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**Managing Carbon in a World Economy:  
The Role of American Agriculture**

by

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# MANAGING CARBON IN A WORLD ECONOMY: THE ROLE OF AMERICAN AGRICULTURE

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## I. INTRODUCTION

Climatic change is one of the most challenging environmental concerns faced by the world.<sup>1</sup> Carbon sequestration offers an optimistic approach to curb the effects of climatic change until a more permanent solution is discovered and implemented.<sup>2</sup> Presently, carbon sequestration is the most practical response to global warming.<sup>3</sup> It has been known for decades that carbon sequestration can assist in decreasing the amount of carbon dioxide in the atmosphere, but the difficulty lies with the incorporation of carbon sequestration into programs that will encourage sufficient participation to make it worthwhile. This article outlines the role American agriculture can play in managing carbon in a world economy.

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1. See David J. Hayes & Nicholas Gertler, *The Role of Carbon Sequestration in the U.S. Response to the Climate Change—Challenges and Opportunities*, 32 *Envl. L. Rep.* 11350 (Nov. 2002).

2. *Id.* It is estimated that carbon sequestered by agricultural soils can give 35 years to the research and implementation of a permanent solution. *Id.* at 11351.

3. U.S. DEPARTMENT OF ENERGY, OFFICE OF FOSSIL ENERGY, CARBON SEQUESTRATION TECHNOLOGY ROADMAP AND PROGRAM PLAN 2 (March 12, 2003), available at [http://www.fossil.energy.gov/programs/sequestration/publications/programplans/2003/sequestration\\_roadmap03-13-03.pdf](http://www.fossil.energy.gov/programs/sequestration/publications/programplans/2003/sequestration_roadmap03-13-03.pdf). Improved efficiency and low carbon fuels are other options for mitigating greenhouse gases. *Id.*

## II. GLOBAL WARMING AND GREENHOUSE GASES

Climate change is an international phenomenon with global and local effects. The greenhouse effect is a natural process that provides heat to the Earth's surface, but excess concentrations of greenhouse gases causes an increase in the average global temperature (a.k.a. global warming).<sup>4</sup> Climatic change is specifically caused by elevated concentrations of greenhouse gases that trap heat (infra-red radiation) near the surface of the earth.<sup>5</sup> The most abundant and destructive greenhouse gases include carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons.<sup>6</sup> Industrial activities emit the greatest amounts of greenhouse gases.<sup>7</sup> Thus, developed countries are the primary contributors of greenhouse gases; at thirty percent, the United States has the highest cumulative release of carbon dioxide.<sup>8</sup>

Carbon dioxide is the principle concern accounting for fifty percent of all anthropogenic greenhouse gases.<sup>9</sup> The carbon cycles, photosynthesis and respiration, are significant to climate change.<sup>10</sup> During photosynthesis plants "fix" carbon when sunlight is absorbed by chlorophyll in organisms, which removes carbon dioxide from the atmosphere and stores it.<sup>11</sup> This process provides energy for the organisms and then releases oxygen back into the atmosphere.<sup>12</sup> When the organisms are consumed, carbon is released back into the atmosphere in the form of carbon dioxide through the process of respiration.<sup>13</sup>

Ecosystems with large quantities of biomass, such as forests, capture and store large amounts of carbon.<sup>14</sup> Research has shown that agricultural land management can be adapted to accommodate the goal of carbon capture and storage.<sup>15</sup> Carbon is released when vegetation, trees, and soils are disturbed by burning, removing, or tilling the land.<sup>16</sup> These forestry management and agricultural practices eliminate natural carbon sinks, which assist in balancing carbon concentrations in the atmosphere.<sup>17</sup> Studies show that only forty percent of manmade emissions of carbon dioxide are currently in the atmosphere, meaning the remaining sixty percent has already been absorbed by carbon sinks.<sup>18</sup> Carbon dioxide has the ability to remain in the atmosphere for decades, therefore decades of accumulated carbon dioxide already exists in the atmosphere.<sup>19</sup> This accumulation of carbon dioxide is believed to be a major factor in climatic change.

4. DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 589 (2 ed. 2002). There is no scientific dispute that the greenhouse gases have the potential to cause global warming; disputes arise concerning the rate at which the global temperature is rising and what the effects will be. *Id.* at 590.

5. *Id.* at 589.

6. *Id.*

7. *Id.* at 599.

8. *Id.* Europe has contributed 27.7% cumulative carbon dioxide emissions, Former Soviet Union 13.7%, China, India and developing Asia 12.2%, South and Central America 3.8%, Japan 3.7%, Middle East 2.7%, Africa 2.5%, Canada 2.3%, and Australia 1.1%. *Id.* at 600.

9. *Id.* at 599.

10. *Id.* at 591.

11. *Id.*

12. *Id.*

13. *Id.*

14. Hayes & Gertler, *supra* note 1, at 11352.

15. *Id.*

16. HUNTER ET AL., *supra* note 4, at 599.

17. *Id.* at 600.

18. *Id.*

19. *Id.* at 592.

It is predicted that climatic changes will cause increases in storm intensity, global warming, and sea levels.<sup>20</sup> More extreme weather patterns could cause severe flooding and droughts, which in turn results in the spread of diseases and major disasters.<sup>21</sup> Worldwide concerns of increased food shortages, water shortages, and loss of biodiversity are also predicted treats of global warming.<sup>22</sup>

The purpose of the article is not to describe the extensive science of global warming, which is available elsewhere, but rather to focus on the development of carbon sequestration as a practical tool, and opportunities to incorporate it into American agriculture. Agriculture, which is already heavily regulated and monitored, is a perfect match for carbon sequestration provisions.

### III. THE EMERGENCE OF CARBON SEQUESTRATION NATIONALLY AND GLOBALLY

#### A. UNFCCC AND THE KYOTO PROTOCOL

In the 1970's concerns of climatic change emerged, and in response the United Nations created the Intergovernmental Negotiating Committee on Climate, to design a global treaty.<sup>23</sup> The information gathered by this committee resulted in the 1992 United Nations Framework Convention on Climate Change (UNFCCC), which was made up of 188 parties, including the United States.<sup>24</sup> In 1995, Intergovernmental Panel on Climate Change (IPCC) obtained a scientific consensus that humans were influencing the global climate, which helped to further the movement to decrease greenhouse gas emissions.<sup>25</sup> In 1997, the parties of the UNFCCC concluded the Kyoto Protocol at the Climate Control Convention.<sup>26</sup> The Kyoto Protocol set forth "binding reduction targets" for developed countries<sup>27</sup> and also made it possible to trade emission allowances.<sup>28</sup> If one country was below their target they could trade their allowance to another country that was above their target.<sup>29</sup> The Protocol incorporated the use of sinks in the climate regime, but the parameters were unclear and under continued scrutiny.<sup>30</sup> In order to take effect, the Protocol needed ratification by at least fifty-five countries and have at least fifty-five percent of the 1990 total carbon dioxide emissions represented by developed countries.<sup>31</sup> As of November 2003, 119 countries had ratified, but only 44.2 percent of developed countries had ratified.<sup>32</sup> In 2003, only the United States and Russia had a large

20. *Id.* at 589.

21. *Id.* The warmer temperatures and the weather changes could act as a catalyst for the spread of water and insect-borne diseases, such as malaria, typhoid, and dengue. *Id.*

22. *Id.* Some changes that occurring today include: the shrinking of glaciers, thawing of permafrost, degradation of biodiversity, lengthened growing seasons, later freezes and earlier thawing of rivers and lakes. *Id.* at 594.

23. *Id.* at 589.

24. Paul E. Hagen et al., *An Overview of Federal, State and Regional, Initiatives and Activities to Reduce Greenhouse Gas Emissions In the United States*, SJ011 A.L.I.-A.B.A. 45, 47 (Nov. 20-21, 2003).

25. HUNTER ET AL., *supra* note 4, at 626.

26. *Id.* at 589-590.

27. *Id.* at 590.

28. Hagen et al., *supra* note 24, at 47.

29. *Id.*

30. HUNTER ET AL., *supra* note 4, at 645.

31. Hagen et al., *supra* note 24, at 47.

32. *Id.*

enough share of the 1990 emissions to reach the fifty-five percent threshold.<sup>33</sup> In the final months of 2004, Russia ratified the Kyoto Protocol which took effect in February of 2005, without the United States.<sup>34</sup>

In 2001, President Bush announced that the United States would not proceed with the ratification of the Kyoto Protocol, thus leaving the United States at odds with the rest of the world.<sup>35</sup> The following year, Bush introduced the Climatic Change Science Program (CCSP) to guide climate research in the U.S., which generated the creation the U.S. Global Change Research Program (USGCRP).<sup>36</sup> Through these programs billions of dollars have been invested into climatic and global change research.<sup>37</sup> In 2002, the Bush Administration announced its goal of reducing the greenhouse gas intensity by eighteen percent over the next ten years.<sup>38</sup> Greenhouse gas intensity is the ratio of greenhouse gas emissions to economic output.<sup>39</sup> Although eighteen percent appears to be a significant reduction, this plan actually allows overall emissions to increase an additional twelve percent over the next ten years because it allows rates to rise and fall with economic output.<sup>40</sup> Thus the projected “substantial” reduction is an illusion, and allows emissions to continue to grow at nearly the same current rate.

Unless a greenhouse gas intensity reduction program is “sufficiently stringent” it will not have any measurable environmental benefits.<sup>41</sup> Reducing greenhouse gas intensity provides no assurance that a given level of environmental protection will be achieved since the degree of environmental protection is measured in relation to gross domestic product.<sup>42</sup> The program is not “sufficiently stringent” because the target is merely voluntary.<sup>43</sup> The program represents only a slight change from current emissions and does not appear to advance specific policy solutions.<sup>44</sup> It is not clear “how this goal will be translated into actual reductions in greenhouse gas intensity across various sectors of the economy.”<sup>45</sup>

### B. THE DEVELOPMENT OF CARBON MANAGEMENT

The concept of carbon sequestration emerged approximately twenty years ago when the United States Environmental Protection Agency encouraged the planting of trees in order to absorb carbon dioxide.<sup>46</sup> About ten years later, the Intergovernmental Panel on Climate Change (IPCC) suggested that improved land

33. *Id.*

34. *Russia Officially Adopts Kyoto Protocol*, 8 *European Fuels News* 25 (Dec. 8, 2004), available at 2004 WL 69469499. “The Kyoto Protocol applies to 30 industrialized nations and requires that emissions from developed nations be reduced by 5.3% on average below 1990 levels between 2008 and 2012.” *Id.*

35. HUNTER ET AL., *supra* note 4, at 590.

36. United States Climate Change Science Program, 68 *Fed. Reg.* 748-01, 750 (Jan. 7, 2003).

37. *Id.*

38. Hayes & Gertler, *supra* note 1, at 11352.

39. *Id.*

40. Vicki Arroyo, *Climate Change: A Primer*, SJ011 A.L.I.-A.B.A. 1, 19 (Nov. 20-21, 2003).

41. *Id.*

42. *Id.*

43. *Id.*

44. *Id.*

45. *Id.*

46. Alexander Gillespie, *Sinks and the Climate Change Regime: The State of Play*, 13 *DUKE ENVTL. L. & POL'Y J.* 279, 281 (2003). It was estimated that trees could absorb 750 tons of carbon annually for each square kilometer planted. *Id.* at 282.

management had the greatest potential for carbon sequestration.<sup>47</sup> In 1988, the first sequestration project between countries occurred when an American power plant agreed to sow trees in Guatemala in order to offset the carbon dioxide produced by a new plant in the United States.<sup>48</sup>

The Seventh Conference of the Parties to the Protocol established that carbon sinks are a “legitimate and creditable” part of a climate strategy.<sup>49</sup> Carbon sinks, including forests and farmland, absorb and sequester carbon dioxide from the atmosphere through the process of photosynthesis.<sup>50</sup> When lands are cultivated, natural sinks are destroyed and large amounts of carbon dioxide are released.<sup>51</sup> Agricultural conservation practices not only aid in reducing global warming, but also encourage the conservation and protection of the environment.<sup>52</sup> Additionally, carbon sequestration in agricultural soils offers the storage of emission reductions at a low cost.<sup>53</sup>

Market-based trading solutions, such as the Kyoto Protocol plan, are being implemented which “allow for a trading mechanism whereby over-polluters can purchase certified Emissions Reductions from under-polluters or non-polluters.”<sup>54</sup> Emission trading is “an economic incentive-based alternative to command-and-control regulation.”<sup>55</sup> In an “emissions trading program,” the government gives a limited number of permits to emitters of pollution based on a set level of allowable emissions, the permit allows the release of a specified amount of that pollutant.<sup>56</sup> The permit holder may retain the permit and release the pollutants or reduce the emissions and sell the permits.<sup>57</sup> The monetary value assigned to the permits if the holder decides to sell them, offers an incentive to reduce the emission of pollutants.<sup>58</sup> The system is based on credits. The sequestration of the carbon in the soil is calculated into a carbon emission reduction credit (CERC), one of which is equal to one metric ton of sequestered carbon.<sup>59</sup>

In February of 2005, Europe opened the first mandatory carbon emission trading market.<sup>60</sup> The European carbon exchange is formalized<sup>61</sup> compared to the informal carbon exchange markets in the United States, meaning the government in Europe is endorsing and managing the market. The European carbon exchange is in response to the Kyoto Protocol, which went into effect February of 2005.<sup>62</sup> The market will

47. *Id.*

48. *Id.* at 283.

49. Hayes & Gertler, *supra* note 1, at 11350.

50. A BRIDGE TO CLIMATE PROTECTION, SLOWING GLOBAL WARMING BY MARKETING CARBON STORED IN FARMS AND FORESTS, ENVIRONMENTAL DEFENSE 1 (2003), available at [http://www.environmentaldefense.org/documents/2638\\_bridge\\_carbon.pdf](http://www.environmentaldefense.org/documents/2638_bridge_carbon.pdf).

51. *Id.*

52. *Id.*

53. Hayes & Gertler, *supra* note 1, at 11351.

54. Tradable Emissions Markets, Blue Energy Economic Advantage, at <http://www.blueenergy.com/economic.html> (last visited Feb. 20, 2005).

55. A WORKABLE SOLUTION FOR EMISSIONS TRADING, CARBON CREDIT EXCHANGE 3 (2003), available at <http://www.engineoilfiltration.com/downloads/carboncreditemexchange.pdf>.

56. *Id.*

57. *Id.*

58. *Id.*

59. Kindra Gordon, *Taking Credit for Carbon*, 19 HAY & FORAGE GROWER, January 1, 2004, at 1, available at 2004 WL 67814093.

60. Katrin Bennhold, *New Limits on Pollution Heard Change in Europe*, N.Y. TIMES, January 1, 2005, at C2, available at 2005 WL 22504.

61. *Id.*

62. *Id.* There is international concern that the failure of the United States to ratify the Kyoto Protocol will give it an unfair industrial advantage because it will not have to comply with the requirements. *Id.*

operate under a free market theory, which allows plants to trade emission permits while channeling the investments to companies with the most energy-efficient technologies.<sup>63</sup> This works with the Kyoto Protocol by limiting the permits available on the market to the amount of total carbon emissions permitted under Kyoto.<sup>64</sup>

Although it seems that the world is accommodating carbon sequestration efforts, concerns still exist. There is a concern that this method diverts focus away from the real goal of drastically eliminating carbon dioxide emissions and provides a way for companies to continue to emit large amounts of greenhouse gases by merely buying their way out of enforcement.<sup>65</sup> There is also controversy surrounding the permanence and potential capacity of terrestrial sinks.<sup>66</sup> Despite the concerns, the positive aspects of carbon sequestration outweigh the doubts.<sup>67</sup> After all, it is better than doing nothing at all.

### C. MEASURING CARBON

Before carbon credits can be bought or traded, the concentration of the carbon sequestered in the soil must be measured. Technology in this field is rapidly improving the methods for measuring carbon sequestration capability. In 2002, the DOE's Los Alamos National Laboratory developed a system called the Laser-Induced Breakdown Spectroscopy (LIBS).<sup>68</sup> LIBS "can make on-the-spot field measurements of carbon in soil with at least 95 percent accuracy."<sup>69</sup> This technology surpasses previous techniques that required large soil samples and analysis in distant laboratories.<sup>70</sup> LIBS requires a core soil sample of one to one-fourth inch diameter and displays results in approximately fifteen minutes with millimeter resolution.<sup>71</sup> Every type of soil sequesters varying amounts of carbon, but LIBS has made the measuring of carbon in any soil type exceedingly more applicable.<sup>72</sup>

Once the amount of stored carbon can be calculated, a value is assigned to the carbon credit. It has been suggested that initially the carbon credits could be offered at wholesale levels of six dollars per ton, with three dollars going to the landowner for the production and three dollars to the certification and monitoring of the credit to ensure that it remains stored.<sup>73</sup> After that, actual market price could be determined by supply and demand.<sup>74</sup>

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63. *Id.*

64. *Id.*

65. Hayes & Gertler, *supra* note 1, at 11351.

66. *Id.*

67. Studies have shown that well-managed forest land can sequester from 200 pounds to a ton of carbon per acre per year, where as mismanaged lands, such as overgrazing can release 400 pounds of carbon per years per acre. Gordon, *supra* note 59, at 1.

68. *Los Alamos Lab Technology Measures Carbon Dioxide in Soil With Millimeter Precision; Method Gauges Use of Farmland as 'Carbon Sink' to Help Reduce Greenhouse Gas*, ASCRIBE NEWSWIRE, May 29, 2002, available at 2002 WL 5802876.

69. *Id.*

70. *Id.*

71. *Id.*

72. *Id.*

73. Randy Brooks, Concern is growing about the effects of excessive carbon, LEWISTON MORNING TRIBUNE, Feb. 23, 2004, at 5b.

74. *Id.*

#### IV. THE ROLE OF AGRICULTURE

##### A. IT IS SIMPLY ABOUT SOIL AND VEGETATION

It is claimed that “agriculture can answer the challenge of climate change while feeding a troubled and hungry world.”<sup>75</sup> Agriculture is a primary source of atmospheric pollution, but agricultural land can easily be transformed into carbon sinks through specific management practices.<sup>76</sup> Agricultural activities naturally release greenhouse gases into the atmosphere, but the expansion, specialization, and intensification of cultivation practices has increased the amount of greenhouse gases released from agriculture.<sup>77</sup> New technology, however, gives agriculture the opportunity to help reduce the concentrations of greenhouse gases in the atmosphere. It is estimated by the United States Department of Agriculture that in the United States “farm and grazing land soils are storing 20 million metric tons of carbon a year and could store an additional 180 million metric tons annually.”<sup>78</sup>

Agricultural practices, such as conservation tillage, can reduce soil carbon levels by degrading organic matter and reducing the sequestering power of the soil.<sup>79</sup> Soils have more carbon holding capacity than plant biomass and the atmosphere combined.<sup>80</sup> The intensification in agricultural production and changes in land practices may be responsible for the increases in carbon dioxide in the atmosphere.<sup>81</sup>

No tillage systems, avoiding the cultivation of permanent pasture and drainage, and cultivating peatlands have all been found to greatly reduce loss of carbon dioxide from beneath the earth’s surface.<sup>82</sup> Agricultural soils are prime sinks because they are relatively carbon depleted and represent a potential sink for carbon dioxide if the carbon lost can be regained.<sup>83</sup>

##### B. CARBON SEQUESTRATION AND CURRENT FARM PROGRAMS

In 2002, for the first time the United States Department of Agriculture (USDA) announced that it wanted to “develop accounting rules and guidelines for crediting [carbon] sequestration projects.”<sup>84</sup> The rules and guidelines would be developed based on land use practices due to the interactions between carbon sequestration and land use.<sup>85</sup> The announcement called for more rigorous reporting requirements and improvements to the existing voluntary emission reduction registration programs.<sup>86</sup> The USDA claimed that the addition of new provisions would not undermine the

75. Senator Pat Roberts, U.S.D.A. Carbon Sequestration Event Wyandotte, Kansas- Ag Hall of Fame (June 6, 2003), available at <http://roberts.senate.gov/sp-06-06-2003veneman.htm> (last visited Feb. 20, 2005).

76. GRAHAM MERRINGTON ET AL., AGRICULTURAL POLLUTION: ENVIRONMENTAL PROBLEMS AND PRACTICAL SOLUTIONS 135 (2002).

77. *Id.*

78. *Los Alamos Lab*, *supra* note 68.

79. MERRINGTON ET AL, *supra* note 76, at 147.

80. *Id.*

81. *Id.*

82. *Id.* at 148.

83. *Id.*

84. Accounting Rules and Guidelines for Forest and Agriculture Greenhouse Gas Offsets, 67 Fed. Reg. 70576-01, 70576 (Nov. 25, 2002).

85. *Id.*

86. *Id.* at 70577.

current conservation practices because carbon sequestration and greenhouse gas emission techniques are also beneficial to other conservation priorities.<sup>87</sup> For example, providing ground cover not only sequesters carbon, but also reduces erosion.<sup>88</sup> It is also advantageous that the process of sequestration does not require crop land to be taken out of production to store carbon.<sup>89</sup> Agricultural practices such as conservation tillage actually aid the sequestration process.<sup>90</sup> It is estimated the carbon concentration in cropland soils in the United States is between thirty and sixty percent, which is ideal for creating carbon sinks.<sup>91</sup> Several American farm programs have either already incorporated carbon sequestration into their provisions, or could easily integrate such provisions.

The Environmental Quality Incentive Program (EQIP) has a ranking system that rewards carbon sequestration.<sup>92</sup> The Conservation Reserve Program (CRP) and the Wetlands Reserve Program (WRP) offer the greatest promise for sequestration by encouraging the conversion of cultivated land into wetlands, grasslands, and forests which absorb large amounts of carbon.<sup>93</sup> Other incentives offered include a modified Environmental Benefits Index (EBI), which would offer more points for carbon sequestration making it a higher priority than previously.<sup>94</sup>

The Forest Service under the Farm and Security and Rural Investment Act of 2002 has made carbon sequestration one of the formal objectives under the Forest Land Enhancement Program (FLEP) and plans to increase tree planting, forest stand improvements, and agroforestry practices.<sup>95</sup> The 2002 Farm Bill encourages the increased research and development of carbon sequestration; it also encourages the development of "market systems for pollution reduction."<sup>96</sup>

The CRP acknowledges that land management practices such as long term vegetation cover can increase carbon storage by approximately 1.3 million tons per year.<sup>97</sup> The CRP also allows for the sale of carbon credits on enrolled land.<sup>98</sup>

87. Bruce I. Knight, Chief Natural Resources Conservation, U.S. Department of Agriculture, Statement Before the U.S. Subcommittee on Clean Air, Climate Change, and Nuclear Safety (July 8, 2003), available at <http://www.nrcs.usda.gov/about/legislative/pdf/Knight070803.pdf>. Other conservation priorities include "reducing soil erosion, improving water quality, creating wildlife, reducing air pollution, and protecting sensitive areas." *Id.*

88. *Id.*

89. *Id.*

90. *Id.* Conservation tillage includes reduced, minimum, and no-till methods. *Id.*

91. *Id.*

92. 16 U.S.C. § 3839aa-8 (2003).

93. Conservation Reserve Program, 16 U.S.C. § 3831 et seq. (2002); Wetland Reserve Program, 16 U.S.C. 3837 et seq. (2003).

94. Conservation Reserve Program, 16 U.S.C. § 3831 et seq. (2002). The EBI is used to score and rank bids into the program. The EBI is used by CRP. *Id.* See also Michael R. Taylor, *The Emerging Merger of Agricultural and Environmental Policy: Building A New Vision for the Future of American Agriculture*, 20 VA. ENVTL. L.J. 169 (2001).

95. Forest Land Enhancement Program, 68 Fed. Reg. 34309-01, 34,317 (June 9, 2003) (to be codified at C.F.R. pt. 230(c)).

96. Farm Security and Rural Investment Act of 2002, Pub. L. No. 107-171, 116 Stat. 134 (codified as amended in scattered sections of 7 U.S.C & 16 U.S.C.) (2002).

97. 2002 Farm Bill—Conservation Reserve Program—Long-Term Policy, 68 Fed. Reg. 24830-01, 24835 (May 8, 2003) (to be codified at C.F.R. pt. 1410).

98. Conservation Reserve Program, 7 C.F.R. § 1410.63 (c)(6) (2005).

## V. CONCLUSION

### *A. INTEGRATING CARBON SEQUESTRATION INTO AMERICAN AGRICULTURE*

Although carbon sequestration is mentioned in current agricultural programs, no real steps have been taken to incorporate carbon sequestration into American agriculture. American agriculture is heavily regulated and monitored by a variety of programs and departments on local, state, and national levels. There already exists ample research and information on agricultural practices and lands. It is logical to incorporate carbon sequestration into the already established farm programs and protocols.

It is not necessary to create new programs to develop the resources necessary to incorporate carbon sequestration into American agriculture. The agriculture programs that are currently established can easily assimilate carbon sequestration. The Natural Resources Conservation Service (NRCS) exists in every county in every state. The NRCS possesses in-depth information on all agricultural lands and practices and has established relationships with local land owners, environmental groups, conservation districts, businesses, and governments on state, local, and tribal levels.

The NRCS works with communities to reduce soil erosion, improve water and soil quality, enhance air quality, improve and restore wetlands, and enhance wildlife habitat. When a person contacts the NRCS to obtain a conservation plan, they are provided with land use maps, soils information, inventories of resources, engineering notes, and other supporting information. All the information needed for successful carbon sequestration is at the fingertips of the NRCS. Carbon sequestration would make a valuable addition to the NRCS program.

Carbon sequestration would also fit nicely in the Conservation Reserve Program (CRP). The CRP assists farmers with soil, water, and other natural resource concerns on their land by: helping to reduce soil erosion; protecting the Nation's ability to produce food and fiber; reducing sedimentation in streams and lakes; improving water quality; establishing wildlife habitat; and enhancing forest and wetland resources. The CRP encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filterstrips, or riparian buffers. Farmers enrolled in the CRP receive an annual rental payment for the term of the multi-year contract. Cost sharing is also provided to establish the vegetative cover practices.

The practices encouraged in the CRP are the same practices that foster carbon sequestration. The addition of carbon sequestration into the CRP would not only benefit farmers by offering additional incentives, but ultimately it would help to reduce greenhouse gases in the atmosphere. A farmer could receive additional benefits for the carbon sequestered on her or his land from the CRP and could also sell the carbon credits to industries for additional income.

The addition of carbon sequestration into any farm program would be relatively simple. The information and tools necessary for executing and calculating carbon sequestration already exist and are easily accessible. The local conservation offices know the local soil types and vegetation cover of the region. Studies have been performed and research is ongoing as to how much carbon certain soils and vegetation sequester and the best methods to use.

It is time for American agriculture to step up and do its part to help reduce global warming. The addition of carbon sequestration into existing farm programs is the

most promising plan to date. As time progresses and no steps are taken to alleviate the greenhouse effect, the accumulation of greenhouses gases in the atmosphere becomes insurmountable. This problem will not just disappear and although we cannot see the source, we will experience the devastating and damaging effects of climatic change.