

THE COMMERCIALIZATION OF CONSERVATION: USING ECONOMIC PRINCIPLES TO PROMOTE SUSTAINABILITY

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I. INTRODUCTION

“Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail’s pace; . . .”¹ Sixty-eight years after his death, the words of Aldo Leopold resonate loudly today as mankind continues to struggle to find the balance between production and preservation. Industrialization has allowed humans to build and progress, but has also compromised air and water quality in the process of development. Air quality concerns have largely been linked to greenhouse gas emissions from cars and power plants. Large scale agriculture, though, has been a centerpiece for discussing water quality issues. The Farm Bill and Clean Water Act have allowed for a voluntary approach to mitigation of water pollution from agriculture.² Yet allowing farmers

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1. ALDO LEOPOLD, A SAND COUNTY ALMANAC AND SKETCHES HERE AND THERE 207 (spec. commemorative ed. 1989).

2. SOREN RUNDQUIST & CRAIG COX, ENVTL. WORKING GRP., FOOLING OURSELVES: VOLUNTARY PROGRAMS FAIL TO CLEAN UP DIRTY WATER 4 (2016), http://static.ewg.org/reports/2016/fooling-ourselves/EWG_FoolingOurselves.pdf.

to pick and choose when and how they implement conservation practices into their operations has not led to a decrease in water contamination from agriculture.³ Therefore, the proposal for stricter regulations in agriculture has gained momentum in the academic and political arenas. Nevertheless, these proposals have been met with strong opposition from the agricultural industry, creating adversarial strains between producers and environmentalists.

The environmental concerns related to the agricultural sector are real and valid. Yet the economic concerns for producers are equally troublesome. This Note explores the commercialization of conservation by analyzing the interconnectedness of the environment, farmers, and industrial agriculture. First, this Note lays out the environmental impacts of agriculture, as well as the economic constraints of farmers. Environmentalists argue there is a need to increase regulation of agriculture to improve soil health and water quality.⁴ Yet farmers stand by their production practices, insisting they are financially pressured to maximize crop production and that regulation could drive farms out of business.⁵ Part III of this Note examines the farmers' market power and relationship to industrial agriculture. Finding the agricultural companies' market power far exceeds the farmers', this Note suggests farmers operate at the hand of the agricultural industry. Therefore, in order to improve the relationship between farmers and the environment, policy must also provide a role for industrial agriculture. Part IV proposes using economic tools to create markets for sustainability by incentivizing agricultural companies to sell inputs—such as cover crops—and the biofuel industry to invest in sustainable cellulosic fuels. A tax subsidy system provides companies with an opportunity to earn profit without diminishing farmers' profit margin. This market-driven approach stimulates the use of practices such as cover crops and buffer strips by making conservation commercially practical. This Note concludes by highlighting the complexity of the agricultural economic model and the connection between commercialization and conservation.

II. CONTENTION IN SUSTAINABLE AGRICULTURE AND LAND USE REGULATION

In order to begin regulating agriculture, it is important to understand what elements of the industry may need to be addressed. Concerns about agricultural runoff that contaminates the water supply with soil and nutrients have made headlines across the country. The "Dead Zone" in the Gulf of Mexico is estimated to

3. *Id.*

4. *Id.*

5. Christopher Doering, *Ag Leader: U.S. Regulation Threatens Farmers, Ranchers*, DES MOINES REG. (Jan. 11, 2015, 7:14 PM), <https://perma.cc/7SMV-GVZG>.

grow up to 6823 square miles in 2016, larger than the state of Connecticut.⁶ The hypoxic zone kills and displaces the wildlife in the area, affecting local ecosystems and fishing industries.⁷ Much of the turmoil in the Gulf can be attributed to agricultural runoff from states upstream of the Mississippi River.⁸ In May 2016, approximately “146,000 metric tons of nitrate and 20,800 metric tons of phosphorus flowed down the Mississippi and Atchafalaya rivers into the Gulf”⁹ Despite ongoing concerns about the contamination of the Gulf, Midwestern states had not seen immediate consequences of agricultural runoff until their own local waters were found to be compromised.¹⁰ In January 2014, Des Moines Water Works notified its intent to sue the Boards of Supervisors for Sac, Calhoun, and Buena Vista Counties in northwest Iowa for a violation of the Clean Water Act (CWA).¹¹ Des Moines Water Works claimed agricultural drainage ditches were point-sources of pollution that require permits under the CWA.¹² The lawsuit against the agricultural region in Iowa has put farming and conservation practices of modern production on trial. Consequently, the struggle to find a balance between conservation and production has sparked debate and created tension between the agricultural and environmental communities.

A. Concerns of the Farmer

The pressure on farmers to change their practices and expand conservation efforts has put many producers on the defense. American farmers take pride in their profession, production, and care for the land. With only 2% of the American population identified as farmers and ranchers, producers are heavily relied on for feeding the world while being stewards of the land.¹³ Despite the large responsibilities on farmers, many family farms have been consolidated as they struggle to

6. *Average ‘Dead Zone’ for Gulf of Mexico Predicted*, NAT’L OCEANIC & ATMOSPHERIC ADMIN. (June 9, 2016), <https://perma.cc/T468-8QMX> [hereinafter ‘*Dead Zone*’].

7. *Id.*

8. *Id.*

9. *Id.*

10. See DAVID OSTERBERG ET AL., THE IOWA POLICY PROJECT, ASSESSING AGRICULTURAL POLICY IMPLICATIONS FOR THE MISSISSIPPI BASIN 10 (May 2016), <http://iowapolicyproject.org/2016docs/160504-manure.pdf>.

11. Letter from Bd. of Water Works Trs. of the City of Des Moines, Iowa, Des Moines Water Works, to Rick Hecht, Chairperson of the Sac Cty. Bd. of Supervisors, Gary Nicholson, Chairperson of the Calhoun Cty. Bd. of Supervisors, Dale Arends, Chairperson of the Buena Vista Cty. Bd. of Supervisors (Jan. 9, 2014) (on file with author).

12. *Id.*

13. *Fast Facts About Agriculture*, AM. FARM BUREAU FED’N, <https://perma.cc/DZY3-Z92V> (archived Oct. 8, 2017) [hereinafter *Fast Facts I*].

maintain a profit.¹⁴ Therefore, farmers often perceive environmentalists as ungrateful, demanding, and unrealistic, which creates disputes between interest groups.

The American Farm Bureau Federation (AFBF) is a non-governmental organization that seeks to represent producers as the “voice of agriculture” on an international, national, state, and county level.¹⁵ According to AFBF, there are two million farms across America, 99% of which are operated by farm families.¹⁶ Since 1950, food production in the U.S. has increased 262%, with 2% fewer inputs.¹⁷ The efficient agricultural production boosts the U.S. economy by consistently contributing over 150 billion dollars of value to the GDP since 2012¹⁸ and producing approximately 20% of the world’s supply of grain in the 2015-2016 growing season.¹⁹ Further, “[m]ore than 21 million American workers, 15 percent of the total workforce, produce, process and sell the nation’s food and fiber.”²⁰

In addition to the efficiency of modern agriculture and its contribution to the food supply and economy, farmers claim they have already taken conservation efforts to ease the environmental impacts of production.²¹ According to AFBF:

Farmers have enrolled 31 million acres in the Conservation Reserve Program [CRP] to protect the environment and provide habitat for wildlife. Since its inception in 1985, the program has helped reduce soil erosion by 622 million tons and restored more than 2 million acres of wetlands.²²

The 2012 National Resources Inventory summary report shows national soil erosion was cut by 44% between 1982 and 2012.²³ Tillage practices have also

14. James M. MacDonald, *Cropland Consolidation and the Future of Family Farms*, USDA (Sept. 3, 2013), <https://perma.cc/YHA9-24LE>.

15. *Working Together to Build Strong Agricultural Communities Since 1919*, AM. FARM BUREAU FED’N, <https://perma.cc/P3RP-BK9Q> (archived Oct. 8, 2017).

16. *Fast Facts I*, *supra* note 13.

17. Ariz. Farm Bureau, *America’s Farmers Are Growing More with Less: American Agriculture’s Environmental Success Story*, FILL YOUR PLATE (May 19, 2010), <https://perma.cc/R94B-BJZT>.

18. *Industry Data*, BUREAU ECON. ANALYSIS (Apr. 21, 2017), <https://perma.cc/UY26-U3V7> (follow “Value Added by Industry” hyperlink; then follow “Annual” hyperlink).

19. *Id.*

20. *Minnesota Farmers CARE About Food*, MINN. FARM BUREAU, <https://perma.cc/BM6U-4RWM> (archived Oct. 14, 2017).

21. *See Fast Facts About Agriculture*, AM. FARM BUREAU FED’N, <https://perma.cc/9E8J-A9WZ> (archived Oct. 14, 2017) [hereinafter *Fast Facts II*].

22. *Id.*

23. U.S. DEP’T OF AGRIC., SUMMARY REPORT: 2012 NATIONAL RESOURCES INVENTORY 14 (2015), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd396218.pdf [hereinafter SUMMARY REPORT].

evolved to improve conservation; in 2012, 173.1 million acres of the 278.8 million acres farmed used no-till or conservation tilling practices.²⁴ Moreover, 10.3 million acres were planted in cover crops to improve soil quality and reduce erosion, and 13.2 million acres were protected from development by perpetual conservation easements.²⁵

As farmers seek to sustainably supply the world with food, fuel, and fiber, many struggle to maintain an operation that is both environmentally conscious and profitable. AFBF reports, “[f]armers and ranchers receive only 16 cents out of every dollar spent on food”²⁶ To illustrate farm financials, ratios are commonly used to provide a standardized method of measurement and comparison of profitability, solvency, liquidity, and financial efficiency.²⁷ Solvency and liquidity measure a farm’s ability to pay off debt; solvency considers all debt, while liquidity considers only short-term debt.²⁸ Profitability ratios analyze the relationship between farm expenses and revenue, and efficiency ratios determine how much of the revenue made is available to the farmer as income.²⁹ Generally, farmers with larger economies of scale have more financial stability. However, the agricultural industry is cyclical, and even Iowa farmers—the largest producers of corn, soybeans, poultry, and pork³⁰—are pressured for income.³¹ The following table lists financial ratios, strong and weak benchmarks for the ratios, Iowa’s 2005–2014 average ratio, and Iowa’s 2015 average ratio:

24. U.S. DEP’T OF AGRIC., 2012 CENSUS OF AGRICULTURAL HIGHLIGHTS: CONSERVATION 1 (July 2014), https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Highlights/Conservation/Highlights_Conservation.pdf [hereinafter 2012 CENSUS].

25. *Id.* at 2.

26. *Fast Facts I*, *supra* note 13.

27. See *Financial Ratios*, FIN. ANALYSIS, <https://perma.cc/CBE7-CVSJ> (archived Oct. 8, 2017).

28. ALEJANDRO PLASTINA, IOWA STATE UNIV., FINANCIAL PERFORMANCE MEASURES FOR IOWA FARMS 1 (Jan. 2016), <https://www.extension.iastate.edu/agdm/wholefarm/pdf/c3-55.pdf>.

29. *Id.* at 4.

30. *2016 State Agriculture Overview: Iowa*, USDA, <https://perma.cc/PX6A-HZE7> (archived Oct. 8, 2017).

31. See generally ALEJANDRO PLASTINA, IOWA STATE UNIV., IOWA FARM FINANCIAL CONDITIONS IN 2015 (Sept. 2016), <https://www.extension.iastate.edu/agdm/wholefarm/pdf/c1-11.pdf>.

TABLE 1.

Financial Ratio	Strong Ratios ³²	Weak Ratios ³³	2005–2014 IA Average ³⁴	2015 IA Average ³⁵
Operating Profit Margin	> 25%	<10%	23%	4.5%
Return on Assets	>8%	<2%	7.9%	0.9%
Net Farm Income Ratio	Varies: compare with local trends		25%	7%
Debt to Asset Ratio	<30%	>70%	20%	24%
Current Ratio	>1.50	<1.0	4.47	2.74

As illustrated by the debt-to-asset ratio and current ratio, farmers have maintained solvency and liquidity and their ability to pay off debt.³⁶ However, Iowa's 2015 farm ratios for profitability and financial efficiency fell below the line of stability.³⁷ The operating profit margin (OPM) measures the portion of farm sales or revenue that is actually profit for the business.³⁸ In 2015, Iowa's OPM indicates only 4.5% of all gross revenue earned is profit available for farm investments.³⁹ Moreover, a low return on assets signals the farm has invested in and held assets that attribute little to overall income.⁴⁰ Lastly, the net farm income ratio (NFIR) measures financial efficiency with the proportion of business's gross revenue available to the farmer as personal income.⁴¹ In Iowa, a healthy NFIR ranges between 12% and 33%,⁴² demonstrating farmers had much less income than normal with an NFIR of only 7% in 2015.⁴³ In turn, the 2015 farm ratios indicate farmers are able to pay off their debts, but do not have large profit margins or individual

32. DAVID KOHL, VA. TECH. UNIV., FARM FINANCIAL RATIOS AND BENCHMARKS 1 (Mar. 2009), <http://cdp.wisc.edu/pdf/farmfinancialratiosandbenchmarks3192009.pdf>.

33. *Id.*

34. PLASTINA, *supra* note 28, at 4.

35. *See* PLASTINA, *supra* note 31, at 10.

36. *See id.*

37. *See id.*

38. *See id.*

39. *Id.*

40. PLASTINA, *supra* note 28, at 1-2.

41. PLASTINA, *supra* note 31, at 10.

42. PLASTINA, *supra* note 28, at 4.

43. PLASTINA, *supra* note 31, at 10.

incomes to put back into the farm operation.⁴⁴ Therefore, farmers are not in a position to make investments in conservation, as they are already struggling to cover debts and sustain a farm and personal income.

In conclusion, the cyclical agriculture industry can bear financial hardships on farmers, making it economically impractical to expand conservation efforts. Nonetheless, farmers take pride in their land and care for its resources to the best of their ability. A cultural admiration for hard-working American farmers and farm families spurs great resistance to government interference with agricultural production and creates a divide between producers and environmentalists.

B. Concerns of the Environmentalist

The environmental impacts of agriculture have been studied and critiqued for decades; more recently, the push for conservation has gained political and scientific momentum. Environmentalists argue erosion from agriculture is far worse than reported; water quality has suffered tremendously and government programs support farmers are geared toward mass production rather than sustainability.⁴⁵ Consequently, agriculture has caused havoc on the environment.

In 2011, the Environmental Working Group (EWG), a national environmental nonpartisan nonprofit, released a reported titled *Losing Ground* that claimed soil loss averages were misleading and likely higher than previously estimated.⁴⁶ The National Resource Inventory (NRI) through the National Resources and Conservation Service (NRCS) allows for a sustainable soil erosion average of 5.0 tons per year.⁴⁷ In 2007, the NRI reported that Iowa's average annual erosion was 5.2 tons, only slightly above NRI's "sustainable level," but notably higher than the Corn Belt average of 3.9 tons per year.⁴⁸ Yet, the EWG explains that using an average to determine soil loss is not practical because soil is often lost due to a variety of factors such as weather patterns, amount and rate of rainfall, slope of the land, conservation practices, crop rotation, and soil type.⁴⁹ As an alternative to the NRI, Iowa State University (ISU) developed the Iowa Daily Erosion Project (IDEP) as a new system to measure erosion that focuses on smaller portions of the state and erosion events, rather than generalizing erosion for the entire state in the form of

44. *See id.* at 10-14.

45. CRAIG COX ET AL., ENVTL. WORKING GRP., *LOSING GROUND* 4-6 (Apr. 2011), http://static.ewg.org/reports/2010/losingground/pdf/losingground_report.pdf.

46. *Id.* at 8; *see also* Joanna Zelman, *Soil Erosion Far Worse than Reported in American Farmlands, According to New EWG Report*, HUFFINGTON POST (Apr. 12, 2011, 9:15 PM), <https://perma.cc/UZ7M-5CQP>.

47. COX ET AL., *supra* note 45, at 8.

48. *Id.*

49. *Id.*

averages.⁵⁰ IDEP measurements show that over six million acres in Iowa eroded at a rate twice the sustainable limit set forth by NRI.⁵¹ Moreover, the IDEP reveals severe storms can have detrimental local effects. For instance, a storm in early May of 2007 affected 15.3 million vulnerable acres with severe erosion in some areas of up to 100 tons of soil per acre in just one day.⁵² In turn, EWG and IDEP propose Iowa's NRI report of 5.2 tons of annual soil is not reflective of the actual erosion from agriculture.⁵³

Due to the susceptibility of soil, erosion and runoff water from agriculture has become a key matter of concern for water conservationists as well as consumers. For instance, Des Moines Water Works seeks to serve potable water to 500,000 central Iowa residences and has struggled to keep nitrate contamination of its product within legal limits.⁵⁴ Further, unease regarding water quality comes from the high levels of contamination into the Gulf of Mexico.⁵⁵ Yet conservationists stress, despite the record levels of water contamination from agriculture, there are practices that can mitigate environmental effects of farming.⁵⁶ For example, the use of cover crops and implementation of wetlands could cut the amount of nitrate drained into the Gulf by 45%.⁵⁷ Nonetheless, voluntary changes have been minimal and unable to make water contamination from agriculture more manageable.⁵⁸ EWG released a report in February 2016 titled *Fooling Ourselves: Voluntary Programs Fail to Clean Up Dirty Water*.⁵⁹ The bold title is reflective of a document that criticizes the ability of farmers to enter and exit conservation programs at will, resulting in statistics that show new acres enrolled in a program but failing to show a loss of net acres enrolled in the program.⁶⁰ EWG states that along 1020 miles of waterways, only 45 acres of buffer strips (seventy-five feet from the bank) were added from 2011 to 2014, but 119 acres of buffer strips were taken out.⁶¹ Hence, the net loss of buffer strips along these waterways amounted to a net loss of 74 acres, despite the United States Department of Agriculture (USDA) spending \$1.3

50. *Id.* at 8-10.

51. *Id.* at 10.

52. *Id.* at 13-14.

53. *Id.* at 8.

54. *Des Moines Utility: Lawsuit Likely over Nitrates in Water*, AG WEB, <https://perma.cc/Y8PG-3G49> (archived Oct. 8, 2017).

55. 'Dead Zone,' *supra* note 6.

56. *Study: Adding Wetlands in the Corn Belt Can Shrink Gulf of Mexico Dead Zone*, ENVTL. DEF. FUND (Feb. 2, 2015), <https://perma.cc/HP8P-YVZZ>.

57. *Id.*

58. RUNDQUIST & COX, *supra* note 2, at 3-4.

59. *See generally id.*

60. *Id.* at 3-4.

61. *Id.* at 3.

billion in Iowa over this time period to encourage sustainable farming practices.⁶²

Consequently, there is skepticism of government farm and conservation programs. Taxpayers have spent \$29.8 billion on federal conservation programs since 2007, yet environmental concerns remain and continue to expand.⁶³ Conservation programs may provide farmers an opportunity to implement conservation practices, but they arguably fall short of the public benefit binding regulations could serve.⁶⁴

III. REDEFINING THE ISSUES IN SUSTAINABLE AGRICULTURE

Both environmentalists and producers have incentive to promote sustainable agriculture. Mitigating erosion helps keep more soil on the farm and more vital nutrients in the soil, providing for both the long-term environmental and economic health of the farm.⁶⁵ Yet, voluntary conservation has not proven sufficient to protect soil and water.⁶⁶ Farmers are receptive of sustainability but fear strict regulation and massive costs. Consequently, regulation for sustainable agriculture can be better drafted with an economic understanding of: (1) why farmers are tight on money, and (2) what players in the industry have “change to spare”?

The United States operates under a capitalist economy where supply and demand mechanisms use prices to allocate resources and provide a platform for trade.⁶⁷ The laws of the country further support capitalism with policies that promote innovation and free trade.⁶⁸ For instance, providing private property rights allows for individuals to accumulate and dispose of assets in a market that incentivizes the creation of wealth.⁶⁹ A standard monetary system and law enforcement makes trade easier and fairer.⁷⁰ The protection of intellectual property further incentivizes competition and innovation by allowing the exclusive right to sell the

62. *Id.* at 3, 8.

63. Env'tl. Working Grp., *What Do Conservation Data Tell Us?*, CONSERVATION U.S., <https://perma.cc/WH5X-E4R2> (archived Oct. 8, 2017).

64. *Id.*

65. *Id.*

66. *Id.*

67. Brigham Young Univ.—Idaho, *Lesson 01*, ECON 150 ECONOMIC PRINCIPLES AND PROBLEMS—MICRO, <https://perma.cc/D6EW-FYH5> (archived Oct. 8, 2017) [hereinafter BYU, *Lesson 01*].

68. Douglas J. Amy, *Capitalism Requires Government*, GOV'T IS GOOD, <https://perma.cc/W37L-DSKV> (archived Oct. 8, 2017).

69. *Id.*

70. *Id.*

good or service in the market.⁷¹ The government establishes mechanisms to regulate banks that provide financing to entrepreneurial businesses, protects entrepreneurs with limited liability, and furthers international trade agreements that stimulate the demand for U.S. goods and services.⁷²

However, some of the same laws that spur capitalism bear the risk of causing a market to fail. Market failure occurs when the resources are not distributed at prices and in quantities that provide a social optimum.⁷³ This Note proposes two of the markets in which farmers are major players have failed: the market for agricultural inputs and the market for conservation.

Market failure may be “caused by monopolies or oligopolies or a lack of property rights on a specific good. . . .”⁷⁴

71. *Id.*

72. *Id.*

73. ANANTHA KUMAR DURAIAPPAN, INT’L INST. FOR SUSTAINABLE DEV., MARKETS FOR ECOSYSTEM SERVICES: A POTENTIAL TOOL FOR MULTILATERAL ENVIRONMENTAL AGREEMENTS 4 (Aug. 2006), https://www.iisd.org/pdf/2007/economcs_markets_eco_services.pdf.

74. *Id.*

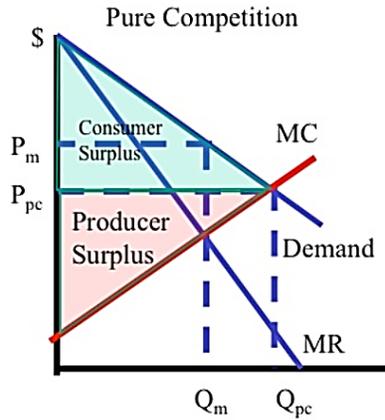


FIGURE 1.⁷⁵

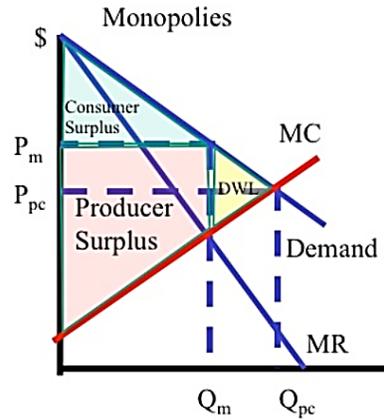


FIGURE 2.⁷⁶

When competition is limited, companies have the ability to increase the price of their goods, making demand more inelastic and reducing consumer surplus in the market.⁷⁷ Such a market failure is present in the inputs farmers purchase for production. In elaboration, the top ten seed companies comprise 67% of the global market share; the top three of these seed companies account for about 47%.⁷⁸ The top ten agricultural chemical companies dominate 89% of the global market

75. Brigham Young Univ.—Idaho, *Lesson 08*, ECON 150 ECONOMIC PRINCIPLES AND PROBLEMS—MICRO, <https://perma.cc/G8HM-3JXH> (archived Nov. 11, 2017). Figure 1 and figure 2 illustrate the effect that monopolies have on competitive markets. Q_{pc} and P_{pc} represent the market quantity and price and intersect at equilibrium when there is perfect competition in the market. Q_m and P_m represent the decreased quantity and increased price of a good in a monopoly market. MC and MR represent the marginal cost and revenue curves that a monopoly uses to determine the levels of production that will optimize profit. Consumer surplus is the financial benefit of a consumer calculated by the difference between the amount the consumer is willing to pay and the amount the consumer actually paid. The reduction in consumer surplus due to a monopoly, illustrated in figure 2, indicates consumers pay more for a product than what they would in a competitive market. Lastly, DWL is the dead weight loss caused by an inefficiency in the market.

76. *Id.*

77. ETC GRP., WHO OWNS NATURE? CORPORATE POWER AND THE FINAL FRONTIER IN THE COMMODIFICATION OF LIFE 12, 13 (Nov. 2008), http://www.etcgroup.org/sites/www.etcgroup.org/files/publication/707/01/etc_won_report_final_color.pdf.

78. *Id.*

share.⁷⁹ The strength of these corporations, without government interference, allows them to set the market price for agricultural inputs.⁸⁰ The expensive inputs put pressure on producers, allowing only the most efficient farms to survive. Moreover, the producers that are left have limited cash flow due to the high input costs and variable commodity prices, meaning these farmers are price takers for both their inputs and outputs.

Another form of market failure is when markets do not “emerge and allocate the correct prices for the environmental effects of economic activity; . . .”⁸¹ Economic theory provides that a social optimum is reached when the marginal cost of a good is equal to the marginal benefit.⁸² However, calculating the marginal costs and benefits can be difficult as most goods have externalities.⁸³ An externality is an “external benefit or cost that is enjoyed or imposed on a third party other than the buyer or seller of the good.”⁸⁴ Agricultural conservation practices such as cover crops and buffer strips render several environmental benefits, however, there is limited monetary benefit yielded by such practices. Consequently, the free market does not encourage the implementation of conservation practices to a socially optimal level where the conservation market would operate most efficiently.

In order to correct the market failures caused by agricultural oligopolies and improper price allocation to conservation benefits, the government may serve a critical role in adjusting the markets so that they reach social optimums.

79. *Id.* at 15.

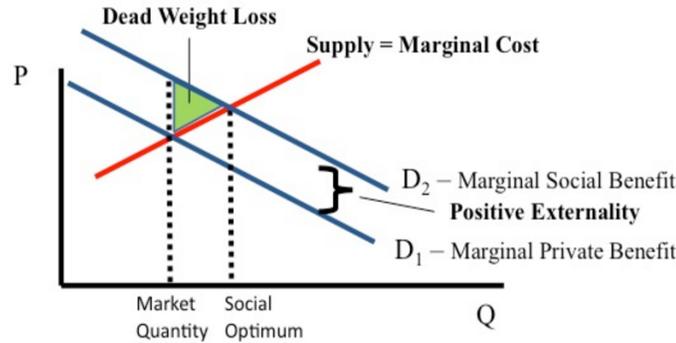
80. *See generally id.*

81. DURAIAPPAH, *supra* note 73, at 4.

82. Bingham Young Univ.—Idaho, *Lesson 11*, ECON 150 ECONOMIC PRINCIPLES AND PROBLEMS—MICRO, <https://perma.cc/V5TH-UP5X> (archived Oct. 8, 2017) [hereinafter BYU, *Lesson 11*].

83. *See id.*

84. *Id.*

FIGURE 3.⁸⁵ Positive externalities

IV. PROPOSAL

In order to promote conservation in agriculture, it is necessary to account for the market failures caused by consolidated agricultural markets and the undervaluation of conservation. Market efficiency has consolidated and narrowed input options available to farmers, limiting their market power. Therefore, conservation policy must focus on compelling what most influences farmers: large agricultural companies. Creating a market for conservation in which the corporate agricultural industry can continue to capitalize profits may provide a market-driven approach to sustainable agriculture. This Note explores a tax-subsidy plan geared toward optimizing the social benefits of conservation, using the examples of cover crops and biomass energy crops.

A. *Generating Tax Revenue for Subsidy Support*

The proposal seeks to fund a conservation subsidy with a tax on companies selling proprietary seed and agrochemicals. The goal of the tax is to isolate the new subsidy so there is no need to reallocate funds from existing conservation programs. Taxes to fund conservation have been effective, as demonstrated in Iowa for the Groundwater Protection Fund.⁸⁶ Within the fund, the Agriculture Management Account collects money from fees paid for “nitrogen-based fertilizer sales, license fees from pesticides dealers, and registration fees for the sale of pesticides.”⁸⁷ The Agricultural Management Account then allocates funds for research and testing of groundwater contamination, sustainable agriculture practices, and

85. *Id.*86. See LEGISLATIVE SERV. AGENCY, GROUNDWATER PROTECTION FUND 1 (2012), <https://www.legis.iowa.gov/docs/publications/FT/15865.pdf>.87. *Id.*

the health effects of pesticide and fertilizer use.⁸⁸ In 2012, the Agricultural Management Account raised \$4.7 million in revenue that was distributed to the Leopold Center, Iowa State University, Iowa counties, the Department of Agriculture and Land Stewardship, University of Iowa Hygienic Lab, and the Center for Health Effects on Environmental Contamination at the University of Northern Iowa.⁸⁹

Similar to Iowa's tax on nitrogen fertilizer, this Note proposes implementing a tax on the sale of proprietary seed and agricultural chemicals. As noted in *Who Owns Nature*, "seeds (mixed in soil, water and sunlight) are, in truth, the first link in the food chain. Seed is the fundamental source of political power that governments must not forget and farmers need to protect."⁹⁰ Proprietary seed accounts for 80% of the seed market, and a majority of the seeds are complimented by chemical fertilizers and pesticides produced by the same companies.⁹¹ Seed and agrochemical companies subject to the tax would include companies such as Monsanto, Syngenta, DuPont, Dow, and Bayer.⁹² In order to keep companies from shifting the cost of the tax to farmers by increasing the prices of their products, tax and price ceilings must be applied to agricultural seed and chemicals. The revenue produced by the tax can be used to fund subsidy programs to support sustainable agriculture.

B. Subsidies for Positive Externalities

Positive externalities of cover crops and buffer strips include: reducing soil erosion, improving soil health, managing soil nutrients, sequestering carbon, and suppressing weeds.⁹³ These benefits are not reflected in the market, and the undervaluation results in underproduction.⁹⁴ A subsidy in the amount of the total positive externality will push a market toward a social equilibrium.⁹⁵ For example, the U.S. has used subsidies to promote the production of renewable biofuels.⁹⁶ The following table shows the support of the biofuel market and the continued increase of ethanol and biodiesel production.

88. *Id.*

89. *Id.*

90. ETC GRP., *supra* note 77, at 8.

91. *Id.*

92. *See id.* at 12.

93. *See generally* Humberto Blanco-Canqui et al., *Cover Crops and Ecosystem Services: Insights from Studies in Temperate Soils*, 107 *AGRONOMY J.* 2449 (2015).

94. *See* DURAIAPPAH, *supra* note 73, at 4, 7.

95. *BYU, Lesson 11, supra* note 82.

96. U.S. ENERGY INFO. ADMIN., *DIRECT FEDERAL FINANCIAL INTERVENTIONS AND SUBSIDIES IN ENERGY IN FISCAL YEAR 2013*, at 2-3 (Mar. 2015), <https://www.eia.gov/analysis/requests/subsidy/>.

TABLE 2.

Year	U.S. Subsidies ⁹⁷ (Billions of Dollars)	Ethanol Produced ⁹⁸ (Billions of Gallons)	Biodiesel Produced ⁹⁹ (Millions of Gallons)
2007	8.1–9.9	6.5	490
2010	7.0	13.3	343
2013	2.0	13.3	1263

As illustrated by the above data, subsidies increased the amount of biofuel and ethanol production. Despite the nearly 75% decrease in subsidies between 2010 and 2013, the production of biofuels continued to increase.¹⁰⁰ In 2015, ethanol production reached 14.8 billion gallons and biodiesel reached 1.263 billion gallons.¹⁰¹ The conclusion drawn from this data is the subsidy accounted for the positive externalities of biofuels, so the burdens of entry into the market were lowered enough to incentivize investment in the market. Once the biofuel market was established, the marginal costs of investment no longer outweighed the marginal benefits, and market forces were able to reach the social optimum. In turn, this Note proposes using a similar subsidy model to reduce the amount of fertilizer runoff from agriculture by making use of cover crops and buffer strips, among other profitable farming practices.

1. Subsidy Option 1: Supply of Cover Crops

The first conservation subsidy option uses the example of cover crops to explore supply side subsidies. An increase in cover crops can reduce soil erosion, enrich soil health, reduce pest infestations, and serve as pollinators to ultimately increase crop yields and income.¹⁰²

97. *Id.*; see CHRIS CHARLES & PETER WOODERS, INT'L INST. FOR SUSTAINABLE DEV., SUBSIDIES TO LIQUID TRANSPORT FUELS: A COMPARATIVE REVIEW OF ESTIMATES 11 (2011), https://www.iisd.org/gsi/sites/default/files/liquid_fuel_subsidies.pdf.

98. U.S. Dep't of Energy, *Global Ethanol Production*, ALTERNATIVE FUELS DATA CTR. (Mar. 2016), <https://perma.cc/RL4W-VL9A> (follow "Global Ethanol Production" hyperlink) [hereinafter *Global Ethanol Production*].

99. U.S. Dep't of Energy, *U.S. Biodiesel Production, Exports, and Consumption*, ALTERNATIVE FUELS DATA CTR. (May 2017), <https://perma.cc/FA3P-8B38> (follow "U.S. Biodiesel Production, Exports, and Consumption" hyperlink) [hereinafter *U.S. Biodiesel Production*].

100. See Inst. for Energy Research, *EIA Report: Subsidies Continue to Roll in for Wind and Solar*, LATEST ANALYSIS (Mar. 18, 2015), <https://perma.cc/L526-428Y>.

101. *Global Ethanol Production*, *supra* note 98; *U.S. Biodiesel Production*, *supra* note 99.

102. ANDY CLARK, SUSTAINABLE AGRIC. RESEARCH & EDUC., COVER CROPS FOR

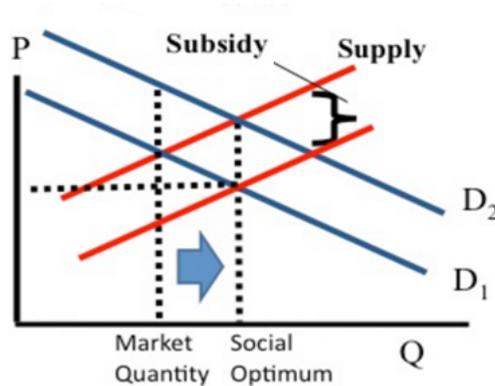


FIGURE 4.¹⁰³ Subsidy for seed companies

The USDA 2012 census reported 10.3 million acres of land were planted with cover crops.¹⁰⁴ Yet, there were over 228.6 billion farm acres treated with fertilizer that same year, meaning only about 4.5% of the farmed acres were planted to cover crops.¹⁰⁵ The University of Illinois estimates the cost of cereal rye seed is approximately \$0.25 a pound, or \$7.50 per acre.¹⁰⁶ Adding the cost of planting and removing the crop, the total cost to implement a cover crop is approximately \$25.60 per acre.¹⁰⁷ In 2015, the average farm size was 441 acres.¹⁰⁸ Therefore it would cost farmers, on average, \$11,289.60 annually to plant rye grass with no return on the investment.¹⁰⁹ Rather than conservation being an added expense for farmers, policy is proposed to provide incentive to seed companies for selling

SUSTAINABLE CROP ROTATIONS 1 (2015), www.sare.org/content/download/75281/1276316/cover_crops_for_sustainable_crop_rotations.pdf.

103. BYU, *Lesson 11*, *supra* note 82. Figure 4 illustrates how a subsidy can be used to correct a market that has failed due to a positive externality. A subsidy in the amount of the positive externalities can be paid to the producer of a product to provide a greater quantity of a good at a socially optimal level. The shift from D1 to D2 demonstrates the change in demand for a good as a result of the subsidy and increase in quantity.

104. 2012 CENSUS, *supra* note 24, at 2.

105. *Quick Stats*, USDA, <https://perma.cc/4RK8-4C9F> (follow “See the Screenshot View” hyperlink) (archived Oct. 8, 2017).

106. Gary Schnitkey et al., *Costs and Benefits of Cover Crops: An Example with Cereal Rye*, *FARMDOC DAILY* (July 6, 2016), <https://perma.cc/AQ6T-8QRK>.

107. *Id.*

108. U.S. DEP’T OF AGRIC., *FARMS AND LAND IN FARMS: 2016 SUMMARY 8* (Feb. 2017), <http://usda.mannlib.cornell.edu/usda/current/FarmLandIn/FarmLandIn-02-17-2017.pdf>.

109. *See id.*; *see also* Schnitkey et al., *supra* note 106.

cover crop seed. A subsidy in the form of a tax deduction would reduce the marginal cost of producing cover crop seed and give companies the ability to make up the profit lost to the tax.¹¹⁰ By providing an opportunity for an increase in profitability, seed companies will promote the sale of cover crops to their customers. Lastly, an increase in the quantity of cover crop seed would lower the price of the good, making it more affordable to farmers.

Challenges to the program include companies shifting costs down to the farmers or exploiting the tax deduction program. An additional issue with initiating the program is creating enough incentive for companies to make a change in what they market rather than to simply pay the tax. Companies' potential profit using the deductions must exceed the profit the company would earn by continuing business as usual and paying the tax.¹¹¹ In order for companies to invest in changes in their company, the difference between paying the tax and utilizing deductions to maximize profit must be substantial. Therefore, further economic findings are necessary to determine the tax rate for the revenue earned on proprietary seed and chemical sales, and to determine the level of deductions and subsidies that would incentivize companies to employ the program. If companies choose to bear the tax rather than to promote cover crops, tax revenues could be used to supplement an additional subsidy.

2. Subsidy Option 2: Demand for Biomass Energy Crops

In response to the positive externality, the government may choose to provide an additional subsidy to consumers. This subsidy would increase the equilibrium quantity and price to a new social optimum.¹¹²

110. See *BYU, Lesson 11*, *supra* note 82.

111. *Id.*

112. *Id.*

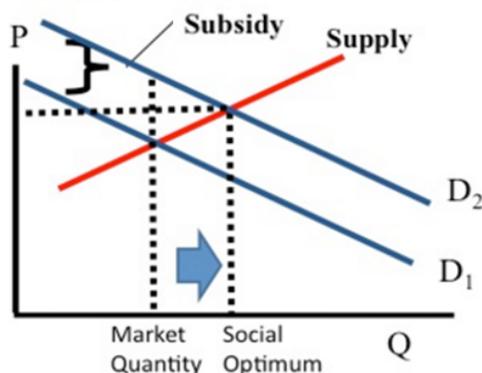


FIGURE 5.¹¹³ Subsidy for biofuel producers

The second subsidy option is designed to account for the benefits of buffer strips. Buffer strips provide a gap between the crop and water streams to slow runoff and filtrate sediments and chemicals from the water.¹¹⁴ Buffer strips can cut water contamination caused by nutrients and pesticides by 50%, pathogens by 60%, and sediment by an astonishing 75%.¹¹⁵ Biomass crops can be grown alongside traditional crop fields in large quantities for energy.¹¹⁶ Corn is currently the most popular biomass crop, but “native trees and grasses are likely to become the most popular in the future. These perennial crops require less maintenance and fewer inputs than do annual row crops, so they are cheaper and more sustainable to produce.”¹¹⁷

In order to create demand for biomass crops grown in buffer strips, the second subsidy proposal is to incentivize biofuel companies to invest in sustainable cellulosic biofuels. As companies seek to produce more biofuel, the value of the

113. *Id.* Figure 5 illustrates how a subsidy can be used to influence consumer demand where there is a positive externality. D1 is the demand without the subsidy, and D2 is the demand with the subsidy. The subsidy is given to the consumer so that the price of the good is reduced, allowing the consumer to purchase a greater quantity so that the market may reach a socially optimal level of production.

114. *Buffer Strips: Common Sense Conservation*, USDA, <https://perma.cc/KBH3-AHFS> (archived Oct. 8, 2017).

115. *Id.*

116. *Growing Energy on the Farm: Biomass Energy and Agriculture (2003)*, UNION CONCERNED SCIENTISTS, <https://perma.cc/9B9N-JHMY> (archived Oct. 8, 2017).

117. *Id.*

biomass crops will increase.¹¹⁸ Therefore, farmers will also have economic incentive to implement buffer strips so they can grow and sell the biomass crops for profit.

A potential drawback for this subsidy option, however, is the tax money collected from agricultural seed and chemical companies will be reattributed to the biofuel industry. Therefore, this option would likely seek greater opposition from agricultural companies than the supply side subsidy.

V. CONCLUSION

The tax-subsidy proposal allows for farmers and agricultural companies to continue business, but with new incentives for how they choose to operate. Such flexibility may minimize the resistance of a program designed to promote sustainable agriculture and conservation. In order to protect the environment, farmers, and social welfare, there is need for affordable, sustainable agriculture. Because farmers have small profit margins controlled by large agricultural companies, it is impractical for farmers to invest in practices to reduce agricultural runoff and water contamination. Instead, incentivizing the wealthy agricultural corporations to sell cover crop seed or purchase crops grown on buffer strips takes the cost burden off the farmers. Moreover, the program proposed will provide farmers with a bump in market power and opportunity to boost income, as companies compete to sell more diverse products. Seed companies will have the opportunity to diversify their sales and potentially reach new customers. Biofuel investors will have potential to develop second generation biofuels that can be made from the cover crops or cuttings off the buffer strips. Due to improved conservation and reduction in runoff pollution, there will be less political pressure to regulate agricultural companies and farmers, allowing the industry to continue business as usual.

In spite of the possible benefits available from the program, there will also be costs to parties that result in opposition to the plan. Companies may have reduced sales revenue or decreased profit due to the tax. Capitalists will likely oppose any government intervention on the markets, and farmers may fear that they will bear additional costs in the program. For these reasons, some political push-back is inevitable. However, with increased public concern of water quality and demands for nonpoint source pollution regulation, the parties involved in the agricultural industry may be more likely to work with a program in which they have more control.

In conclusion, society has a need for both agriculture and conservation. Farmers are responsible for feeding the world and serving as stewards of the land.

118. See *BYU, Lesson 11*, *supra* note 82.

Yet, producers have little financial leeway and need the support of environmentalists to appraise the benefits of conservation and weigh the costs of environmental degradation. Holding economically powerful agriculture companies accountable for their role in soil erosion and water pollution will help to establish a relationship between commercialization and conservation. With a valuation of conservation benefits and production costs, market tools can incentivize the use of practices such as cover crops and buffer strips by making sustainable agriculture profitable for farmers and industrialists, alike. As a result of the implementation of these practices, the expansion of conservation will mutually serve for the prosperity of the public, economy, landowners, and environment.