is harmful to the environment, farmers continue to produce at these staggering numbers simply because it makes good money. From 1970 to 1986, direct government payments to farmers increased from $3 billion a year to $26

74. *Id.*

75. Angelo, *supra* note 10, at 604.

76. Eubanks, *supra* note 59, at 222.

77. *Id.* at 225.

78. Angelo, *supra* note 12, at 604.

79. Nigel Key & Michael Roberts, Commodity Payments, Farm Business Survival, and Farm Size Growth, ECONOMIC RESEARCH SERVICE (Nov. 2007), http://www.ers.usda.gov/media/216658/err51_reportsummary_1_.pdf.

80. Food and Agricultural Act of 1977, Pub. L. No. 95-113, §§ 401(B), 501(B), 91 Stat. 913, 922, 929 (1977).

81. Prairie Farmer, Illinois Takes Top Yield Honors in Corn Belt with 175 Bushels of Corn Per Acre, FARM PROGRESS (May 14, 2008), http://prairiefarmer.com/story.aspx?s=17305&c=14.

82. Angelo, *supra* note 12, at 604.

83. *Id.* at 623.

billion a year.[84] From 1995 through 2006, $8,807,823,536 of direct payments and $5,381,622,107 in countercyclical payments from subsidies went to corn producers alone.[85] Today the United States is the largest corn producer in the world, accounting for approximately 42 percent of all corn produced globally.[86] It is only by virtue of the market-distorting subsidy programs provided through Farm Bills that farmers have an incentive to grow corn in such a high-yield fashion, requiring large inputs of chemicals and water that contribute to the degradation of the environment.[87]

III. THE CURRENT STATE OF THE AGRICULTURAL INDUSTRY AND CORN

Since the time of the Agricultural Adjustment Act in the Depression era, the face of farming has changed so much that it is arguably a different business altogether. Most agricultural production is concentrated in fewer, larger, and more specialized operations, with about 8 percent of farms account for 75 percent of farm sales.[88] Farmers now comprise less than 2 percent of the population, and most of the country's 2 million farms are part-time with many operators relying on off-farm jobs for most of their income.[89] While the original aspiration of farm subsidies may have been to provide affordable and safe food for Americans while assisting the farming industry, the subsidies have far surpassed that goal; Americans spend the least amount of money on food based on the average income.[90] Moreover, after such extreme payments have been made for crops like corn, the agricultural industry is no longer in threat of collapse.

The fifteen pieces of Farm Bill legislation that have followed in the subsequent seven decades have evolved into the country's comprehensive agricultural policy, tackling a variety of goals from price support to conservation.[91] However, there has not been much change since the early 1970's. In 2002, a new Farm Bill was enacted and repositioned U.S. industrial agriculture as America's largest corporate

84. Windham, *supra* note 2, at 11.

85. Angelo, *supra* note 12, at 605.

86. Corn Refiners Association, Corn Facts, SOYATECH, http://www.soyatech.com/corn_facts.htm (last visited Nov. 15, 2012).

87. Angelo, *supra* note 12, at 595.

88. Monke, *supra* note 3, at 6.

89. *Id.*

90. CHARLES FRANCIS, PLANTING THE FUTURE: DEVELOPING AN AGRICULTURE THAT SUSTAINS LAND AND COMMUNITY, 3 (Elizabeth Ann R. Bird et al. eds., 3d prtg. 1996).

91. RENEE JOHNSON & JIM MONKE, CONG. RESEARCH SERV., RS22131, WHAT IS THE FARM BILL?, (Oct. 3, 2012).

welfare recipient and officially discarded any attempt to deregulate the agricultural economy by giving industrial agriculture $89.7 billion in commodity subsidies.[92]

The current Farm Bill—the recently passed Food, Conservation, and Energy Act of 2008—contains a labyrinth of complex, piecemeal, and often contradictory agricultural, energy, and conservation subsidy programs with a total cost of about $307 billion.[93] This 2008 Farm Bill consisted of approximately $307 billion in spending for various programs, with roughly $35 billion dollars going to the subsidy program for commodity crops, such as corn, wheat, cotton, soybeans, and others.[94] This development in agriculture legislation has seen its excesses and abuses, which have led to unfavorable effects on agriculture itself.[95]

However, corn producers should not bear all of the blame for taking advantage of the Farm Bill and making the most economically feasible decision. Congress is the source of the problem for allowing these provisions to remain in place to keep large agribusiness constituents happy.[96] By making these commodity programs more attractive than conservation programs, Congress is indirectly promoting loss of habitat, soil erosion, water pollution, and air pollution.[97] With all the money to be made, more inventive measures have been introduced to profit on the situation rather than solve the corn overproduction crisis. Unfortunately, these additions quickly transitioned into part of the problem.

An address of the current state of the agricultural industry must include genetically engineered food and the debate regarding the use of corn as biofuel. The genetic engineering techniques and demand for biofuel may seem as if they are on the cutting edge of solving corn issues, yet upon implementation, these concepts are exacerbating the corn overproduction crisis as detailed in the following subsections.

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92. Windham, *supra* note 2, at 12.

93. Food, Conservation, and Energy Act of 2008, Pub. L. No. 110-246, 122 Stat. 923 (2008).

94. Wender, *supra* note 1, at 160.

95. Street, *supra* note 8, at 398.

96. Mary Beth Blauser, *The 2008 Farm Bill: Friend or Foe to Conservationists and What Improvements Are Needed?*, 12 VT. J. ENVTL. L. 547, 563 (2011).

97. *Id.*

A. *Genetically Engineered Food*

The business of genetic engineering is the practice of altering or disrupting the genetic blueprints of living organisms including plants, animals, microorganisms, and humans, then patenting these altered genes and selling the resulting gene-foods, seeds, or other products for profit.[98] Advances in molecular biology and plant genetic engineering have made it possible to introduce genes from a variety of organisms into plants to create transgenic crops having agriculturally and commercially useful traits.[99] In turn, the adoption of these crops by U.S. farmers has been rapid. Between 1996 and 2002, the percent of transgenic corn acres increased by about 2,500 percent, and more than $11 billion in crop value was attributed to transgenic crops in 2010.[100]

Crops engineered with traits that confer a purely agronomic benefit are called "first generation crops."[101] Examples of these input traits include pesticide or disease resistance, herbicide resistance, or environmental stress tolerance.[102] These traits facilitate production and increased yields by attacking the causes of crop loss such as pests, diseases, weather stress such as drought and frost, and competitors such as weeds.[103] Currently, more than forty transgenic traits have been approved for commercial release in the United States including herbicide-tolerant, as well as insect-resistant, corn.[104]

The research and development divisions at companies associated with the agricultural industry, such as Bayer, Dow Chemical, and Monsanto, also want to be first to hit the market with a genetically engineered nitrogen-efficient corn seed that might use up to 30 percent less fertilizer per bushel. This is not necessarily because these companies are concerned with the pollution that results from nitrogen fertilizer use. This particular genetically engineered crop is at the top of the corn growers' wish list because the cost of ammonium nitrate

98. RONNIE CUMMINS & BEN LILLISTON, GENETICALLY ENGINEERED FOOD: A SELF DEFENSE GUIDE FOR CONSUMERS 15 (Marlowe & Co. 2d ed. 2000).

99. Wendy Thai, *Transgenic Crops: The Good, the Bad, and the Laws*, 6 MINN. J.L. SCI. & TECH. 877, 877 (2004-2005).

100. INTERNATIONAL SERVICE FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS, GLOBAL AREA AND VALUE OF TRANSGENIC CROPS. http://www.nature.com/nbt/journal/v29/n4/box/nbt.1842_BX4.html.

101. Stuart Smyth et al., *Liabilities and Economics of Transgenic Crops*, 20 Nature Biotechnology 537, 537 (2002).

102. THE PEW INITIATIVE ON FOOD AND BIOTECHNOLOGY, HARVEST ON THE HORIZON: FUTURE USES OF AGRICULTURAL BIOTECHNOLOGY 25 (Pew Initiative on Food and Biotechnology, Sept. 2001).

103. Thai, *supra* note 99, at 879.

104. *Id.* at 877.

fertilizer has soared 130 percent to $450 a ton since 2002.[105] Analysts say the U.S. market for corn with such a trait could be worth nearly $700 million a year, with global market opportunities as high as $1.5 billion.[106] As more and more genetically engineered crops are entering the market, countries become reliant on these genetically modified crops for both production and consumption, meaning more opportunity for profit. An example would be the United States, which alone plants approximately fifty-four million hectares of genetically modified plants each year.[107]

Previously, in *J.E.M. Ag. Supply, Inc. v. Pioneer Hi-Bred International, Inc.*,[108] the U.S. Court of Appeals for the Federal Circuit indirectly encouraged the growth and development of researching and creating genetically modified organisms by validating the patentability of newly developed plant breeds.[109] As a result, there are billions of dollars to be made for the company that holds the patent rights to lucrative genetically modified organisms. What often gets lost in the corporate battle for patent rights are the potential environmental impacts resulting from increased exposure of indigenous plant and animal species to organisms that are modified genetically.[110] Instead of producing superior breeds of plants and animals, a large percentage of genetic transplants end in failure, with only one in thousands of attempts achieving the desired results without undesired side effects.[111]

The growing use of genetically engineered crops is coupled with concerns regarding the impact of these plants on issues other than the environment as well. The food supply is also at risk due to these products because the contamination of food crops is potentially harmful to humans. The risks associated with transgenic plants stem from pollen-facilitated gene flow from transgenic plants to unintended recipients, as well as seed dispersal during harvest, transportation, planting, and re-harvest.[112] This also poses several environmental risks associated with genetically engineered crops, including: irreversible genetic pollu-

105. John Birger, *Search for Super Corn seeks to Limit Nitrogen Use, Pollution*, BLOOMBERG (Apr. 15, 2011), http://www.bloomberg.com/news/2011-04-14/search-for-super-corn-seeks-to-limit-nitrogen-use-pollution.html.

106. *Id.*

107. Richard Hines & Clare Oxborrow, *Who Benefits From the Use of GM Crops: The Rise of Pesticide Use*, FRIENDS OF THE EARTH INTERNATIONAL, Issue 112, Jan. 2008.

108. 534 U.S. 124 (2001).

109. Lee Stockhorst, *Super Crops or a Super Problem? The Battle Over Bt Corn*, 15 MO. ENVTL. L. & POL'Y REV. 531, 541 (2008).

110. *Id.* at 539.

111. Cummins & Lilliston, *supra* note 98, at 16.

112. Thai, *supra* note 99, at 878.

tion and drift; damage to non-target species, beneficial insects, and soil fertility; and creation of genetically engineered ultra-resilient super weeds and super pests.[113] The United States has reported an increase in the overall use of pesticides which is accompanied by increasing development of super weeds that are resistant to herbicides.[114] One study indicated that between 1996 and 2004, the United States used 122 million more pounds of pesticides than would have been applied if genetically engineered crops had not been introduced, meaning that the use of so much pesticide has led to increasing occurrences of herbicide resistant weeds.[115]

Another environmental concern arises from the basic idea of how some genetically modified organisms, particularly Bt[116] products, work on a basic level.[117] If ingested, Bt toxin will cause mortality in insects by dissolving in the gut of the insect, punching a hole in the lining of the insect's gut cells, and then spilling out of the gut into the insect resulting in death of the insect within a few days.[118] While Bt products are created to target specific crop-destroying insects, there is nothing to say that other non-target insects will not ingest the Bt toxin thereby threatening the survival of hundreds of insect species, not to mention the potential unbalance in the ecosystem that could result from an insect species being eradicated in a particular area.[119]

There have been other instances of harm caused specifically by genetically engineered corn. Contamination of taco shells by genetic material encoding the Bt toxin from StarLink corn was reported in September 2000, which was followed by reports of allergic reactions from consumers who had eaten food products containing the corn.[120] Russia even has suspended the import and use of a genetically engineered corn that was made by Monsanto to withstand glyphosate, a weedkiller that Monsanto sells under the Roundup label, following a

113. Cummins & Lilliston, *supra* note 98, at 48.

114. Hines & Oxborrow, *supra* note 107.

115. Stockhorst, *supra* note 109, at 544.

116. Bt stands for "Bacillus thuringiensis" and is a biological pesticide and insecticide.

117. *Id.* at 545.

118. *Bacillus thuringiensis: How Does Bt Work?*, UNIVERSITY OF CALIFORNIA SAN DIEGO, http://www.bt.ucsd.edu/how_bt_work.html (last visited Nov. 15, 2012).

119. Stockhorst, *supra* note 109, at 545.

120. CENTER FOR DISEASE CONTROL AND PREVENTION, INVESTIGATION OF HUMAN HEALTH EFFECTS ASSOCIATED WITH POTENTIAL EXPOSURE TO GENETICALLY MODIFIED CORN: A REPORT TO THE U.S. FOOD AND DRUG ADMINISTRATION FROM THE CENTERS FOR DISEASE CONTROL AND PREVENTION 4 (2001).

study's findings that suggested the crop might cause cancer.[121] The study found that rats fed over a two-year period with the U.S. company's genetically modified corn, marketed under the Roundup Ready brand name, developed more tumors, pathologies, and other severe diseases than a test group fed with regular corn. This prompted other countries in the European Union to quickly review the study to determine if they would seek an immediate ban on imports of the crop if the study's findings were deemed conclusive.[122]

Further genetic experimentation has the potential for other disastrous consequences as well. As mentioned earlier, any gene flow from a crop that has been genetically engineered to produce an industrial chemical to a food crop intended for human consumption could lead to contamination of the general food supply.[123] This is especially significant when dealing with such a widely used food crop, such as corn, which is not only used for food, but also as animal feed and as a host plant for the production of pharmaceuticals.[124] This is how the genetic engineering of corn alone could ultimately lead to a contamination of the human food supply. Genetically modified organisms are an important legal, political, economic, and environmental issue that the United States will grapple with for years to come.[125] If not carefully handled, the continuation of genetic engineering experimentation to achieve the "perfect" corn crop could lead to an indestructible plant. This plant, without any natural enemies, could continue to produce corn at a seemingly unlimited level, which would only contribute to the corn overproduction crisis.

B. Food or Fuel Debate

To reduce America's craving for oil, the government has been encouraging domestic ethanol[126] production, with the United States and Brazil currently combining to produce over 70 percent of the world's ethanol.[127] The U.S. domestic ethanol industry will continue to

121. Michael Haddon & Ian Berry, *Russia Suspends Use of Genetically Modified Corn*, THE WALL STREET JOURNAL, Sept. 25, 2012, http://online.wsj.com/article/SB10000872396390444358804578018472810435506.html.

122. *Id.*

123. Thai, *supra* note 99, at 885.

124. David S. Bullock et al., *The Economics of Non-GMO Segregation and Identity Preservation*, 27 FOOD POL'Y 85 (2002).

125. Stockhorst, *supra* note 109, at 553.

126. A biofuel additive for gasoline made from feedstock.

127. Marcel De Armas, *Misleadingly Green: Time to Repeal the Ethanol Tariff and Subsidy for Corn*, 7 SUSTAINABLE DEV. L. & POL'Y 25, 25 (2006-2007).

grow as alternative fuels become increasingly politically popular.[128] These government policies that increase demand for corn ethanol are, in turn, expanding and driving U.S. corn production along with its associated economic, health, and environmental impacts.[129] To replace the United States' current dependence on 149 billion gallons of gasoline per year, it would take approximately 350 million acres of corn, assuming 400 gallons per acre per year of ethanol.[130] However, if we want to reduce U.S. oil dependence, biofuel production must move beyond corn to more diverse and environmentally friendly crops and waste materials.[131]

While it is beneficial that the United States is recognizing the value and importance of energy diversification, it may also be creating a greater environmental harm in the process.[132] On closer inspection, ethanol produced from corn may generate as much pollution as the fossil fuels it replaces and may even create new environmental problems.[133] As a result of the greenhouse gas produced during the corn/ethanol life cycle, researchers at Princeton and Duke now say that ethanol has a carbon footprint at least as large as gasoline's.[134]

Moreover, processing corn into ethanol requires substantial amounts of water. While the process is increasingly more efficient, demanding just 3 gallons of water per gallon of ethanol today, down from 6.8 gallons of water per gallon of ethanol a decade ago, it still represents a dramatic strain on an already overtaxed resource.[135] This water use for ethanol also concerns scientists, particularly in light of a 2003 U.S. Government Accountability Office report that found that water managers in at least 36 states expect shortages by 2013.[136] The National Academy of Sciences report estimated that an ethanol plant producing 100 million gallons a year uses as much water as a town of 5,000 people.[137]

Beyond the loss of precious water, ethanol is also depriving us of food. Forty percent of the U.S. corn crop is now used to produce some 13 billion gallons of ethanol per year, according to the U.S. Energy In-

128. *Id.*
129. UNION OF CONCERNED SCIENTISTS, *supra* note 14.
130. De Armas, *supra* note 127, at 25.
131. UNION OF CONCERNED SCIENTISTS, *supra* note 14.
132. De Armas, *supra* note 127, at 25.
133. *Id.*
134. Birger, *supra* note 105.
135. Cho, *supra* note 63.
136. *Biofuels, Biodiesel and Ethanol*, N.Y. TIMES, June 17, 2011, http://topics.nytimes.com/top/news/business/energy-environment/biofuels/index.html.
137. *Id.*

formation Administration.[138] Specifically, federal renewable-fuel standards require the blending of 13.2 billion gallons of corn ethanol with gasoline this year, requiring 4.7 billion bushels of corn, which represent 40 percent of the crop.[139] After factoring in over 30 percent of our corn crop being used to feed livestock, and about 15 percent being exported, this leaves only around 15 percent left to actually be used toward food and beverage production for human consumption.[140] This number is startlingly low and could leave the United States with a food supply shortage, especially in unforeseeable situations such as a drought. However, by suspending renewable-fuel standards that were unwise from the start, the government could divert vast amounts of corn from inefficient ethanol production back into the food chain, where market forces and common sense dictate it should go.[141]

Any defense of the ethanol policy rests on fallacies, primarily that: (1) ethanol produced from corn makes the United States less dependent on fossil fuels; (2) ethanol lowers the price of gasoline; (3) an increase in the percentage of ethanol blended into gasoline increases the overall supply of gasoline; and (4) ethanol is environmentally friendly and lowers global carbon dioxide emissions.[142] In reality, corn has a far lower yield relative to the energy used to produce it than ethanol from other plants, ethanol yields about 30 percent less energy per gallon than gasoline, and adding ethanol actually raises the price of blended fuel because it is more expensive to transport and handle than gasoline.[143]

The current state of the agricultural industry can be directly linked to the U.S. Farm Bills. The agricultural industry has reached a tipping point, and the upcoming 2012 Farm Bill represents a unique opportunity for change. The 2012 Farm Bill may signify a shift away from the massive subsidies that large corn operations have become accustomed to from earlier versions of the bill.[144] In tough economic times, and during a renewed effort to cut spending across the board, the 2012 Farm Bill could look drastically different.[145]

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138. Birger, *supra* note 105.

139. Collin A. Carter & Henry I. Miller, Corn *for Food, Not Fuel*, N.Y. TIMES, July 30, 2012, http://www.nytimes.com/2012/07/31/opinion/corn-for-food-not-fuel.html?_r=0.

140. *Id.*

141. *Id.*

142. *Id.*

143. Carter & Miller, *supra* note 139, at 1.

144. Volinski, *supra* note 13, at 517.

145. *Id.*

IV. PROPOSAL FOR AMENDING THE FARM BILL

The corn industry has reached a crossroad, and with the new Farm Bill currently under review in Congress, an opportunity to address the issue is available.[146] The central weakness of the Farm Bill's environmental provisions is that the Bill is not an environmental statute, but rather aimed at maintaining a stable, productive, and internationally competitive agricultural industry.[147] A consistent regulation of pollution is needed to safeguard public health, environmental quality, and agricultural productivity.

The Farm Bill presents a chance to establish legislation to plan for anticipated problems.[148] The 2012 Farm Bill could be used as a single, comprehensive piece of legislation to implement the changes needed to remedy the corn overproduction crisis, as well as the resulting environmental pollution. Few pieces of legislation carry such an overwhelming effect on the landscape and environment as the Farm Bill.[149] The current method of agriculture production employed by large-scale corn operations is not sustainable, and the Farm Bill needs to begin encouraging different methods of food production.[150] The incentives and disincentives built into the Farm Bill help decide what happens on nearly half of the private land in the United States, including whether it will be farmed or left wild, and whether it will be used sustainably or to maximize productivity by dousing it with chemicals.[151] "The health of the American soil, the purity of its water, the biodiversity and the very look of its landscape owe in no small part to impenetrable titles, programs and formulae buried deep in the Farm Bill."[152]

A. Reduce Subsidies and Incentives to Overproduce

The problem with changing the current program is that five crops control the subsidy market: corn, cotton, rice, soybeans, and wheat; and these crops are predominantly controlled by large corporations.[153] This subsidy program has snowballed into a legislative

146. *Id.* at 513.

147. H.R. REP. No. 107-191, pt. 1, at 93-94 (2001).

148. Street, *supra* note 8, at 400.

149. Michael Pollan, *You Are What You Grow*, N.Y. TIMES, Apr. 22, 2007, http://www.nytimes.com/2007/04/22/magazine/22wwlnlede.t.html?pagewanted=all&_r=0.

150. Wender, *supra* note 1, at 159.

151. Pollan, *supra* note 149.

152. *Id.*

153. Wender, *supra* note 1, at 144.

package of subsidized commodities that increasingly benefit the largest of agricultural producers.[154] The most obvious solution is the elimination of subsidies altogether.[155] While a subsidy-free market would be ideal, it is difficult to achieve.[156] The vast subsidy infrastructure currently embedded in the Farm Bill would be difficult to pull out from under the feet of industrial farmers that use those subsidies to obtain such profits.[157] If the government eliminated subsidies, the net farm income would decrease about twenty-five to thirty percent, a total of about $15 billion.[158] Any solution, therefore, must include some subsidies or loans.[159]

Previous attempts to abolish subsidies have failed, such as when the 1996 Food Agriculture Improvement and Reform Act contained provisions for a seven-year gradual phase-out of agricultural subsidies.[160] However, when commodity prices declined following the passage of the Act, Congress provided farmers with "emergency" payments in each year leading up to the 2002 Farm Bill, where Congress responded to farmer requests and prevented achievement of the 1996 FAIR Act's commodity program goals.[161] Given the past failures, coupled with the cyclical nature of farm prices and the power of farm interests in Congress, any solution to agriculture's environmental problems that depends too heavily on the elimination of subsidies may not be achievable.[162]

Therefore, instead of eliminating the Farm Bill subsidies, Congress could approach farm subsidies in an efficient way that promotes conservation methods. One way is by subsidizing sustainable agriculture in order to shift payments to farmers who are implementing sustainable agricultural methods.[163] Sustainable farming methods are philosophies and farm techniques that are low chemical, energy conserving, and resource efficient.[164] The industrial corn operations will

154. *Id.*

155. *The Farm Bill: Food Policy in an Era of Corporate Power*, FOOD & WATER WATCH (Apr. 2007), http://documents.foodandwaterwatch.org/FarmBill.pdf.

156. William S. Eubanks II, *The Sustainable Farm Bill: A Proposal for Permanent Environmental Change,* 39 ENVTL. L. REP. NEWS & ANALYSIS 10505, 10505 (2009).

157. *Id.* at 10506.

158. Food & Water Watch, *supra* note 155, at 8.

159. Wender, *supra* note 1, at 162.

160. Jeffrey A. Peterson, *The 1996 Farm Bill: What to (re) do in 2002,* 11 KAN. J.L. & PUB. POL'Y 65, 71 (2001).

161. S. REP. NO. 107-117, at 29-30 (2002).

162. Jesse Ratcliffe, *A Small Step Forward: Environmental Protection Provisions in the 2002 Farm Bill*, 30 ECOLOGY L.Q. 637, 653 (2002).

163. Eubanks, *supra* note 156, at 10506.

164. Wender, *supra* note 1, at 163.

farm where the money is, so if Congress provides subsidies for sustainable agriculture, the producers will undertake that method as opposed to the environmentally hazardous methods currently employed.[165] This policy would offer subsidies to all farmers based on their farming practices rather than the crops they cultivate, which would also encourage smaller farmers to use sustainable procedures in order to receive these payments.[166] For instance, if the government gave a large portion of the commodity crop subsidies to farmers using sustainable agricultural methods, it would greatly impact the market by decreasing supermarket prices for sustainably farmed food and increasing prices for foods based on industrially farmed corn.[167] However, in order to effectively promote conservation and environmentally friendly farming methods, programs have to be not just profitable for farmers, but *more* profitable than conventional practices.[168] This means the funding for conservation programs and the commodity programs should be flipped, thereby allocating the bulk of the money for conservation programs such as sustainable agriculture.[169]

Also, by diversifying subsidies to better include other crops, farmers could then give up producing vast amounts of chemical-intensive corn and build a more varied agriculture by rotating crops and using animals to recycle nutrients on farms.[170] Through crop rotation, or a planned sequence of changing the crop grown on a particular field, producers are able to control some pests, diseases, and weeds without the use of pesticides and other harmful chemicals while also creating different types of residues and better soil quality.[171] A study concluded that, in the absence of subsidies, farmers in regions that do not depend on irrigation would probably cultivate a larger percentage of drought-resistant crops, such as hay, corn, and wheat.[172] The use of sustainable agriculture would help repair local ecosystems, boost farmers' yields as the ecosystem improves, and mitigate the degradation caused by decades of mechanized agriculture under the Farm Bill.[173]

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165. *Id.* at 164.

166. Eubanks, *supra* note 156, at 10506.

167. *Id.* at 10507.

168. JEFFREY A. MCNEELY & SARA J. SCHERR, ECOAGRICULTURE: STRATEGIES TO FEED THE WORLD AND SAVE BIODIVERSITY 217 (Island Press 2002).

169. Blauser, *supra* note 96, at 565.

170. Pollan, *supra* note 13, at 3.

171. Centner et al., *supra* note 41, at 134.

172. Ratcliffe, *supra* note 161, at 650.

173. Wender, *supra* note 1, at 164.

B. Implement Environmental Protection Incentives and Restrictions

Regulating pesticides and chemical fertilizers is another important change to implement in the upcoming Farm Bill. While some legislation already exists that attempts to regulate chemical pollution from agricultural sources, unfortunately this legislation has not demonstrated the capacity to adequately protect the environment.[174]

The Clean Water Act, the primary U.S. law for controlling water pollution, is probably the most important environmental law with respect to pollution resulting from large-scale commodity crop operations; however, agricultural activities are largely exempt from the core programs responsible for the effectiveness of the law.[175] First, many agricultural activities are not covered by the National Pollutant Discharge Elimination System (NPDES) program established under Section 402 of the Clean Water Act, which is a permitting program for point sources of pollution, or facilities that discharge pollutants into waters of the United States.[176] Permits issued under the program may place limits and conditions on discharges, and are based on available control technologies and on applicable water quality considerations.[177] However, the NPDES program expressly exempts irrigation return flows from the definition of point sources subject to regulation, which means that water containing pesticides, fertilizers, sediment, and other pollutants that flows from irrigated fields into surface waters is not regulated under the NPDES program.[178]

Second, the agriculture industry is exempt from regulation under another key component of the Clean Water Act: the industrial storm water permit program.[179] The Clean Water Act specifically excludes agricultural storm water discharges from the definition of point sources that may be regulated, resulting in large agricultural operations thousands of acres in size not being required to obtain storm water permits.[180] The result is that the substantial weather-related runoff containing pesticides, fertilizers, and other pollutants is not subject to Clean Water Act protections.[181][182]

174. Street, *supra* note 6, at 399.
175. Breggin et al., *supra* note 5, at 18.
176. 33 U.S.C. § 1362(14).
177. Ruhl, *supra* note 25, at 293.
178. Ruhl, *supra* note 25, at 295-96.
179. Breggin et al., *supra* note 5, at 19.
180. 33 U.S.C. § 1362(14).
181. Breggin et al., *supra* note 5, at 19.
182. There is more to be discussed regarding agriculture and water quality under the Clean Water Act; however, those topics are beyond the scope of this paper. In a recent

The Safe Drinking Water Act, whose key objectives are to set standards for public water systems' drinking water quality and to prevent contamination of surface and ground sources of drinking water, also plays a role in protecting sources of drinking water from contaminants generated by agricultural operations.[183] Although the EPA recognizes that runoff containing fertilizer and pesticides from agricultural operations can have significant impacts on vulnerable aquifers, the law does not provide for federal regulation of this runoff, but instead relies on state assessments, voluntary programs, and best management practices.[184]

These legislative failures indicate a need for more restrictive regulations to control the use of chemical pesticides and fertilizers capable of causing undesirable secondary effects in the environment.[185] First, the registration system for these chemicals should be considerably more selective, with incentives for products which are less environmentally intrusive.[186] Also, environmental protection incentives given to farmers who employ conscious practices and strategies such as the use of field scouting, data collection, and analysis to apply pesticides and chemical nutrients only at critical times of need, would ensure that fewer amounts of these pesticides and fertilizers are used.[187] For example, studies found these environmentally conscious practices can actually increase profits by reducing the amount of fertilizer applied to crops.[188] Another study that analyzes economic and best management practice adoption data from 963 Kansas farms finds that adoption of nitrogen best management practices has a significant positive effect on net farm income for corn acres.[189]

Stricter, local regulation of chemical usage could help to avoid unnecessary and wasteful use while helping to ensure the most appropriate fertilizer levels and pest control.[190] Large crop operations that

development, the United States Court of Appeals for the Fifth Circuit ruled that Clean Water Act permits are not required for confined animal feeding operations that are likely to pollute. *See* http://sustainableagriculture.net/blog/court-rules-for-cafos/.

183. OFFICE OF WATER, DOC. NO. EPA 816-F-04-030, UNDERSTANDING THE SAFE DRINKING WATER ACT (U.S. Environmental Protection Agency, June 2004).

184. OFFICE OF WATER, DOC. NO. EPA 816-F-04-032, PROTECTING DRINKING WATER SOURCES (U.S. Environmental Protection Agency, June 2004).

185. Street, *supra* note 8, at 398.

186. *Id.* at 400.

187. Centner et al., *supra* note 43, at 134.

188. Jodi DeJong-Hughes & Jeffrey Vetsch, *On Farm Comparison of Conservation Tillage Systems for Corn Following Soybeans* 10 (UNIVERSITY OF MINNESOTA EXTENSION, 2007).

189. Breggin et al., *supra* note 5, at 39.

190. Street, *supra* note 8, at 400.

opt to receive any form of federal farm subsidy should assume responsibility for publicly disclosing information about their application of agricultural chemicals such as the quantity, type, and timing of fertilizers and pesticides they apply each year.[191] The actual amounts of agricultural chemicals used should be documented to comply with regulations, thus providing accurate input values to be used for environmental study with respect to time and amount of chemicals used, as well as calculating penalties for improper use.[192] This will increase public access to information on the sources and quantities of chemical pollution potentially entering surface waters and groundwater, while at the same time helping to discourage practices that result in the overuse of fertilizers and pesticides through penalties.[193][194]

While an environmental disclosure and documentation program would meet this need, the information gathered regarding chemical application may increase net returns and provide the financial incentive needed for crop operations to participate.[195] Focusing on the use and management of agricultural chemicals can lead to new discoveries or revelations regarding the application of fertilizers and pesticides. All the information compiled from disclosures by participating operations can result in reductions in chemical use, which could mean significantly lower operating costs.[196] The information to be disclosed should emphasize generating a clear, easy-to-understand dataset that also minimizes the burden on operators.[197]

Asking recipients of subsidies to assume responsibility for disclosure of fertilizer and pesticide applications is also consistent with food marketing system trends, as the top food industry companies in the main sectors of the U.S. food system are voluntarily reporting to varying extents on their environmental and other socially beneficial activities.[198] When a company makes a voluntary disclosure of this kind, it signals to the investment community that this firm is environmentally responsible, and investors are saying they would prefer to

191. Breggin et al., *supra* note 5, at 5.

192. Street, *supra* note 8, at 401.

193. Breggin et al., *supra* note 5, at 5.

194. This regulatory approach adopts the public disclosure strategy that has been successful in another environmental statute, the Emergency Planning and Community Right-to-Know Act (EPCRA).

195. *Id.* at 41.

196. *Id.* at 5.

197. *Id.*

198. Breggin et al., *supra* note 5, at 5.

invest in an environmentally responsible firm.[199] Ultimately, this would enable greater control over regulation, provide for better removal of undesirable products, and give society more direct control over the use of agricultural chemicals.[200]

C. Place Accountability on Crop Operations

Large crop operations that opt to receive any form of federal farm subsidy should also be accountable for implementing a set of responsible baseline planning and management measures to reduce pollution.[201] These responsible planning and management measures are a set of ethical practices appropriate to the crop, geography, climate, and other circumstances of the particular operation.[202] Recipients of subsidies should certify that baseline measures for chemical pollution reduction have been implemented and then experts could determine whether these baseline measures have been met sufficiently before the operation can receive those subsidies.[203] The aim should not be to establish a new, significant administrative program, which is likely impractical given the current economic climate, but rather the objective should be a workable, streamlined process for adoption of stewardship measures that can be readily integrated into existing subsidy program administration.[204]

The baseline measures also could be used to calculate penalties for improper agricultural chemical use if it is determined the operation has not complied. Typically, when the production of a good or service generates pollution or other adverse environmental impacts, the individual or company that is responsible, and profiting from the activity, is required by the law to avoid or minimize the impacts.[205] However, this is not the case in the agriculture sector. It is not currently United States policy to address the pollution related to commodity crop agriculture, outside of voluntary grant programs and cost-share programs designed to encourage conservation activities.[206] As a result, the costs

199. Susanne Rust, *Disclosing Greenhouse Gas Emissions Boosts Business, Study Finds*, CALIFORNIA WATCH (Feb. 6, 2012), http://californiawatch.org/dailyreport/disclosing-greenhouse-gas-emissions-boosts-business-study-finds-14765.

200. Street, *supra* note 8, at 402.

201. Breggin et al., *supra* note 5, at 4.

202. *Id.*

203. *Id.*

204. *Id.*

205. Ved P. Nanda, *Agriculture and the Polluter Pays Principle*, 54 AM. J. COMP. L. 317, 318 (2006).

206. Breggin et al., *supra* note 5 at 16.

associated with negative environmental impacts are typically not accounted for by either the seller of commodity crops such as corn or by the purchaser.[207] This means that the producer receives a price without having to account for the full costs of its production, and the purchaser, often a large agribusiness company, pays a lower price than it otherwise would be required.[208]

One reason why commodity crop producers have not been required by law to account for the pollution associated with their operations is that pollution generated by large commodity crop operations tend to be cumulative and attributable to a variety of sources.[209] For example, the Gulf of Mexico dead zone results from the combined nutrient runoff from thousands of fields, facilities, and municipalities which feed into the Mississippi River, making it difficult to fairly and credibly assign responsibility with the sources of the problem diffused.[210] Another reason is that the economic consequences of agricultural pollution such as lost catch, undersized or unhealthy commercial fish, lost tourism dollars, and other costs associated with the dead zone in the Gulf of Mexico have yet to be fully documented and articulated.[211]

This leaves the public to bear the burden of pollution expenses. Rather than address or discourage these pollution costs, the existing legal framework subsidizes large-scale commodity crop production without requiring subsidy recipients to adopt responsible planning and management practices that could significantly reduce pollution.[212] "Ultimately, Americans can pay for the production of commodity crops as many as three times: as consumers of the end product at the grocery store cash register or gas pump; as taxpayers funding federal farm subsidies; and as citizens bearing the environmental and public health costs of harms traceable in part to pollution from commodity crop operations."[213]

Finally, any agricultural program implemented should include more stringent penalties, including higher fines for noncompliance.[214] Some of the current programs, such as the Sod- and Swampbuster pro-

207. *Id.*

208. *Farm Subsidies 101*, FOOD & WATER WATCH (Feb. 2011), http://documents.foodandwaterwatch.org/doc/FB-subsidies101.pdf.

209. Breggin et al., *supra* note 5, at 17.

210. *Id.*

211. *Id.*

212. *Id.* at 16.

213. *Id.*

214. Ratcliffe, *supra* note 162, at 659.

grams, simply disallow farm program benefits to non-complying producers rather than imposing large fines.[215] The problem with making loss-of-benefits the only penalty is, depending on how benefits are structured, their loss may not outweigh the costs of compliance, essentially meaning large crop operations are not being held accountable for environmental violations.[216] While more substantial penalties for violating environmental requirements will certainly not be popular with farm interests, they will be necessary to make the rest of the system work.[217]

CONCLUSION

Farm Bills have deep roots in American history and have supplied Americans with an ample source of affordable food over the years, but now the challenge is to preserve and conserve the environment while still maintaining a constant supply of reasonably priced food. The Farm Bills are neither an overwhelming success nor an abject failure for the goals of sustainable farming and reduced environmental impacts, but rather are incremental steps in the direction of sustainable agriculture.[218] However, only by addressing the environmental consequences of the current subsidy program, and by creating a comprehensive and mandatory regulatory system, can the negative environmental impacts of agriculture be reduced to sustainable levels.[219]

While the aforementioned plans could work, it is up to Congress to implement the change through Farm Bill legislation. Hopefully when the opportunity arises in the coming years to draft new legislation for a farm bill, Congress will strengthen conservation programs.[220] Congress should listen to concerns about agricultural chemical pollution due to corn overproduction, and make conservation provisions an economically viable option for producers instead of undermining them by providing excessive subsidies.[221] We can no longer continue down this current road of Farm Bill subsidies which contribute to the corn overproduction crisis and massive environmental destruction.

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215. 16 U.S.C. §§ 3811(a), 3821(c) (2003).

216. EDGER L. MICHALSON ET AL., CONSERVATION FARMING IN THE UNITED STATES; THE METHODS AND ACCOMPLISHMENTS OF THE STEEP PROGRAM 205 (CRC Press LLC, 1999).

217. Ratcliffe, *supra* note 162, at 659.

218. *Id.*

219. *Id.*

220. Blauser, *supra* note 96, at 569.

221. *Id.*

It is time to create a system built on sustainable agriculture and environmental protection, both of which are entirely feasible with current advancements. Organic farmers do not use synthetic fertilizer and, every day the sun still rises, plants and their bacterial associates still fix nitrogen, and farm animals still produce vast quantities of nitrogen in their waste.[222] This means it may take more work, but it is possible to nourish the soil and keep the crops free of pests without dumping so many chemical nutrients and pesticides into the environment.[223]

222. Pollan, *supra* note 15, at 3.
223. *Id.*

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