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Farming in the Modern Era: Feeding the World with an Enviromental Conscience

Kelsey Peterson

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Farming in the Modern Era: Feeding the World with an Environmental Conscience

Cover Page Footnote

She would like to thank her family and friends for their love and support in helping her pursue her interest in law and environmentally responsible agriculture.

Farming in the Modern Era: Feeding the World with an Environmental Conscience

Kelsey Peterson[†]

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I. INTRODUCTION

As the global population continues to grow, so too does the demand for food production.¹ In response to this ever-increasing demand, the agricultural industry has developed techniques that achieve higher yields, but also have devastating environmental impacts. Feedlots, pesticide and fertilizer application, and massive amounts of land use for crops contribute to water pollution, air pollution, and the habitat loss and degradation of native species. These practices pose a serious risk to the environment, wildlife, and human health.

Modern farming techniques produce the massive amounts of food needed to feed the growing global community in an efficient and cost effective manner. However, these farming techniques also have harmful impacts on water quality, air quality, and habitat degradation. Currently, the global population is up to 7.1 billion, and it is the job of the agricultural industry to feed a large portion of this ever-growing population.² To completely deny the agricultural industry the use of such techniques in the interest of environmental protection would be to deny the world the benefit of a large amount of food production. Requiring farmers to comply with certain environmental regulations would increase costs, which would likely be passed on to the consumer in the form of higher prices. Worse still, prohibiting highly productive agricultural methods could make it impossible to satisfy global need. Furthermore, organic farming provides an alternative for some conscientious consumers, but unfortunately produces yields that are “25% lower than conventional farming methods.”³ Farmers need a more pragmatic alternative. Alternatives to the current farming system will need to strike a balance between producing the mass amounts of food needed and acknowledging the serious environmental impacts involved. Water

1. Shannon L. Ferrell et al., *The Future of Agricultural Law: A Generational Shift*, 18 DRAKE J. AGRIC. L. 107, 108 (2013).

2. Corrine Harris, Opinion, *How to Feed 9.3 Billion People*, DAILY EVERGREEN: WASHINGTON STATE UNIVERSITY, Sept. 18, 2013, available at http://www.dailyevergreen.com/opinion/columns/article_32fa32d4-1fe0-11e3-9330-001a4bcf6878.html?mode=jqm.

3. Matthew Knight, *Study: Organic Yields 25% Lower Than Conventional Farming*, CNN, April 27, 2012, available at <http://www.cnn.com/2012/04/26/world/organic-food-yield/>.

quality, air quality, and habitat degradation are three areas that are heavily impacted by modern farming techniques. At a minimum, in order to mitigate the damage, farming techniques must conform to the improved standards codified under the Clean Water Act (CWA), the Clean Air Act (CAA), and the Federal Insecticide, Rodenticide, and Fungicide Act (FIFRA). However, due to holes in the regulatory system, much of this damage has been allowed to continue unabated, rendering the necessary balance between practicing environmentally friendly food production techniques and the ability to produce the requisite amounts of food off kilter, and often lopsided.

While there are massive federal regulatory schemes to prevent industrial pollution (the CWA, CAA, and FIFRA), regulatory holes and other safe harbors for the agricultural industry have allowed farmers to escape most of the requirements that these regulations place on other polluting industries. Part II of this article covers the impact of modern farming practices. Part III goes on to discuss the issues with the current environmental regulation regimes for agriculture. Improvements must be made to these statutory schemes in order to ensure that they affect the agriculture industry in the same ways that they do other industries. Part IV discusses the potential improvements that could be made to these programs. The solution for agricultural pollution, however, cannot be simply increasing costly regulation on farmers. A balance between food production and environmental needs might be found in providing farmers with various subsidy and incentive programs to offset the cost of the improved practices. Part V covers programs that could encourage such practices.

II. IMPACTS OF MODERN FARMING TECHNIQUES

While current techniques have been developed in order to both feed the world and provide food producers a profitable business, they have had serious environmental consequences. Such negative impacts can be seen in the realm of feedlots, also known as animal feeding operations (AFOs) or concentrated animal feeding operations (CAFOs). There are also serious problems associated with pesticide and fertilizer application, habitat loss, and soil erosion. These problems pose a danger to the environment and to human wellbeing. Feedlots are among the most visible of these impacts.

Feedlots are large operations that provide for the housing and feeding of massive numbers of cows or pigs before they are slaughtered and sold into the food market. While raising such a large number of animals in a small area provides an efficient way to produce low cost

meat, it also can have a number of negative side effects, such as air and water pollution. The main problem from these facilities is the fact that large numbers of animals produce large amounts of waste that can cause serious environmental problems.

Because the goal of CAFOs (feedlots) is for the animals to gain body weight quickly, they are fed large amounts of grain. This in turn leads to large amounts of excrement. One 1,000 pound animal can produce almost sixty pounds of manure a day. Manure, in this case, includes both feces and urine.⁴ When you consider how many animals are contained in feedlots these days, the manure piles up rapidly. According to a study done by the General Accounting Office in 2008, a 3,500 head operation can produce as much as 40,000 tons of manure each year.⁵ Animal waste must, of course, be cleaned in the interest of maintaining animal health and sanitation. The question then becomes one of storage or disposal. Usually, the waste is kept in storage containers or facilities before it is either disposed of or used for another purpose, such as being sold for fertilizer. This stored waste becomes an environmental liability for these facilities because it can contribute greatly to both air and water pollution.

Water pollution from these facilities can occur as leaks and spills from manmade structures or as natural runoff. Leaks and spills come from on-site structures or ponds where the manure is contained.⁶ Water pollution from these facilities can also come in the form of storm water runoff, which occurs when precipitation falls on CAFOs and flushes the animal waste into bodies of water like nearby streams and rivers.⁷ This type of pollution, also known as nonpoint source water pollution, creates a serious regulatory problem for the government under the Clean Water Act; leaks from such facilities can cause serious problems because nonpoint source water pollution can both kill aquatic life and contaminate drinking water. When manure enters the water supply, it can lead to a decrease of oxygen levels in the water, which, in turn, can make it hard for aquatic organisms to breathe. When manure enters drinking

4. *Manure Production Data*, QUEENSLAND GOVERNMENT: DEPT. OF AGRICULTURE, FISHERIES AND FORESTRY (July 1, 2011), <http://www.daff.qld.gov.au/environment/intensive-livestock/cattle-feedlots/managing-environmental-impacts/manure-production-data>.

5. Jeremy Bernfeld, *Beef Feedlots Grapple with Never Ending Waste*, HARVEST PUBLIC MEDIA (Dec. 11, 2012), <http://harvestpublicmedia.org/article/1536/beef-feedlots-grapple-never-ending-waste/5>.

6. J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27-2 *ECOLOGY L.Q.* 263 (2000).

7. Sarah C. Wilson, *Hogwash! Why Industrial Animal Agriculture is Not Beyond the Scope of Clean Air Act Regulation*, 24 *PACE ENVTL. L. REV.* 439 (2007).

water supplies, bacteria levels often increase. Elevated bacteria levels can lead to an increased risk of infections and other diseases for anyone unlucky enough to drink from the contaminated supply.⁸ However, the damage from these operations is not limited to endangering the water supply; it also affects the air.

Air pollution is another problem caused by the issues surrounding modern feedlots. When such large amounts of manure are stored, it often sits for extended periods of time and begins to decompose. As the manure decomposes, it emits a number of gases, such as ammonia, methane, and hydrogen sulfide.⁹ At high levels, these gases can have seriously harmful side effects on humans and the environment. For example, Ammonia and hydrogen sulfide can end up in the atmosphere and can cause respiratory ailments. In addition, Methane is a well-known contributor to global warming.

Besides the production of harmful gases, smell is another factor. Holding a large number of animals and storing large amounts of their manure for extended periods of time is not a particularly odorless process. However, there is little that neighbors to these facilities can do because of the prevalence of “right to farm” statutes, such as those in Washington State.¹⁰ While right to farm statutes make sense in terms of protecting food producers from urban encroachment, there should be some regulation to provide the neighbors confidence that the close by facilities will not affect their water or air needs. Harmful substances are being emitted not only into the air or water, but also directly on the food supply in the form of pesticides and fertilizers.

Although it is known that pesticide and fertilizer use have devastating environmental impacts, the necessity to use such technologies has been recognized and widely accepted. In fact, without the use of modern pesticides, fertilizers, and other chemical additives, the current yields experienced by the agriculture industry would not be possible. As shown in the table below, additives like nitrogen-based fertilizers are extremely important to produce the yields that consumers have come to rely on from farmers. This is not just an expectation of consumers; this is the actual ability to feed the world. Significant enough reductions in yield could result in food shortages.

8. 2 NEIL E. HARL, AGRICULTURAL LAW § 14.01 (Matthew Bender, 2014), *available at* LexisNexis Advance.

9. Wilson, *supra* note 7.

10. WASH. REV. CODE ANN. § 7.48.300 (2014).

Table 1- Estimated Effect of Eliminating N Fertilizer on U.S. Crop Yields¹¹

Crop	Baseline	Without N	Reduction, %
Corn	122	72	41
Cotton	679	427	37
Rice	5,500	4,000	27
Barley	47	38	19
Sorghum	69	56	19
Wheat	32	27	16
Soybean	34	34	0
Peanut	2,281	2,281	0

Without the aid of substances like nitrogen fertilizers, commodities like corn would decline 41% in average yields.¹² Because corn is a major cash and food crop in the United States, such a decline would be a serious blow to the agricultural industry.¹³ This demand for high yields has led to a dependence on chemical substances, leading to heavy use all over the country, which has damaged the environment in a number of ways.

One of the most serious impacts from fertilizer and pesticides comes from water pollution, particularly storm runoff. This occurs when, similar to the runoff problem that occurs with CAFOs, precipitation hits areas that have been sprayed with fertilizer or pesticides. Then, the water

11. News and Views, *Fertilizer Contributions to Crop Yield*, INTERNATIONAL PLANT NUTRITION INSTITUTE (May 2002), [http://www.ipni.net/ppiweb/ppinews.nsf/0/7DE814BEC3A5A6EF85256BD80067B43C/\\$FILE/Crop%20Yield.pdf](http://www.ipni.net/ppiweb/ppinews.nsf/0/7DE814BEC3A5A6EF85256BD80067B43C/$FILE/Crop%20Yield.pdf).

12. *Id.*

13. Gary W. Brester, *Corn*, AGRICULTURAL MARKETING RESEARCH CENTER (Feb. 2012), http://www.agmrc.org/commodities__products/grains__oilseeds/corn_grain/.

containing these substances is washed into surface or groundwater, contaminating habitats and drinking water.¹⁴ This runoff is considered the main culprit for the notorious “dead zones” found in the Gulf of Mexico and the Chesapeake Bay region.¹⁵ Because runoff from CAFOs and fertilized fields are considered nonpoint sources of pollution, they are extremely difficult to regulate under the Clean Water Act and, thus, have been allowed to continue with very little control under the law.

Besides the damage to drinking water and aquatic habitats, pesticides and fertilizer applications also create issues with air pollution. There are two distinct ways that these items pollute the air. First, animal waste stored for use as fertilizer can start to decay and emit dangerous gases.¹⁶ Second, dangerous pesticides can end up in the atmosphere as a result of aerial spraying and in the form of fumigants,¹⁷ which can then expose both humans and wildlife to dangerous chemicals when they are used to treat crops. It is unsettling to think that the chemicals that we need to grow our food can also prove such a danger to nearby humans and wildlife. However, nearby wildlife suffers from exposure to dangerous chemicals and destruction of local habitats.

Habitat degradation comes in many forms and they all have adverse effects. One major problem is the loss of habitat due to conversion of land for agriculture. This trend has left very little unaltered grassland in the United States.¹⁸ Another problem that results from large amounts of land being dedicated to crops is the large amounts of water required to support such growth.¹⁹ This usually means diverting massive amounts of water from other natural sources, usually in the form of damming or irrigation.²⁰ These techniques decrease the availability of water for native flora and fauna, and also drastically alter the natural habitat of the area.²¹ Water is a finite resource, and surface water and groundwater are connected.²² So, when water is pumped from the ground for irrigation, water availability decreases in other places. This practice “can lead to the

14. Ruhl, *supra* note 6.

15. Bina Venkataraman, *Ocean “Dead Zones” on the Rise*, N.Y. TIMES, Aug. 14, 2008, http://www.nytimes.com/2008/08/15/science/earth/15oceans.html?_r=0.

16. Ruhl, *supra* note 6.

17. *Id.*

18. *Id.*

19. *Id.*

20. Kristen Blann, *Habitat in Agricultural Landscapes: How Much is Enough?*, DEFENDERS OF WILDLIFE (2006), http://www.defenders.org/publications/habitat_in_agricultural_landscapes.pdf.

21. *Id.*

22. John H. Davidson, *Agricultural Irrigation*, in *FOOD, AGRICULTURE AND ENVIRONMENTAL LAW* 51, 60 (Envtl. Law Inst., 2013).

elimination of wetlands, playa lakes, prairie potholes, lakes and flowing streams.”²³ Habitat loss and degradation can also occur when land is converted to rangeland or pasture for cattle.

When this land is fenced off and used for raising cattle, the cattle and native species will compete for both food and water resources.²⁴ Such competition can spark politically charged battles between ranchers and environmentalists. For instance, ranchers in Washington State who fear for the safety of their cattle vehemently oppose the reintroduction of the wolf to the Pacific Northwest.²⁵ These conflicts bring the battle between environmental and economic food interests into glaring visibility. Cattle grazing can also be extremely hard on delicate environments. Many areas that are considered favorable for grazing land are “largely arid and rugged; it damages easily and recovers slowly. As a result, livestock grazing has significantly degraded these fragile landscapes.”²⁶ Such damages to the land impact native species’ reliance upon reliance upon it for food and shelter. This type of treatment upon the land has also been known to increase the risk of wildfires in such areas, which poses a great danger to wildlife and their human neighbors.²⁷ Habitat loss and degradation can also occur as a result of water pollution that comes from agricultural sources.

Aquatic habitats can become contaminated when storm runoff occurs from fields that have been treated with pesticide or fertilizer, as well as from AFOs and CAFOs, and then finds its way into nearby aquatic habitats contaminated bodies of water.²⁸ Such pollution also has the drastic effect of creating “dead zones” in runoff areas. The nitrogen in substances like fertilizer cause an increase of photosynthetic plankton in coastal areas, and when this type of plankton decomposes it causes the oxygen in the water to deplete.²⁹ This makes it difficult for many types of native aquatic species to survive, which can eventually lead to death. Two of the most heavily affected areas in the United States include the Gulf of Mexico and the Chesapeake Bay region.³⁰

The damage to bodies of water is not just limited to pollution from chemicals; it also includes the pollution of the soil itself. The continued

23. *Id.*

24. Scott Nicoll, *The Death of Rangeland Reform*, 21 J. ENVTL. L. & LITIG. 47 (2006).

25. Rob Dubuo, *The Northern Rocky Mountain Wolf Delisting: What Would Leopold Think?*, 32 ENVIRONS ENVTL. L. & POL’Y J. 215 (2009).

26. Nicoll, *supra* note 24.

27. *Id.*

28. Ruhl, *supra* note 6.

29. Venkataraman, *supra* note 15.

30. *Id.*

use of land for agricultural purposes also leads to serious problems regarding soil erosion. When land is continually cleared, planted, harvested and replanted for crops, the continuous vegetation cover that would otherwise hold the soil in place disappears for long periods.³¹ The loosened soil is then blown or washed away, often ending up in nearby bodies of water. This soil erosion leads to issues such as increased sedimentation in nearby water bodies. The increase in sedimentation leads to a serious decrease in the quality of the environment for aquatic organisms.³² When the amount of soil sediment increases in a body of water, the amount of sunlight that can reach aquatic plants decreases, thus making it more difficult for them to survive. Higher soil content in the water can also clog the gills of fish and smother other aquatic creatures.³³ When soil erosion increases sedimentation in bodies of water, these sediments can also carry with them the fertilizers and pesticides that were applied when it was still topsoil for cropland.³⁴ This introduction of harmful substances into aquatic environments will do further harm to its inhabitants and anything that utilizes that body of water as a drinking source.

Proper regulatory tools could control problems that result from animal feedlots, pesticides, fertilizers and habitat. However, agriculture is an industry that has been allowed to slip through the cracks when it comes to proper governmental regulation. The gaping holes in the environmental regulatory framework have allowed many of these problems to continue unfettered.

III. PROBLEMS WITH CURRENT ENVIRONMENTAL REGULATION

A. *The Clean Water Act (CWA)*

While there are federal regulations in place that promote environmental protections, there have been many problems within various federal acts that make certain industries difficult to control; specifically, the agricultural industry. For example, the main problem with the Clean Water Act is its difficulties in controlling what is known as nonpoint source pollution.³⁵

31. *Soil Erosion-Cause and Effects*, ONTARIO, MINISTRY OF AGRICULTURE, FOOD, AND RURAL AFFAIRS (Oct. 10, 2012), <http://www.omafr.gov.on.ca/english/engineer/facts/12-053.htm>.

32. Ruhl, *supra* note 6.

33. D. Morse, *Environmental Considerations of Livestock Producers*, J. ANIMAL SCI. 2733–4040 (1995).

34. *Id.*

35. EDWARD B. WITTE & NATALIA MINKEL-DUMIT, *THE CLEAN WATER HANDBOOK*, 193-206 (Mark A. Ryan ed., 3rd ed. 2011).

A nonpoint source is defined as "diffuse runoff and, as described by the EPA 'is caused by rainfall or snow melt moving over and through the ground and carrying natural and human-made pollutants, into lakes, rivers, streams, wetlands, estuaries, other coastal waters, and ground water.'"³⁶ The regulation of nonpoint source pollution is difficult, as it is not the type of pollution that has a distinct source that you can put a cap on and monitor. Much of the water pollution that is associated with agriculture is in irrigation return flows, or runoff from fields that have had fertilizers or pesticides applied to them.³⁷ This is considered nonpoint source pollution, which poses a challenge to the CWA's regulatory scheme.³⁸

The CWA mostly regulates *point* source pollution, which is defined as "any discernible, confined and discrete conveyance . . . from which pollutants are or may be discharged."³⁹ This is done through the National Pollutant Discharge Elimination System (NPDES). Storm runoff from concentrated animal feeding operations falls under the definition of a point source and is, thus, subject to the NPDES requirements. However, it is one of the few water pollutants from agriculture that do fall under this definition.⁴⁰ Because most water pollution coming from agriculture, such as storm runoff that brings fertilizers, pesticides and soils into water bodies, does not fall under this point source requirement, it goes mostly unregulated by the NPDES. Because there is little regulation for these nonpoint sources on a federal scale, the burden shifts to the states. The provisions requiring states to implement nonpoint source control in the original CWA are to be found within sections 208, 303, and 319, and will be discussed below.

Section 208 is considered the initial planning section. It requires state governors to designate problem areas for water quality and then

36. *Id.*

37. *Id.*

38. J.B. Ruhl, *The Environmental Law of Farms: 30 Years of Making a Mole Hill Out of a Mountain*, 31 ENV. L. REP. 10203 (2001).

39. WITTE & MINKEL-DUMIT, *supra* note 35.

40. *Guide Manual on NPDES Regulations For Concentrated Animal Feeding Operations*, EPA, 2 (Dec. 1995), available at <http://nepis.epa.gov/Exe/ZyNET.exe/20012S0L.txt?ZyActionD=ZyDocument&Client=EPA&Index=1995%20Thru%201999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C95THRU99%5CTXT%5C0000018%5C20012S0L.txt&UseR=ANONYMOUS&Password=anonymous&SortMethod=h%7C&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=5&ZyEntry=1>.

create a "planning agency" to develop a plan to rectify the problems in those designated areas. Such agencies were also meant to identify sources of pollution from nonpoint sources such as agriculture.⁴¹ They were not, however, required to control pollution from nonpoint sources, which might explain why the program has had a negligible impact on the nonpoint pollution problem.⁴² Section 303 also requires that states "implement a continuous planning process for all navigable waters within the state."⁴³

Moreover, section 303 introduces the use of Total Maximum Daily Loads (TMDLs) that require states to designate bodies of water that are not meeting established water quality standards. The state is then required to create and implement a TMDL for that body of water. A TMDL is defined as "the amount of a specific pollutant that may be discharged into an impaired water body from all sources, including point and nonpoint sources, to achieve water quality standards."⁴⁴ The program, however, was not specifically designed to address the problem of nonpoint source pollution. While there are these sections to guide states under the CWA, the federal government, through the EPA, has limited power to enforce these regulations, except in an oversight capacity.

Section 319 of the CWA was designed to help address the problem of nonpoint source pollution. Under this section, states were required to assess navigable waters within their borders and, in turn, send those assessments in as reports to the EPA.⁴⁵ If those waters failed to meet the state water quality standards because of nonpoint source pollution, then the states were required to adopt management programs to address that nonpoint source pollution.⁴⁶ Such programs were to include provisions for "enforcement, technical assistance, financial assistance, education, and training programs, for implementation of best management practices."⁴⁷ States were then required to submit the plan to the EPA for approval. Then, with the EPA's approval, a state could receive federal funding for the implementation of their plan. While this section of the CWA is well intentioned, its goal of controlling nonpoint source

41. WITTE & MINKEL-DUMIT, *supra* note 35.

42. Mary Jane Angelo & James F. Choate, *Agriculture and the Clean Water Act*, in *FOOD, AGRICULTURE AND ENVIRONMENTAL LAW*, 147, 148 (2013).

43. WITTE & MINKEL-DUMIT, *supra* note 35, at 195.

44. *Id.*

45. *Id.*

46. WITTE & MINKEL-DUMIT, *supra* note 35.

47. WITTE & MINKEL-DUMIT, *supra* note 35, at 196.

pollution through mostly “best-management practices” has not made enough of an impact to cure the problem.⁴⁸

Despite CWA’s attempts to address the problems with nonpoint source pollution, the indirect and voluntary nature of the provisions, as well as the lack of oversight from the EPA, has weakened their effectiveness. Unfortunately, the CWA is not the only legislation that the government clearly struggles to regulate effectively.

B. The Clean Air Act (CAA)

The Clean Air Act is another example of federal regulation that has allowed the agricultural industry to slip through the cracks. Originally, the CAA did not regulate the agricultural industry because there was not much air pollution associated with the industry to motivate a regulatory scheme.⁴⁹ Today, that has changed, particularly for animal feeding operations and concentrated animal feeding operations. The large amounts of manure produced by such operations are allowed to sit for extended periods and they emit a number of harmful gasses like hydrogen sulfide, ammonia and methane. These substances can have serious impacts, such as respiratory system problems and acid rain.⁵⁰ It seems like this would be the type of problem that the CAA was created to deal with, and for any other industry, it might be. For the agricultural industry, however, such regulatory control under the CAA is sadly lacking. When the CAA was drafted, the picture many might have had in their minds was of large, graying factories with numerous smokestacks belching toxic clouds into the air. Few probably would have associated the picturesque country scene as a source of similar levels of pollution. Unfortunately, the CAA has failed to address the problems associated with this inadequate perception.

One problem with the CAA is that it mostly regulates “major sources” of air pollution. A major source is defined under the CAA as “any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants.”⁵¹ AFOs and CAFOs meet many of the criteria for classification as “major sources” under the CAA’s permitting programs, but as the result of political pressures, the

48. Angelo & Choate, *supra* note 42.

49. Wilson, *supra* note 7.

50. *Id.*

51. 42 U.S.C. § 7412 (2006).

EPA has failed to regulate them as such.⁵² However, there are arguments to be made that part of the agricultural industry, such as AFOs and CAFOs, should actually be included in this definition. Among these arguments are the following: 1) the fact that these feedlots emit the same amount of air pollution as other polluting industries that are classified as major sources; 2) other environmental laws, like the CWA, have started to regulate them as major sources; and 3) states where they have caused serious air pollution have begun treating them as major sources.⁵³

CAA also uses an "objective measurement of pollutants" which does not apply to problems like those caused by offensive odors from AFOs and CAFOs, particularly those created by the unique odor of livestock operations.⁵⁴ Regulation of such problems was once controlled by the ability to bring nuisance suits against feedlot operations, but "Right to Farm" laws, like those found in Washington under Rev. Code Wash. (RCW) § 7.48.300, protect farmers from nuisance suits brought by their non-agricultural neighbors.⁵⁵ While such Right to Farm laws are important in order to protect agricultural land loss due to urban development and encroachment, it means that there must be some other regulatory scheme to protect from air pollution problems that come from such feedlot operations. While the federal government does set the standards for meeting the National Ambient Air Quality Standards (NAAQS), it is up to states to develop state implementation plans (SIPs) to meet these standards. Due to the political power of the agricultural industry, many states choose not to regulate agriculture as heavily under the CAA.⁵⁶

C. Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

A lesser-known regulatory scheme that has failed in effectively regulating the agriculture industry is the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). This particular statutory scheme is used to control the registration of pesticides before their application to farmland. Fertilizers, however, are excluded from this regulation. Before a pesticide can be used, however, it is required that it be registered with the EPA. In order to register a pesticide with the EPA, data about the

52. Teresa B. Clemmer, *Agriculture and the Clean Air Act*, in *FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW*, 163, 167 (2013).

53. Wilson, *supra* note 7.

54. Margaret Rosso Grossman, *Agricultural Land Use in the United States*, in *AGRARIAN LAND LAW IN THE WESTERN WORLD 171–195* (Margaret Rosso Grossman, & Wim Brussaard eds., 1992).

55. WASH. REV. CODE § 7.48.300 (1992).

56. Ruhl, *supra* note 38.

pesticide and its impacts are required to be submitted. On its face this seems like a good system because the data involves testing the pesticides for harmful effects, while also providing that “approved pesticides must be periodically re-registered,”⁵⁷ which allows FIFRA to check to see if harmful effects may develop from the use of a particular pesticide. The real issue with FIFRA regulation is that there is very little EPA control over pesticide usage after it issues a registration for a particular pesticide.⁵⁸ There is no permitting system like other regulatory statutes. There is no EPA approval required before pesticide use after it is registered. There are no environmental performance standards. There are no technology-based standards, as are found in the Clean Water Act or other environmental regulatory schemes. Finally, there is no effective way for the EPA to monitor when and where pesticides are used.⁵⁹

FIFRA does mandate that certain substances only “be applied by certified persons and consistent with their label instructions.”⁶⁰ Requirements for such certification vary depending on what the pesticide is and how it is being used. There are pesticides for “general use,” which can be applied by the general public without a certification.⁶¹ Then there are more potentially harmful substances that are classified for “restricted use.”⁶² For “restricted” substances, certification is required before application. The requirements for certification are divided between private applicators and commercial applicators.⁶³ Private applicators, while requiring certification, may or may not need to have any sort of education or examination before becoming certified. Commercial applicators, however, face a more rigorous testing process through the EPA.⁶⁴ While such a certification process is encouraging, the EPA does not provide direct oversight of the application process. This is disconcerting considering that it is likely that such pesticides are only safe for the environment and for people when they are used and applied in the proper places, with the proper methods, and at the proper levels. As long as the certification is in place, the only real requirement under FIFRA is complying with pesticide “label instructions,”⁶⁵ leaving

57. *Id.*

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

59. Ruhl, *supra* note 38.

60. *Id.*

61. *Id.*

62. *Id.*

63. Ruhl, *supra* note 38.

64. *Id.*

65. *Id.*

open the possibility that applicators, even those who have been properly certified, may misunderstand directions and make mistakes during the application. Although proper oversight authority by the EPA or some other governing body would not eliminate all risks, such mistakes cannot be caught or curtailed with certainty or regularity without oversight mechanisms under FIFRA.⁶⁶ This lack of oversight has led to a failure to monitor a number of problems that result from pesticide applications.

In addition, FIFRA does not require monitoring of primary environmental issues that may be traced back to pesticide use, such as air pollution, water pollution, and habitat degradation that occurs from storm runoff.⁶⁷ In order to better combat these problems under FIFRA, it would be helpful to ensure greater controls earlier in the process, particularly in how these pesticides are applied.

D. Toxic Substances Control Act (TSCA)

There are also concerns with agricultural regulation under the Toxic Substances Control Act (TSCA),⁶⁸ which was primarily designed to manage hazardous chemicals instead of fertilizer use.⁶⁹ The TSCA provides for the registration of chemical components in fertilizers but there is no regulation beyond the registration process.⁷⁰ Unlike FIFRA, which at least has a fairly thorough certification process for some applicators, there are no such restrictions under the TSCA. There are no existing restrictions on how, when, or where fertilizers are used.⁷¹ This is alarming because so much damage has been caused by fertilizer application even when it is applied properly. Considering the various detrimental effects of fertilizer run off, more stringent regulation of this aspect of agricultural production is necessary.

IV. IMPROVING CURRENT REGULATION

Agriculture must be more thoroughly regulated. While requiring the government to force farming operations to follow more stringent regulatory schemes may be costly, the future cost to the environment is even greater if regulatory action is not taken. A healthy environment is necessary for long-term food production; therefore, it is in the interests of

66. *Id.*

67. *Id.*

68. *Id.*

69. Jessica N. Schifano et al., *The Importance of Implementation in Rethinking Chemicals Management Policies*, 41 ENVTL. L. REP. NEWS & ANALYSIS 10527 (2011).

70. Ruhl, *supra* note 38.

71. *Id.*

farmers, consumers, and regulators alike to find sustainable agricultural solutions. In addition to damage resulting from inadequate regulation of farming, land used for food production may become less productive, thereby increasing the total damage inflicted upon the agricultural system as a whole. Finally, because there is a finite amount of arable land, it is important to make the most of the existing workable land. One solution is to improve upon the current regulatory scheme surrounding the agricultural industry. If one of the largest polluting industries in the country does not fall under the control of any existing regulatory scheme designed specifically to prevent such pollution, then some of the measures are either failing, or new regulatory measures need to be implemented.

As mentioned above, farmers and consumers would likely face increases in costs as a result of additional requirements associated with more stringent regulation, such as meeting record keeping and reporting requirements as well as and implementing practices that require more expensive technology or application practices. Accordingly, while more efficient regulation is necessary, it must also be paired with subsidy and incentive programs to help farmers offset the added costs of compliance by providing some impetus for farmers to improve techniques and utilize more adept technologies.⁷²

A. Clean Water Act (CWA)

The CWA is one area where federal legislation can begin its improvement. Perhaps the most pressing issue under the CWA is to implement stronger regulation for nonpoint pollution sources. Nonpoint pollution sources, by definition, are difficult to regulate because they do not come from a definite source that can be pinpointed and monitored. Nonpoint pollution sources are highly varied, ranging from field runoff to irrigation return flows. Such variety makes regulating these sources in a uniform manner very difficult under the CWA.⁷³ However, there are ways in which better regulation might be implemented.

One central issue with the CWA is the lack of power that enables the EPA to enforce its provisions. A Federal Advisory Committee of the EPA noted the problem with enforcing provisions like Sections 208 and 319 is that the “EPA had no ‘hammer’ provision for states not adopting

72. See Section V for an in depth discussion on this subject.

73. JAMES SALZMAN & BARTON H. THOMPSON, JR., ENVIRONMENTAL LAW AND POLICY 161-163 (3rd ed. 2010).

programs and no ability to establish a program if a State chose not to.”⁷⁴ If the EPA actually had the strength to enforce this regulation, it would likely be more effective. However, such enforcement power is unlikely to come considering the recent budget cuts that the EPA has faced.⁷⁵ Without the legal ability or the money and the personnel to monitor agricultural operations, proper enforcement of regulations becomes much more difficult. However, technology could help combat some of these regulatory difficulties.

Technological improvements could be another option for filling the enforcement gaps in the CWA. Even if nonpoint pollution sources, such as agricultural storm runoff, were included in the definition of point sources, they cannot necessarily be regulated in the same way because they are inherently different types of pollution. However, this difference can be combatted preventatively. Such as the situation with GM foods, technology can be developed that will be less reliant on pesticides and fertilizers. There are also technological improvements, such as drainage systems, that prevent pesticides and fertilizers from reaching groundwater, drinking water, or the ocean.⁷⁶ If such technologies and techniques were perfected and made widely available and affordable, farmers might have a chance at improving a situation where the current CWA has been ineffective.

B. The Clean Air Act (CAA)

The CAA could be more effective if it categorized farming operations, particularly animal feeding operations, as major sources of industrial air pollution so as to require their compliance under the CAA. While air pollution is not the first thing that comes to mind when one thinks of agricultural pollution, it is created by agricultural activities, and the CAA needs to be amended to address the issue.

Another way in which agricultural air pollution could be more effectively controlled under the CAA would involve improving the EPA’s enforcement methods. In 2005, the EPA developed a consent agreement with animal feeding operations across the country, agreeing that it would not sue them for various civil violations involving “animal

74. J.B. RUHL ET AL., *THE PRACTICE AND POLICY OF ENVIRONMENTAL LAW* 267-269 (2nd ed. 2010).

75. Patrick Ambrosio, *President Proposes Cut To EPA Funding for Fiscal Year 2015*, BLOOMBERG BNA, Mar. 6, 2014, <http://www.bloomberg.com/news/2014-03-06/president-proposes-cut-to-epa-funding-for-fiscal-year-2015.html>.

76. Julie Buntjer, *New tiling technique stores water, nutrients in soil*, WORTHINGTON DAILY GLOBE, Aug. 29, 2013, <http://www.dglobe.com/content/new-tiling-technique-stores-water-nutrients-soil>.

waste emission units.”⁷⁷ In order for the EPA to do this, the animal feeding operations had to allow the EPA to monitor their farms as part of a “study of air pollution emissions and monitoring methodologies, pay nominal penalties, [and] eventually apply for coverage under the necessary Clean Air Act permits.”⁷⁸ While this would seem like a reasonable plan, the EPA has taken a long time to do this monitoring work. The study did not begin until 2007 and, as of 2012, the “final emission-estimating methodologies” have yet to be released.⁷⁹ Currently, only the drafts of these methodologies are available for public comment.⁸⁰ Moreover, the EPA’s studying of activities are only continuing at twenty-one facilities, though the agreement covered farms numbering in the thousands.⁸¹ While this seems like a well-intentioned effort on the part of the EPA to come to a peaceful solution and obtain more information for solving the problem of agricultural air pollution, it seems to have moved away from its original goal. The EPA needs to return its focus back to its main goals of finding the best ways to monitor and prevent such pollution as well as asserting its authority to require that farming facilities use the available monitoring equipment and submit samples of the data they produce.⁸²

C. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)

There are a number of ways in which FIFRA could improve its regulation of pesticide and fertilizer application. While the FIFRA requires the licensing of pesticides and some applicators, the oversight should not stop there. Once a pesticide is registered under FIFRA, there are no requirements on how, where, or when it is used.⁸³ The only real limitation that exists is that users must follow the label instructions for any particular substance.⁸⁴ Therefore, FIFRA should require even licensed agricultural users to notify the EPA of their use of any pesticide substance so the EPA knows who is applying it as well as when and where it is being used. This way, the EPA is not only monitoring the use

77. Teresa B. Clemmer, *Agriculture and the Clean Air Act*, in FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW 163, 175 (Envtl. Law Inst., 2013).

78. *Id.* at 163, 174.

79. *Id.*

80. *Agriculture – Air Monitoring: Basic Information*, EPA, <http://www.epa.gov/airquality/agmonitoring/basicinfo.html>.

81. Clemmer, *supra* note 77.

82. *Id.*

83. Mary Jane Angelo, *The Federal Insecticide, Fungicide, and Rodenticide Act*, in FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW 129, 132 (Environmental Law Institute, 2013).

84. *Id.* at 129, 133.

of such substances for their impact on human populations, but also is evaluating the impact of the environment, which has not been traditionally weighed in when determining the correct uses of these substances.⁸⁵ The EPA could also offer assistance to applicators that may not understand the label instructions if they have a better understanding of when and where these substances are being applied. Such a requirement, however, is a tall order for an agency that is often lacking in staff and budgetary resources. In order to meet the goals of increased monitoring and presence in places where these pesticides are being used, the EPA needs additional personnel and resources.⁸⁶

D. Toxic Substances Control Act (TSCA)

A stronger regulatory presence would increase the efficacy of the TSCA. The registration of the potentially dangerous chemical components of fertilizers is important but the regulation must extend further than a mere filing. Like FIFRA, there should be a registration requirement for the fertilizers themselves so the EPA can monitor when, where, and how these items are being used. Furthermore, education requirements on safe application processes should be implemented so that users know how to practice safe habits before they are allowed to register. This would allow the EPA to regulate fertilizers like it does pesticides and prevent some of the environmental damage that has been caused by massive amounts of fertilizer application in American agriculture.

The holes in the environmental regulatory system for the agricultural industry are obvious. In some instances, it is simply a matter of better enforcement and oversight. In others, it is the failure to include the agricultural industry as a polluter. In any case, the agricultural industry has been allowed to circumvent a number of these regulations, and it has allowed farming pollution to continue with little control or mitigation.

V. SUBSIDY AND INCENTIVE PROGRAMS FOR SUSTAINABLE FARMING

Federal subsidy and incentive programs are an important aspect of improving regulation of the agricultural industry. Such programs encourage those responsible for pollution to take control and mitigate

85. *Id.*

86. Ronald White, *EPA Sustains Major Cuts to Developing and Enforcing Safeguards in FY 14 Appropriations*, CENTER FOR EFFECTIVE GOVERNMENT (Feb. 3, 2014), <http://www.foreffectivegov.org/blog/epa-sustains-major-cuts-developing-and-enforcing-safeguards-fy-14-appropriations>.

detrimental effects of pollutants, with both their profit and environmental balance in mind. Additionally, there are studies suggesting that cooperative enforcement, rather than deterrence-based enforcement, is more successful when it comes to environmental issues.⁸⁷ Cooperative measures could include increased support for existing programs that encourage sustainable farming practices. Such sustainable practices would include preserving land in its natural state, restoring damaged habitats, and developing technology that makes large scale farming more environmentally friendly.

A. Conservation Reserve Program (CRP)

One program that has proven successful is the Conservation Reserve Program.⁸⁸ The CRP is a federal program that was established by the 1985 Farm Bill.⁸⁹ The program was designed to encourage farmers to conserve some of their land by allowing the federal government to essentially rent plots of land from farmers that were formerly utilized for crops.⁹⁰ The land is then replanted with natural plant cover to prevent problems like soil erosion, a problem that is commonly associated with heavily farmed areas.⁹¹ There is even a provision that allows farmers to still use the land in minimally invasive ways for a reduction in the government rental payments.⁹²

While the CRP has proven to be a well-intentioned program, there are still some improvements that might be made. First, the thirty-two million acreage cap that was placed on the program in 2012 could be removed, in order to allow more participants to enroll.⁹³ Second, it might be necessary to increase the amount in rental payments that is being offered by the government. Currently, farmers are being offered more to rent their land to grow large commodity crops, like corn and soybeans.⁹⁴ This system has caused many farmers to opt out of conserving their land

87. CLIFFORD RECHTSCHAFFEN & DAVID L. MARKELL, REINVENTING ENVIRONMENTAL ENFORCEMENT, 213-288 (2003).

88. *Conservation Reserve Program*, NATIONAL SUSTAINABLE AGRICULTURE COALITION, <http://sustainableagriculture.net> (last visited April 2014).

89. Margaret Rosso Grossman, *Agrarian Land Law in the Western World*, in *AGRARIAN LAND LAW IN THE WESTERN WORLD* 171-195 (Margaret Rosso Grossman & Wim Brussaard eds., 1992).

90. Mary Jane Angelo & Joanna Reilly-Brown, *An Overview of the Modern Farm Bill*, in *FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW* 13, 21 (Environmental Law Institute, 2013).

91. *Id.* at 13, 22.

92. NATIONAL SUSTAINABLE AGRICULTURE COALITION, *supra* note 88.

93. *Id.*

94. Juliet Eilperin, *Battle in the Plains: Preserving prairies*, THE WASHINGTON POST, Sept. 23, 2013, at A5.

under the CRP.⁹⁵ It is important to recognize that farmers, while they may care a great deal about the environment, are still running businesses. It is understandable that they might choose profit over the environment when cash crops offer such high returns. Without making conservation a more profitable alternative against these cash crops, the CRP program might fail entirely.⁹⁶ In the interest of keeping farmers' profit margins in mind, it would also be helpful to keep the provision that allows farmers to still use the tracts of land that the government rents in minimally invasive ways, but without the reduction in the rental payments. Such an incentive might encourage even more farmers, especially smaller producers who cannot spare much arable land while still being profitable, to join the program if they are allowed to still use it in some way.⁹⁷

B. Wetlands Reserve Program (WRP)

Another federal program to enhance is the Wetlands Reserve Program. This program utilizes long term or permanent easements to restore wetland areas that have been utilized for agricultural production.⁹⁸ The program also provides technical assistance to some participants to try to restore the land to its original, natural state.⁹⁹ WRP could be improved by allowing more farmers to participate in it. Currently, only about 10 percent of the country's farmland acreage is enrolled in the program.¹⁰⁰ Higher enrollment, however, would require more money to fund these easements, and that money was not forthcoming under the 2014 Farm Bill.¹⁰¹ With higher funding and enrollment, however, the benefits of this program could be far-reaching.

C. Wildlife Habitat Incentives Program (WHIP)

Although no changes to its current incentive structure are warranted, one successful federal program worth mentioning is the Wildlife Habitat Incentives Program (WHIP). This program provides financial aid to farmers who are attempting to restore and conserve

95. *Id.*

96. *Id.*

97. NATIONAL SUSTAINABLE AGRICULTURE COALITION, *supra* note 88.

98. *New USDA Report Highlights Successes of the Wetlands Reserve Program*, NATIONAL SUSTAINABLE AGRICULTURE COALITION (August 23, 2011), <http://sustainableagriculture.net/blog/new-usda-report-on-wrp>.

99. *Id.*

100. *Id.*

101. *Conservation Easement Funding Deadline Announced*, NATIONAL SUSTAINABLE AGRICULTURE COALITION (May 2, 2014), <http://sustainableagriculture.net/blog/2014-acep-sign-up>.

habitat for native wildlife.¹⁰² The impact on the land and habitat is important, but it is also important to keep in mind the animals that rely on that land. The WHIP provides “both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat.”¹⁰³ This is a fairly strong show of support for wildlife conservation, considering the state of other federal regulation for the agricultural industry.¹⁰⁴

D. Environmental Quality Incentive Program (EQIP)

The Environmental Quality Incentives Program (EQIP) is another valuable federal program that allows farmers to enter into contracts with the government in order to utilize their land for various conservation purposes.¹⁰⁵ The government offers farmers financial aid for implementing environmentally friendly conservation practices on their land under ten-year contracts.¹⁰⁶ Such practices include conservation planting, water conservation, and energy conservation.¹⁰⁷ Some improvements could also be made to the EQIP. One subprogram that merits higher funding under the EQIP is known as the Conservation Innovation Grants Program.¹⁰⁸

E. The Conservation Innovation Grants Program and Technology Development

1. The Conservation Innovation Grants Program

The Conservation Innovation Grants program is particularly valuable because it supports the development of environmentally friendly farming techniques.¹⁰⁹ Under this subprogram program of the EQIP, which is administered by the Natural Resources Conservation Service,

102. Megan Stubbs, *Agricultural Conservation: A Guide to Programs*, CONGRESSIONAL RESEARCH SERVICE REPORTS 19 (2010), <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1010&context=crsdocs>.

103. *Wildlife Incentives Program*, NATIONAL RESOURCES CONSERVATION SERVICE (2014), <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/whip/>.

104. *Id.*

105. *Environmental Quality Incentives Program*, NATIONAL SUSTAINABLE AGRICULTURE COALITION (October 2014), <http://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/environmental-quality-incentives-program/> [hereinafter EQIP].

106. *Id.*

107. *Id.*

108. *Conservation Innovation Grants Program*, NATIONAL RESOURCES CONSERVATION SERVICE (October 2014), <http://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/conservation-innovation-grants/>.

109. *Id.*

the federal government awards competitive grants to anyone who presents a proposal to develop innovative techniques and technologies for agricultural use.¹¹⁰ Current Conservation Innovation Grants include plans to improve soil health, irrigation technology, and nitrogen and phosphorus runoff from fields.¹¹¹ Unfortunately, the funding for this promising program was cut from \$37.5 million per fiscal year to \$25 million.¹¹² Without the requisite funding, these types of projects could fail to have a lasting impact on the agricultural industry. If funding for such projects could be increased and their uses expanded, the benefits for the environment and for the agricultural industry could be enormous.

Such techniques could go beyond mitigating past damage and help make the industry an environmentally sustainable one. The government should increase the funding for this program from the twenty million that is already designated under the EQIP, in order to award more grants to those who develop environmentally friendly farming technology. While funding for conservation under the EQIP is important, funding for projects must look beyond just remedying damage that has already been caused. Additional funding is needed for the types of projects that create solutions to meet the current demand for high of agricultural yields without continued environmental harm. Developing conservation practices could not only prevent harm in the future, but could also heal some of the harm that has already been done.

While land set aside programs like the CRP and WRP and working land programs such as the EQUIP are a step in the right direction in terms of sustainable farming practices, they are only one step in a long journey. Technological development should also play a starring role in any plan to build a sustainable agricultural industry.

2. Technology Development

Technology development incentives are an essential part of the balancing act between decreasing detrimental environmental impacts of the agricultural industry without severely decreasing the vitality of the industry. Technological advancements once helped solve the issue of food security for the agricultural industry with the creation of “high-yielding varieties of rice and wheat,” and “the expansion of irrigation

110. EQIP, *supra* note 105.

111. *FY 2013 Conservation Innovation Grant National Awardees*, NATIONAL RESOURCES CONSERVATION SERVICE (2013), <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/cig/?cid=stelprdb1186125>.

112. Agricultural Act of 2014, H.R. 2642, 113th Cong. §2207 (2014).

infrastructure.”¹¹³ Such technological advancements could be used again to help industrial agriculture become increasingly sustainable while minimizing and even decreasing the overall impacts of such practices on the natural environment. The use of innovative technology in farming operations could have some exciting possibilities, such as the use of captured methane from a dairy farm to produce electricity.¹¹⁴ Controlled drainage systems have been successful in Minnesota and Iowa, which prevent fertilizer-contaminated runoff from draining into larger water bodies.¹¹⁵ This technology is better for both the environment and farmers, and has been partly funded by aid from the EQIP.¹¹⁶

One technique that might merit more attention under the Conservation Innovation Grants program is the concept of genetically modified (GM) foods, also known as genetically modified organism (GMO).¹¹⁷ While GM foods are still a politically and scientifically controversial issue, if the science behind them is perfected, the beneficial effects of such technology upon the natural environment could be substantial. Crops could be modified in order to produce toxins that are deadly to some pests, but safe for other harmless or necessary insect life.¹¹⁸ This could allow for a significant decrease in the use of some pesticides.¹¹⁹ Crops could also be designed to be hardier, which could decrease the need for chemical fertilizers and herbicides and, thus, decrease problems associated with agricultural runoff.¹²⁰ GM plants could also be designed to improve yields without requiring greater land usage, thus maintaining the food supply without putting greater pressure on native wildlife and resources.¹²¹ One recent success story about this

113. *Role of Technology in Agriculture*, THE DUPONT ADVISORY COMMITTEE ON AGRICULTURAL INNOVATION AND PRODUCTIVITY, 3 (2010), <http://foodsecurity.dupont.com/wp-content/uploads/2012/07/DuPont-Agriculture-Committee-The-Role-of-Technology-in-Agriculture.pdf>.

114. *Fiscalini Farms Methane Capture Project*, THE CARBON NEUTRAL COMPANY (2015), <http://www.carbonneutral.com/carbon-offsets/fiscalini-farms-methane-capture-project>.

115. Julie Buntjer, *New tiling technique stores water, nutrients in soil*, DAILY GLOBE, Aug. 30, 2013, available at <http://www.dglobe.com/content/new-tiling-technique-stores-water-nutrients-soil>.

116. *Id.*

117. Marc Lallanilla, *GMOs: Facts About Genetically Modified Food*, LIVE SCIENCE, November 1, 2013, available at <http://www.livescience.com/40895-gmo-facts.html>.

118. Damian Carrington, *GM Crops Good for the Environment, Study Finds*, THE GUARDIAN, June 13th, 2012, available at <http://www.theguardian.com/environment/2012/jun/13/gm-crops-environment-study>.

119. *Id.*

120. Jason J. Czarneski & Emily Montgomery, *Genetically Modified Organisms and the Environment*, in FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW 93, 96 (Env'tl. Law Inst., 2013) [hereinafter ELI].

121. *Id.*

type of technology is about a modified potato designed to resist bruising, which causes a number of potatoes to be discarded. This technology could help cut down on the amount of potatoes that are wasted, allowing more of them to go into the food supply and perhaps decreasing the amount of land needed for their cultivation.¹²² With such successes already in the making, it is easy to see how this technology could benefit the agricultural industry and the environment.

While there are many benefits to the use of GMOs, there are also potential risks. For example, the long-term effects of pest or herbicide resistant crops are unknown, and they could be harmful to the environment or the human population.¹²³ Pest-resistant crops have promulgated the evolution of “super bugs” that are resistant to the crops’ natural toxins.¹²⁴ Given that such risks exist, GM foods should not be the only technological advancement relied upon by the agricultural industry. Other environmentally sustainable techniques and technologies should be pursued and utilized in order to prevent further damage from occurring. Such technological advancements, however, will be much more difficult, if not impossible, to obtain unless knowledgeable and motivated people get the right amount of support from the federal government.¹²⁵

New technology that decreases or even eradicates the problems often associated with industrial scale agriculture will make the food we eat safer, the land we live on more habitable, the air we breathe fresher, and the water we drink cleaner. Technology could thrive under Conservation Innovation Grants program and explore the possibilities of GM foods. While there are many options and strategies for how to fix the problems that agricultural pollution has caused, there also needs to be consideration for the future, which dedication to the pursuit of technological developments represents.

VI. CONCLUSION

The negative effects of agricultural industry practices of the past and present can be seen in everything from air and water pollution in our

122. Andrew Pollack, *U.S.D.A. Approves Modified Potato. Next Up: French Fry Fans.*, N.Y. TIMES, November 7, 2014, available at http://www.nytimes.com/2014/11/08/business/genetically-modified-potato-from-simplot-approved-by-usda.html?emc=edit_tnt_20141107&nliid=68689121&tntemail0=y&_r=1.

123. ELI, *supra* note 120, at 97.

124. *Id.* at 98.

125. *Research and Development: Essential Foundation for U.S. Competitiveness in a Global Economy*, NATIONAL SCIENCE BOARD (Jan. 2008), <http://www.nsf.gov/statistics/nsb0803/start.htm?CFID=13958706&CFTOKEN=75798913&jsessionid=f030beaa014e47cf79d52b6133524147e3d1>.

lakes, rivers and aquifers, to habitat degradation from the prairies to the Gulf of Mexico. In part, damage associated with such negative effects can be blamed on the failure of current legislative schemes to effectively oversee the agricultural industry. The CWA, CAA, FIFRA and TSCA all fail to regulate primary pollutants from the industry in significant ways, whether by failing to prohibit the use of certain pollutants or simply not having sufficient oversight to prevent pollution from occurring. Better regulatory schemes, support for federal conservation programs that help farmers to be more environmentally friendly, and the encouragement of technology are all needed to protect the environment from harm and facilitate its recovery.

The agricultural industry never intended to destroy the earth for the sake of profit. Instead, the damage that the industry has caused is a result of the ever-mounting pressure to feed a growing global population at a cost that is affordable to the majority of consumers. This, coupled with decades of poor regulation and a lack of understanding of how industrialized farming affects the environment in the long term, has led to the serious issues we see today. Now, the key is to find a balance between environmentally sustainable farming and the need to feed the world. This balance will require a combination of improved federal regulation, government and market incentives for producers to use sustainable practices, and development of technologies that will allow the farmers of tomorrow to use that land more effectively. Such a balance could be the key to saving the world we love, and feeding the people in it.