

WATER QUALITY ALONG THE MISSISSIPPI: ITS HISTORY, TWO DIFFERENT STATE APPROACHES, AND THE BIG PICTURE

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I. INTRODUCTION

The Mississippi has historically been vital to the United States as a route for both trade and travel.¹ Today, the Mississippi River provides electricity through hydroelectric power and water for many states.² It is also one of the “world’s major river systems [given its] size, habitat diversity and biological productivity.”³

The United States federal government has been relatively slow in improving water quality along the Mississippi River. To understand the federal government’s

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1. *Mississippi River Facts*, NAT’L PARK SERV. (July 14, 2021, 12: 13 PM), <https://www.nps.gov/miss/riverfacts.htm> [<https://perma.cc/WE8E-XLS3>].

2. *See id.*

3. *Id.*

hesitation to regulate this vital resource, one must consider the history of water quality in the United States, different Midwestern states' approaches to water quality under the current standards, the federal government's contemporary stance on this issue, how the government is navigating water policy in light of a global pandemic, and potential water policy on the horizon.

II. WATER ERAS ALONG THE MISSISSIPPI

The first public water works was built in 1802, with 136 public water utilities established by 1860.⁴ The number of public water utilities increased by almost 600% by 1880, just twenty years later.⁵ This vast increase of public works facilities brought about an increase in water usage, which left the door open to widespread water quality degradation problems.⁶ In fact, these newfound public works facilities quickly became overwhelmed with the increased usage, and the default method for sewage systems was to transport wastewater to nearby waterbodies.⁷

The United States' modern water policy along the Mississippi River has been shaped by five major water quality eras. The five eras of water quality in the United States are (1) Beginnings of Water Quality Problems, (2) Water Sanitation Era, (3) New Pollution Emerges, (4) Era of Growth, and (5) Clean Water Act.⁸ These five eras bring the United States to its current water quality era.

The "Beginnings of Water Quality Problems" era was between 1870 and 1900.⁹ During this time, the federal government mostly stayed out regulating water quality, essentially leaving it to state regulations.¹⁰ As a result, many states created their own Public Health Boards, but very little was actually done to benefit water quality during this time.¹¹

The "Water Sanitation Era" was between 1900 and 1935, and brought about the early recognition of regional water quality problems.¹² Congress, as a result,

4. Edward Stets, *Water Quality Evolution: From Industrialization to the Age of the Internet*, U.S. GEOLOGICAL SERV. (June 19, 2021, 8:24 AM), https://acwi.gov/monitoring/webinars/industrial_internet_11242015.pdf [<https://perma.cc/LPJ2-WQCV>].

5. *Id.*

6. *Id.*

7. *Id.*

8. *Id.*

9. *Id.*

10. *Id.*

11. *Id.*

12. *See id.*

enacted the “catch-all” Public Health Service Act of 1912.¹³ The Public Health Service Act of 1912 authorized investigations into sanitation, water supplies, and sewage disposal.¹⁴ This Act, however, took no additional steps to improve water quality.¹⁵ In 1930, toward the end of this era, pollution in the Upper Mississippi River was exacerbated by navigational structures in the Rivers and Harbors Act.¹⁶

The “New Pollution Emerges” era occurred between 1935 and 1948, a period characterized by a government focused toward World War II, a focus that outweighed concerns over improving water quality.¹⁷ However, attention focused back to water policy in 1941 when W.D. Collins wrote *Quality of Surface Waters of the United States*.¹⁸ This era also brought with it the Water Pollution Act of 1948, which was the first law at the federal level dealing with water quality.¹⁹ It is estimated that over 100 similar bills were drafted and defeated between 1902 and 1948.²⁰

The Era of Growth was from 1948 to 1972.²¹ During this time, the world’s population grew and with this growth came an increase in agricultural fertilizer usage, crops harvested, livestock raised, and overall water usage in the United States.²² Consequently, nitrate and sulfate concentrations in United States’ waters grew heavily.²³ The Water Pollution Control Act of 1948 proved to be largely ineffective in the face of such consumption growth and pollution.²⁴ This ineffectiveness was largely due to the federal government’s inability to require any direct reduction in discharges, which resulted in increased pollution and no

13. *See id.*

14. *Introduction: Two Centuries of Health Promotion*, U.S. NAT’L LIBR. MED. (June 19, 2021, 8:26 AM), https://www.nlm.nih.gov/exhibition/phs_history/intro.html [<https://perma.cc/87GZ-P69G>].

15. *See id.*

16. Stets, *supra* note 4.

17. *Id.*

18. *See generally* W.D. COLLINS ET AL., *QUALITY OF SURFACE WATERS OF THE UNITED STATES*, U.S. DEP’T INTERIOR (1941), <https://pubs.usgs.gov/wsp/0942/report.pdf> [<https://perma.cc/8SQQ-ZPNU>].

19. Stets, *supra* note 4.

20. *See History of the Clean Water Act*, U.S. ENV’T PROT. AGENCY (June 19, 2021, 8:27 AM) <https://www.epa.gov/laws-regulations/history-clean-water-act> [<https://perma.cc/XW3Z-CN2G>].

21. Stets, *supra* note 4.

22. *Id.*

23. *Id.*

24. *Federal Water Pollution Control Act (1948)*, ENCYCLOPEDIA.COM (June 19, 2021, 8:27 AM), <https://www.encyclopedia.com/history/encyclopedias-almanacs-transcripts-and-maps/federal-water-pollution-control-act-1948> [<https://perma.cc/FJW8-HHZB>].

significant improvement to the quality of the nation's waters.²⁵ The Water Pollution Control Act of 1948 did, however, signal political and popular support for pollution control efforts.²⁶ As a result, the Water Pollution Control Act of 1948 was updated in 1956 to include a grant system for wastewater treatment plant construction and federal support for state projects to improve water quality, and permitted projects to consider "propagation of fish, aquatic life, and wildlife."²⁷ Then came the Water Quality Act of 1965.²⁸ The Water Quality Act of 1965 required states to set pollution standards and created a Federal Water Pollution Control Administration.²⁹ This Act prioritized the preservation of state supremacy in dealing with water policy, which resulted in ambiguous environmental regulations.³⁰ This Act also paved the way to the next era: the Clean Water Act era.

The "Clean Water Act" era was between 1972 and 1987.³¹ The stated goal of the Clean Water Act (CWA) of 1972 was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."³² This Act recognized pollution from both point and non-point sources, leaving exceptions for stormwater and agricultural runoff.³³

In 2001, the United States Supreme Court decided *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*.³⁴ This Court held the Migratory Bird Rule in the CWA does not grant jurisdiction to the United States Army Corps of Engineers over isolated, non-navigable waters of the United States.³⁵

In 2006, the Supreme Court of the United States heard *Rapanos v. United States*.³⁶ The *Rapanos* Court ruled that, under the CWA, "waters of the United States" included only relatively permanent, standing, or flowing bodies of waters.³⁷ This description includes bodies of water such as streams, oceans, rivers, and other

25. *Id.*

26. *See id.*

27. Stets, *supra* note 4.

28. *Id.*

29. *Id.*

30. *Id.*

31. *Id.*

32. *Id.*

33. *Id.*

34. *See* Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps of Engineers, 531 U.S. 159, 162 (2001).

35. *See id.* at 174.

36. *See generally* Rapanos v. United States, 547 U.S. 715 (2006).

37. *Id.* at 732.

waterways forming geographical features.³⁸ The *Rapanos* Court also found that waters of the United States does not include lands only intermittently saturated with water.³⁹ The *Rapanos* Court's definition of waters of the United States under the CWA left a whopping 98% of the country's waters unprotected by federal agencies.⁴⁰

III. MODERN APPROACHES TO WATER POLICY

In 2015, the CWA clarified the statutory authority given to the Environmental Protection Agency (EPA) in light of the *United States Army Corps of Engineers* and *Rapanos* decisions.⁴¹ This clarification did not set out any regulatory rules, rather it re-defined the scope of waters within the bounds of the CWA, Supreme Court precedent, and science.⁴²

The CWA has been beneficial in reducing pollution in the Mississippi River.⁴³ This reduction in pollution comes specifically from point sources, including industries and water treatment plants. Point sources are identifiable areas that release pollutants as discrete conveyances.⁴⁴ Areas that remained problematic and ambiguous included non-point sources, such as urban runoff and agriculture.⁴⁵ Non-point sources are difficult to pinpoint given this source is a combination of potential pollutants from a large area.⁴⁶

The CWA has three major issues with its framework such as (1) it vests limited power to the federal government in addressing non-point sources, (2) there is a substantial amount of contentiousness surrounding it, and (3) it lacks in overall

38. *Id.* at 732-33.

39. *Id.*

40. *See id.*; Steve Zwick, *Waters of the United States Part Three: The Rapanos Decision*, ECOSYSTEM MARKETPLACE (June 19, 2021, 8:29 AM), <https://www.ecosystemmarketplace.com/articles/waters-of-the-united-statespart-iii-the-decision/> [<https://perma.cc/Z2CP-K3SA>].

41. Clean Water Rule: Definition of "Waters of the United States", 80 Fed. Reg. 37,053 (June 29, 2015).

42. *Id.*

43. *See id.*

44. *Point Source vs. Nonpoint Source Pollution*, WATER EDUC. FOUND. (June 19, 2021, 8:31 AM), <https://www.watereducation.org/aquapedia-background/point-source-vs-nonpoint-source-pollution> [<https://perma.cc/J9JJ-V2U8>].

45. *See generally* NAT'L RSCH. COUNCIL, MISSISSIPPI RIVER WATER QUALITY AND THE CLEAN WATER ACT: PROGRESS, CHALLENGES, AND OPPORTUNITIES (2008).

46. *Point Source vs. Nonpoint Source Pollution*, *supra* note 43.

funding.⁴⁷ These three prominent issues leave states skeptical of the CWA, including states along the Mississippi River Basin.⁴⁸ Many states, however, have embraced the CWA by implementing state-level strategies to improve water quality.⁴⁹

A. Iowa's Voluntary Approach to Water Policy

The Iowa Department of Natural Resources (Iowa DNR) describes two approaches to water quality: a voluntary approach and a regulatory approach.⁵⁰ A voluntary approach tends to be more politically favorable, for it does not require individuals to do something and it incentivizes action.⁵¹ For example, the CWA provides grant programs under Section 106 that permits states to apply for funding in order to incentivize water policy.⁵² The “catch” is that a state receiving funding must monitor and record data.⁵³ Iowa follows a fairly voluntary approach to water policy, most notably under the Iowa Nutrient Reduction Strategy (Iowa NRS).⁵⁴

The Iowa NRS outlines voluntary efforts Iowans can take “to reduce nutrients in surface water from both point sources, such as wastewater treatment plants and industrial facilities, and non-point sources, including farm fields and urban areas, in a scientific, reasonable and cost effective manner.”⁵⁵ An additional benefit of a voluntary approach to water policy is that it is flexible, allowing a state to tailor policy according to its landscape, community, economy, and goals.⁵⁶ A

47. Silvia Secchi & Moira McDonald, *The State of Water Quality Strategies in the Mississippi River Basin: Is Cooperative Federalism Working?*, 677 SCI. TOTAL ENV'T 241, 1 (2019).

48. *See id.*

49. *See id.*

50. JACK RIESSEN, IOWA DEP'T NAT. RES., WATER PLANNING LAW AND GOVERNMENT 5 (2008), http://publications.iowa.gov/20878/1/Law_and_Govt2.pdf [<https://perma.cc/595C-7DEK>].

51. *Id.*

52. *Id.* at 5.

53. *Id.*

54. *See Iowa Nutrient Reduction Strategy*, IOWA STATE UNIV. (June 19, 2021, 8:31 AM), <http://www.nutrientstrategy.iastate.edu/> [<https://perma.cc/82M2-KJ8U>].

55. IOWA DEP'T NAT. RES., NUTRIENT REDUCTION STRATEGY (July 12, 2021, 10:40 PM), https://www.iowadnr.gov/Portals/idnr/uploads/water/npdes/Nut_Strat_factsheet.pdf [<https://perma.cc/4UPS-2R32>].

56. *Voluntary Approach*, SCIENCE DIRECT (July 12, 2021, 10:57 PM), <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/voluntary-approach> [<https://perma.cc/P8VJ-FRED>].

voluntary approach can also be a vehicle for innovation, economic vitality, and private-partner engagement.⁵⁷

For example, the Iowa Agriculture Water Alliance (IAWA) spearheads the Conservation Infrastructure (CI) effort, which identifies the need for developing opportunities and investments “that will support the enormous level of scaling up” as is called for in the Iowa NRS.⁵⁸ The IAWA is made up of three prominent Iowa agriculture commodity organizations. Specifically, the IAWA is comprised of the Iowa Corn Growers Association, Iowa Pork Producers Association, and Iowa Soybean Association.⁵⁹ The IAWA, with the support of these prominent Iowa agriculture groups, works as a non-profit organization with private partners to improve water quality in Iowa.⁶⁰ More specifically, the IAWA works with stakeholders and private partners to work toward goals set out in the Iowa NRS.⁶¹

The CI effort is also spearheaded by the Iowa DNR since this effort launched in 2016.⁶² Together, these two organizations are bringing private-sector organizations to the table to work toward innovative and economically viable ways Iowa can reach the goals set out in the Iowa NRS.⁶³

There are three types of practices used to address nutrient loss in Iowa agriculture including (1) in-field practices, (2) out-field practices, and (3) land use changes.⁶⁴ It is important to understand what practices are available for implementation in order to understand the voluntary, tailored approach the Iowa NRS presents.

57. *Iowa Nutrient Reduction Strategy*, *supra* note 54

58. *About the Conservation Infrastructure Initiative*, CONSERVATION INFRASTRUCTURE INITIATIVE (June 19, 2021, 8:32 AM), <https://www.iowaci.org/> [<https://perma.cc/DRM5-A3SQ>].

59. *About Iowa Agriculture Water Alliance*, IOWA AGRIC. WATER ALL. (June 19, 2021, 8:33 AM), <https://www.iowaagwateralliance.com/water-quality-mission> [<https://perma.cc/784K-9GND>].

60. *Id.*

61. *See id.*

62. *See* Joanna Schroeder, *Iowa Ag Water Alliance Announces Conservation Strategy*, AGWIRED (Aug. 30, 2016), <http://agwired.com/2016/08/30/iowa-ag-water-alliance-announces-conservation-strategy/> [<https://perma.cc/963H-SLNS>].

63. *About the Conservation Infrastructure Initiative*, *supra* note 58.

64. *See Measuring Conservation and Nutrient Reduction in Iowa Agriculture*, IOWA STATE UNIV. (July 9, 2020), <https://crops.extension.iastate.edu/cropnews/2020/07/measuring-conservation-and-nutrient-reduction-iowa-agriculture> [<https://perma.cc/3PVE-MGML>].

1. In-field Practices

In-field practices include cover crops, reduced and no-tillage, and fertilizer practices, to name a few.⁶⁵ Cover crops are referred to by the Natural Resource Conservation Service (NRCS) as a “trap crop,” as they provide a protective canopy for soil in between the planting of typical row crops (such as corn and soybeans), and over time, soil health measurably improves on the land, resulting in greater yields over time.⁶⁶ It takes time for the land to get used to this natural, scientifically-viable conservation practice; however, once the land acclimates, there are a multitude of benefits in addition to better water quality such as pest resistance, suppressed soil diseases, high-quality material for grazing livestock and wildlife, and more.⁶⁷

Reduced and no-tillage is another kind of in-field conservation practice that helps improve soil health on farmland, and promotes an array of other practical soil benefits.⁶⁸ After the application of cover crops, and before it is time to plant the row crop, the practice of minimal or no tillage leaves the residue of the cover crop on the field, which in turn helps prevent soil erosion and loss from water and air.⁶⁹ Earthworms are left undisturbed deep in the soil, thereby increasing microbial activity and “better soil aeration and improved soil fertility.”⁷⁰

Fertilizer adjustments simply ensure farmers are not putting too much fertilizer on their farms, which would result in non-point pollution caused by the excess fertilizer running off the field and into waterways.⁷¹ Factors considered in appropriately applying fertilizers are the handling and storage of fertilizer, timing of application, and types of fertilizers.⁷²

65. *Id.*

66. *See Cover Crops - Keeping Soil in Place While Providing Other Benefits*, U.S. DEP’T AGRIC. (June 19, 2021, 8:35 AM), https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ny/technical/?cid=nrcs144p2_027252 [<https://perma.cc/XPZ4-F7A4>].

67. *Measuring Conservation and Nutrient Reduction in Iowa Agriculture*, *supra* note 65.

68. *Reduced Tillage / No Tillage*, SATAVIC FARMS (June 19, 2021, 8:36 AM), <https://satavic.org/reduced-tillage-no-tillage/> [<https://perma.cc/G4CB-KZ5L>].

69. *Id.*

70. *Id.*

71. *Fertilizer Management*, EXTENSION UTAH STATE UNIV. (June 19, 2021, 8:36 AM), <https://extension.usu.edu/waterquality/agriculturewq/fertilizer> [<https://perma.cc/L34B-5TSA>].

72. *Id.*

2. Edge-of-field Practices

Edge-of-field practices include placement of vegetation in targeted areas surrounding the crop field to prevent nitrate as well as eroded soil from leaving the field and entering nearby surface water or drainage.⁷³ Specific examples of edge-of-field practices include bioreactors, saturated buffers, terraces, and nutrient removal wetlands.⁷⁴

Bioreactors are deep trenches that are dug at the outskirts of a farm field that have woodchips dumped into the trenches.⁷⁵ As water rushes off the field and through the bioreactor, nitrate and phosphate are absorbed by the woodchips, allowing a better water quality product to exit the trench before reaching a nearby surface water.⁷⁶ It costs between \$10,000 and \$15,000 to install a bioreactor on a field.⁷⁷ Requested funding to implement bioreactors on Iowa farms has been exponentially met, showing a desire for more bioreactors implemented, as well as a need for additional funding.⁷⁸

Saturated buffers are fairly similar to bioreactors in what they achieve, which is removing nitrate from leaving the farmland and entering another waterway.⁷⁹

A new water control structure, or box, is installed, and perforated distribution pipes are connected to the box at a shallow depth. The structure directs a portion of subsurface tile drainage water into the buffer as shallow groundwater flow rather than discharging it directly to surface water.⁸⁰

Dan Jaynes, a soil scientist who works with the United States Department of Agriculture's (USDA) Agricultural Research Service's National Laboratory for Agriculture and the Environment, in part came up with the saturated buffer, which can remove up to 100% of nitrate from tile water that would otherwise go off the

73. *Measuring Conservation and Nutrient Reduction in Iowa Agriculture*, *supra* note 65.

74. *Id.*

75. See Ann Robinson, *Iowa State Research Aims to Improve Next Generation of Bioreactors*, IOWA STATE UNIV. (Jan. 25, 2019, 10:02 AM), <https://www.extension.iastate.edu/news/iowa-state-research-aims-improve-next-generation-bioreactors> [<https://perma.cc/Z27B-NTMS>].

76. *See id.*

77. *Id.*

78. *See id.*

79. *See id.*; *Iowa State University Advances Saturated Riparian Buffers as a Promising Water-quality Practice for Crop Fields*, IOWA STATE UNIV. (Dec. 17, 2018), <https://www.cals.iastate.edu/news/releases/iowa-state-university-advances-saturated-riparian-buffers-promising-water-quality> [<https://perma.cc/Q7SC-TMQD>].

80. *Iowa State University Advances Saturated Riparian Buffers as a Promising Water-quality Practice for Crop Fields*, *supra* note 80.

field and into nearby waterways.⁸¹ Tom Isenhardt, who worked with Jaynes on the project, explained that “[u]ltimately, what makes the difference for water quality is reducing that load before it reaches waterways.”⁸²

“Terraces are man-made earthen structures that intercept runoff on slopes.”⁸³ As water continues down a slope, it slows down, allowing the soil to “settle out,” keeping it on the field.⁸⁴ There are hundreds of miles of terraces in Iowa making it a common feature in Iowa agriculture.⁸⁵ In addition to better water quality and soil health, terraces help maintain natural habitat and “can help retain moisture” for better crop growth.⁸⁶

Nutrient removal wetlands, or referred to simply as “wetlands,” remove both nitrate and phosphate from water “through a combination of physical, chemical, and biological processes.”⁸⁷ Wetlands have been referred to as “nature’s kidneys,” because they filter out pollutants from water.⁸⁸

3. Land-use Changes

Land-use changes that help tackle soil erosion and benefit soil health involve “incorporat[ing] additional crops or convert[ing] row crops to perennial vegetation. These practices include extended rotations [and] conversion to pasture or prairie.”⁸⁹

Extended rotations occur when a row crop, such as corn or soybeans, is planted one year, and then the next two years a different kind of crop—such as small grains and forages—is planted.⁹⁰ Some of the advantages, in addition to

81. *Id.*

82. *Id.*

83. IOWAAGLITERACY, *Why Do They Do That? – Terraces and Tile Lines*, IOWA AGRIC. LITERACY FOUND. (Nov. 21, 2016), <https://iowaagliteracy.wordpress.com/2016/11/21/why-do-they-do-that-terraces-and-tile-lines> [<https://perma.cc/8MRU-ASMP>].

84. *Id.*

85. *Measuring Conservation and Nutrient Reduction in Iowa Agriculture*, *supra* note 65.

86. *Id.*

87. *The Wetlands Initiative Is Helping Farmers Install Wetlands to Naturally Reduce Nutrient Runoff. How Exactly Do Wetlands Remove Nutrients?*, WETLANDS INITIATIVE (June 19, 2021, 8:39 AM), <http://www.wetlands-initiative.org/nutrient-removal> [<https://perma.cc/C3JG-U5SZ>].

88. *Id.*

89. *Measuring Conservation and Nutrient Reduction in Iowa Agriculture*, *supra* note 65.

90. *See Water Quality, Soil Health Solutions: Extended Crop Rotation*, IOWA AGRIC. WATER ALL. (July 13, 2021, 4:06 PM), <https://www.iowaagwateralliance.com/conservation-solutions/extended-crop-rotation> [<https://perma.cc/UB2T-XV87>].

better water quality, “of more diversified crop rotations include dispersed workload, improved weed control, increased crop yields, potential for improved profitability, which in turn can reduce profit variability, and reduced fertilizer and herbicide requirements.”⁹¹ The Iowa NRS reports that a 5-year crop rotation, including at least two years of the crop alfalfa, results in a 42% reduction of nitrate losses to surface water.⁹²

Conversion to pasture or prairie is often incentivized by federal programs, referred to as Transition Incentives Program, such as the Conservation Reserve Program and the Grassland Reserve Program. “The Conservation Reserve Program . . . pays a yearly rental payment in exchange for farmers removing environmentally sensitive land from agricultural production and planting species that will improve environmental quality.”⁹³ In contrast, the Grassland Reserve Program “works to prevent grazing and pasture land from being converted into cropland or used for urban development. In return for voluntarily limiting the future development of their land, farmers receive a rental payment.”⁹⁴

B. Minnesota’s Regulatory Approach to Water Policy

Minnesota has a different approach to water policy than Iowa. In Minnesota, water quality standards are more regulatory in nature, as the state has implemented Chapter 7050 of the Minnesota Rules, titled “Waters of the State,” and Chapter 7052 of the Minnesota Rules, titled “Lake Superior Basin Water Standards.”⁹⁵ Both regulations are extensive and compliment the CWA.⁹⁶ Chapter 7053 of the Minnesota Rules, titled “State Waters Discharge Restrictions” and parts of Chapter 7052 set out regulations specifically for point-sources and water quality.⁹⁷

In order for the Minnesota Pollution Control Agency (MPCA) to implement this type of regulation, the agency must “establish the technical basis and create supporting documents for the standard, ensure peer review, and give the public the

91. *Id.*

92. *Id.*

93. *Conservation Programs*, U.S. DEP’T AGRIC. (June 19, 2021, 8:40 AM), <https://www.fsa.usda.gov/programs-and-services/conservation-programs/index> [<https://perma.cc/RQS2-JNKV>].

94. *Id.*

95. *See Water Quality Standards*, MINN. POLLUTION CONTROL AGENCY (June 19, 2021, 8:41 AM), <https://www.pca.state.mn.us/water/water-quality-standards> [<https://perma.cc/KMV3-YH4W>].

96. *See id.*

97. *Id.*

opportunity to comment on their proposal,” but the EPA is ultimately charged with the final approval of any new or revised standards.⁹⁸

In handling violations of the rules, inspections and file reviews are conducted.⁹⁹ There is very seldom a violation of the rules found.¹⁰⁰ However, when a violation is found, the violation is resolved with enforcement action, such as a Letter of Warning or Notice of Violation.¹⁰¹ If the violation is serious, or if the MPCA is dealing with a repeat offender, then the perpetrator will likely be given a monetary penalty.¹⁰² If a monetary penalty is to be given, the MPCA has the discretion to issue administrative penalty orders, stipulation agreements, consent decrees, and field citations.¹⁰³

IV. BIG PICTURE: WATER POLICY APPROACHES ALONG THE MISSISSIPPI RIVER

It is going to take a well-rounded approach and widespread implementation, guided by the successes and downfalls of voluntary and regulatory measures, to improve water quality along the Mississippi River. Both voluntary and regulatory measures have their pros, as well as their cons. It is precisely for this reason why improving water quality is not a “one-size fits all” solution. Improving water quality along the Mississippi River requires a collaborative and holistic approach, especially in the years to come following the COVID-19 pandemic and potential federal legislation on the horizon.

A. One Water Approach to Improve Water Quality

While this note has analyzed the two different water policy approaches of Iowa and Minnesota—a voluntary approach and a regulatory approach, respectively—these two states cannot improve water quality along the Mississippi River alone. At the federal level, states are required to individually work toward better water quality. However, the minimum standard outlined by the federal government is insufficient. States along the Mississippi River need to work holistically and cooperatively to improve water quality.

98. *Id.*

99. *See Compliance and Enforcement*, MINN. POLLUTION CONTROL AGENCY (June 19, 2021, 8:42 AM), <https://www.pca.state.mn.us/regulations/enforcement> [<https://perma.cc/MYW5-NYKF>].

100. *See generally id.*

101. *See generally id.*

102. *See id.*

103. *Id.*

If states are unable to self-regulate and prioritize water quality, then the federal government will need to step in and regulate accordingly. Federal regulation may be the least desired outcome in light of some states' successes in tailoring water quality policies to their unique state landscapes, communities, economies, and goals. Certainly, a federal one-size fits all approach to regulation and a lack of funding will inhibit key stakeholders' roles in doing their part. For example, federal overreach and regulation may inhibit farmers in the United States from maintaining their economic viability. At the same time, damage caused to public health and the environment in the United States is not sustainable at its current pace.¹⁰⁴ Water sources are growing scarce, threatened further by increasing pressure "from population growth, climate change, rapid [urbanization], rising levels of consumption, and the degradation of lands that previously provided a natural replenishment of water resources."¹⁰⁵

The One Water Approach comes from the United States Water Alliance.¹⁰⁶ "The One Water Approach views all water—drinking water, wastewater, stormwater, grey water, and more—as resources that must be managed holistically and sustainably [to build] strong economies, vibrant communities, and healthy environments."¹⁰⁷ This approach envisions managing all water in an integrated, inclusive, and sustainable manner to secure a bright, prosperous future for our children, our communities, and our country.¹⁰⁸

In its *One Water for America Policy Framework*, the United States Water Alliance lays out six significant areas where the One Water Approach is applicable.¹⁰⁹ These areas are (1) Reliable and Resilient Water Utilities, (2) Thriving Cities, (3) Competitive Business and Industry, (4) Sustainable Agricultural Systems, (5) Social and Economic Inclusion, and (6) Healthy Waterways.¹¹⁰

104. See Fiona Harvey, *Humans Damaging the Environment Faster Than It Can Recover, UN Finds*, THE GUARDIAN (May 19, 2016, 12:56 PM), <https://www.theguardian.com/environment/2016/may/19/humans-damaging-the-environment-faster-than-it-can-recover-report-finds> [<https://perma.cc/6AUL-QCUV>].

105. *Id.*

106. *One Water, One Future*, US WATER ALL. (June 19, 2021, 8:43 AM), <http://uswateralliance.org/> [<https://perma.cc/4ECH-W2PJ>].

107. *Id.*

108. See *One Water for America Policy Framework*, US WATER ALL. (June 19, 2021), <http://uswateralliance.org/initiatives/listening-sessions> [<https://perma.cc/5CZY-4BTG>].

109. See *id.*

110. ONE WATER FOR AMERICA, ONE WATER FOR AMERICA POL'Y FRAMEWORK 2 (2017), [http://uswateralliance.org/sites/uswateralliance.org/files/publications/One%20Water%20for%](http://uswateralliance.org/sites/uswateralliance.org/files/publications/One%20Water%20for%20)

As for Sustainable Agricultural Systems, farmers along the Mississippi are using on-farm strategies to reduce water usage and manage nutrients.¹¹¹ Some of the techniques farmers are adopting to keep nutrients out of the water and in their fields include on-field practices such as cover crops, filter strips, and no-till or strip-till farming as previously discussed.¹¹² New technologies and practices are enabling farming communities to increase the efficiency in their usage of water for their agriculture and simultaneously reduce nutrient loads.¹¹³

For example, soil and plant moisture-sensing devices and computer-based crop-growth simulation models can assist with better water management.¹¹⁴ Building bioreactors is another technique that has increased in popularity in both Iowa and Minnesota.¹¹⁵ A bioreactor is an edge-of-field practice that is estimated to remove between 35 to 50% of nitrate from water.¹¹⁶

B. Upstream-Downstream Collaboration

Central to the long-term preservation of our water systems is the protection of our watersheds, whether through the management of developed lands, conservation of natural lands, controlling water withdrawals, or managing point and non-point discharges. Healthy watersheds and waterways require a place-based regional approach and the power of watershed management is uniting stakeholders around a common vision and approach. When landowners and producers upstream work with cities downstream in managing shared water resources, everyone benefits. Collaboration between urban and rural entities is key to maintaining the health of watersheds and the sustainability of waterways. These partnerships can promote source water protection, thriving ecosystems, and improved water quality.

In Iowa, the city of Cedar Rapids is working with upstream stakeholders by investing in upstream farmers' water quality practices. Cedar Rapids, consequently, can spend less money on its water treatment facility.¹¹⁷ In the past,

20America%20Policy%20Framework%20Executive%20Summary_0.pdf
[<https://perma.cc/T74R-NG9W>].

111. *Id.*

112. *Id.*

113. *Id.*

114. *Id.*

115. See *Measuring Conservation and Nutrient Reduction in Iowa Agriculture*, *supra* note 65.

116. See *Water Quality, Soil Health Solutions: Extended Crop Rotation*, *supra* note 91.

117. See Brian Morelli, *Cedar Rapids Invests Upstream in Better Water with Middle Cedar Partnership*, THE GAZETTE (Nov. 15, 2019, 3:12 PM),

Cedar Rapids had only invested in its water treatment facility and in local flood protection measures.¹¹⁸ This upstream-downstream approach is an example of how diverse public and private sector users, who are often miles away, can effectively manage vast and increasingly troubled watersheds through forging relationships.¹¹⁹

Cedar Rapids is also a large agricultural production city, as it houses companies such as PepsiCo, Cargill, General Mills, and more who “use about 70% of the water processed by Cedar Rapids’ treatment facilities.”¹²⁰ Cedar Rapids was given a United States Water Prize in September 2019 by the United States Water Alliance “for public sector leadership in changing how water is viewed, valued, and managed.”¹²¹

C. Navigating Water Policy in the “New Normal”

The year 2020 began in an unimaginable way—a global pandemic.¹²² Water bodies, natural and built environments, and related sociological systems such as policy and governance, have experienced a significant impact from the economic slowdown caused by the COVID-19 pandemic.¹²³ In fact, there have been “discernable positive impacts due to the reduction of pollutants from industries, vehicle emissions, and other sources.”¹²⁴

Similar to the New Pollution Emerges era when the United States’ focus was toward World War II, the United States is unlikely to prioritize water quality in light of COVID-19. Rather, it will be up to the private partners, research institutes, and policymakers to refrain from putting water quality funding and legislation on the backburner. However, there may be a strategic, economically-vibrant route to take in “expanding and repurposing existing federal financing programs like

<https://www.thegazette.com/subject/news/government/cedar-rapids-invests-upstream-cedar-river-in-better-water-with-middle-cedar-partnership-20191115> [<https://perma.cc/A2HD-KVUJ>].

118. *Id.*

119. *See id.*

120. *Id.*

121. *Id.*

122. *See* Abhijit Mukherjee et al., *Thinking About Water and Air to Attain Sustainable Development Goals During Times of COVID-19 Pandemic*, J. EARTH SYS. SCI., AUG. 29, 2020, at 1.

123. *See generally* *Assessment of the Impact of Covid-19 Pandemic on Water, Environment and Related Ecological and Human Systems*, FRONTIERS (June 19, 2021, 8:48 AM), <https://www.frontiersin.org/research-topics/13978/assessment-of-the-impact-of-covid-19-pandemic-on-water-environment-and-related-ecological-and-human> [<https://perma.cc/9DK8-DDZH>].

124. *Id.*

[United States] EPA’s Water Infrastructure Finance and Innovation Act (WIFIA) Loan Program.”¹²⁵ Many of the contemporary issues local and state governments are facing in the ongoing COVID-19 pandemic are already beginning to show their consequences.¹²⁶ The federal government has played a large role in keeping the economy afloat.¹²⁷ However, time is of the essence in tackling the economic consequences of COVID-19.¹²⁸ Rather than creating new policies and financial programs, it may be more efficient for policymakers to expand and repurpose existing federal financing programs “that already lend to state and local governments and public agencies.”¹²⁹

One of the most significant programs that policymakers should be expanding and repurposing is the EPA’s WIFIA.¹³⁰ In short, the WIFIA Loan Program “is a federal loan and guarantee program at EPA that aims to accelerate investment in the nation’s water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects.”¹³¹ A few of the water quality areas the WIFIA Loan Program reaches include “drinking water treatment and distribution projects; wastewater conveyance and treatment projects; enhanced energy efficiency projects at drinking water and wastewater facilities; desalination, aquifer recharge, alternative water supply, water recycling projects; and drought prevention, reduction, or mitigation projects.”¹³²

Since its enactment in 2017, the WIFIA Loan Program has helped public water agencies across the United States by “providing over \$15 billion in current or expected long-term loan commitments to more than 90 major water infrastructure projects throughout the United States.”¹³³ While it may go unnoticed, public water utilities are on the front lines of tackling the COVID-19 pandemic by providing a source of employment to communities and by providing an essential resource—water.¹³⁴ For example, the EPA put six billion additional dollars in new

125. John Ryan, *COVID-19 Recovery: WIFIA’s Role*, WATERWORLD (Nov. 11, 2020), <https://www.waterworld.com/drinking-water/infrastructure-funding/article/14185766/covid19-recovery-wifias-role> [<https://perma.cc/2DWJ-6MEM>].

126. *See id.*

127. *Id.*

128. *See id.*

129. *Id.*

130. *Id.*

131. *EPA Announces \$6 Billion in New Funding for Water Infrastructure Projects*, U.S. ENV’T PROT. AGENCY (July 14, 2020), <https://www.epa.gov/newsreleases/epa-announces-6-billion-new-funding-water-infrastructure-projects> [<https://perma.cc/XJ9Q-Z7S6>].

132. *Id.*

133. Ryan, *supra* note 127.

134. *Id.*

funding for water infrastructure projects through the WIFIA Loan Program, creating 35,000 jobs and \$12 billion in water infrastructure.¹³⁵ EPA Administrator Andrew Wheeler commented the following:

EPA's WIFIA loan program has become one of the most effective tools used in President Trump's efforts to upgrade our nation's infrastructure, create jobs and safeguard public health and the environment... This new round of \$6 billion in funding comes in time to help communities that are trying to recover from the health and financial stress of the COVID-19 pandemic and, for the first time, includes funding expressly available to states.¹³⁶

While it is vital to have federal funding available to local and state governments, it is just as important to have state and local funding available for communities and private sectors to leverage and use. Focusing on Iowa, an Iowa DNR report was released in early December, and found that there are water issues in more than 60% of the state's rivers, streams and lakes.¹³⁷ More specifically, the Iowa DNR found "750 water quality issues along Iowa's rivers, streams and lakes."¹³⁸ Therefore, while some reports claim the COVID-19 pandemic brought with it a reduction in certain pollutants,¹³⁹ it is clear that such reduction is not enough.¹⁴⁰ These findings are, however, from data collected between 2014 and 2018, before the COVID-19 pandemic hit.¹⁴¹

In sum, the Iowa DNR looked at 1,300 segments of different bodies of water and found that 61% of the segments evaluated could not be used for their "use or function," such as swimming, fishing, or supporting population.¹⁴² In response to the Iowa DNR's report, Iowa Governor Kim Reynolds allocated \$2 million in water quality grant money to 11 Iowa communities.¹⁴³ These communities include

135. *EPA Announces \$6 Billion in New Funding for Water Infrastructure Projects*, *supra* note 133.

136. *Id.*

137. See Travis Breese, *Iowa DNR Finds Water Quality Issues at Over 60% of Sites in Recent Study*, NEWS 7 KWWL (Dec. 3, 2020), <https://kwwl.com/2020/12/03/iowa-dnr-finds-water-quality-issues-at-over-60-of-sites-in-recent-study/> [<https://perma.cc/AB4L-TGXX>].

138. *Id.*

139. *Assessment of the Impact of Covid-19 Pandemic on Water, Environment and Related Ecological and Human Systems*, *supra* note 125.

140. See Breese, *supra* note 139.

141. See *id.*

142. *Id.*

143. Trevor Oates, *\$2 Million in Water Quality Project Grants Awarded to 11 Iowa Communities*, NEWS 7 KWWL (Dec. 18, 2020), <https://kwwl.com/2020/12/18/2-million-in-water-quality-project-grants-awarded-to-11-iowa-communities/> [<https://perma.cc/7J9Y-K8N4>].

“Fort Atkinson, Janesville, Lone Tree, Preston, Ladora, Dakota City, Early, Fontanelle, Melcher-Dallas, Runnells, and Russell.”¹⁴⁴ In total, however, the program received 23 applications, totaling over \$6 million in requested funds.¹⁴⁵ Thus, the state only met one-third of requested funds. Priorities for the grant money issued included “[d]isadvantaged communities; [p]rojects that will significantly improve water quality in their watershed; [p]rojects that use alternative wastewater treatment technologies; [c]ommunities with the highest sewer or water rates; [p]rojects that use technology to address nutrient reduction; and projects to address improvements to drinking water source waters.”¹⁴⁶

D. Potential Water Policy and Environmental Change on the Horizon: The Green New Deal

There has been much political debate from voters, media outlets, and politicians over the allusive Green New Deal.¹⁴⁷ The Green New Deal is a “congressional resolution that lays out a grand plan for tackling climate change.”¹⁴⁸ However, in 2019, notable Republicans strongly campaigned against the Green New Deal proposal and Democrats were divided on the resolution.¹⁴⁹ Interestingly enough, one poll found a correlation between Fox News media viewers and a disbelief in climate change, as well as a disapproval of the Green New Deal.¹⁵⁰

What has been called the “Fox News Effect,” or the belief that “Fox News is a driving force of political polarization in America,” has turned a great number of registered Republican voters away from the Green New Deal, which is notable given that Fox News viewers make up approximately 35% of registered Republican voters.¹⁵¹

The Green New Deal, among its main provisions, calls on the federal government to ensure clean water.¹⁵² Specifically, the Green New Deal calls for hazardous waste sites to be cleaned up, as well as a reduction in toxic air and water

144. *Id.*

145. *Id.*

146. *Id.*

147. See Cecelia Smith-Schoenwalder, *Poll: Rift Over Green New Deal Deepens*, U.S. NEWS & WORLD REP. (May 10, 2019), <https://www.usnews.com/news/politics/articles/2019-05-10/poll-rift-over-green-new-deal-deepens> [<https://perma.cc/H2A8-YDXZ>].

148. Lisa Friedman, *What Is the Green New Deal? A Climate Proposal, Explained*, N.Y. TIMES (Feb. 21, 2020), <https://www.nytimes.com/2019/02/21/climate/green-new-deal-questions-answers.html> [<https://perma.cc/9BHR-9AKA>].

149. Smith-Schoenwalder, *supra* note 149.

150. *See id.*

151. *See id.*

152. Friedman, *supra* note 150.

pollution caused by oil, gas, and coal extraction and usage. Communities of color and low-income families—who endure disproportionate exposure to toxins and pollutants—stand to benefit the most from the resolution.¹⁵³ Some states and cities, such as Illinois, California, and Pittsburgh, to name a few, are proactively implementing policies contained within the Green New Deal.¹⁵⁴

However, Iowa Senators Chuck Grassley and Joni Ernst, and Iowa Representatives (incumbents at the time of writing this note) Abby Finkenauer, Dave Loebsack, Cindy Axne, and Steve King, have yet to voice their support for the Green New Deal.¹⁵⁵ These Iowa representatives and senators may be missing out on an opportunity to help Iowa farmers.¹⁵⁶ Many politicians have weighed in “cynically and misleadingly.”¹⁵⁷ The current agricultural system in Iowa is not sustainable, and has led to “decades-long economic decline across the Midwest, depopulated . . . small towns, and polluted air, water and soil.”¹⁵⁸ The Green New Deal could be an opportunity, as opposed to a detriment, to Iowa farmers and communities.¹⁵⁹

A vast majority of Iowa’s land is used for farming.¹⁶⁰ Going hand-in-hand with the Iowa NRS—as well as the One Water Approach—farmers know that soil health is key to economic viability and profitability.¹⁶¹ However, there is no existing large-scale mode of incentivization in Iowa to promote better soil health.¹⁶²

For example, private sector organizations—such as real estate companies—could incentivize better soil health by increasing the cost and monetary value of

153. *What Is a Green New Deal?*, SIERRA CLUB (June 19, 2021, 8:58 AM), <https://www.sierraclub.org/trade/what-green-new-deal> [<https://perma.cc/XYZ6-HJ7W>].

154. *See id.*

155. *See* Aaron Calvin, *Here’s Where Iowa’s Congressional Delegation Stands on the Green New Deal*, DES MOINES REG. (Mar. 6, 2019, 8:22 AM), <https://www.desmoinesregister.com/story/news/2019/03/05/green-new-deal-where-iowas-congressional-representatives-stand-cortez-climate-change-ernst-grassley/3053319002/> [<https://perma.cc/K5GA-LGZA>].

156. Nate Preus & Hannah Breckbill, *Green New Deal Could Be a Major Win for Iowa Farmers*, DES MOINES REG. (Mar. 12, 2019), <https://www.desmoinesregister.com/story/opinion/columnists/iowa-view/2019/03/12/green-new-deal-could-major-win-iowa-farmers/3141329002/> [<https://perma.cc/X3S9-TUBQ>].

157. *Id.*

158. *Id.*

159. *Id.*

160. *Id.*

161. *See id.*

162. *See id.*

land depending on how many years it has had cover crops or other soil health practices on its land.¹⁶³ Or, if a uniform soil health metric could be implemented and used in the private-sector landscape, then landowners would be incentivized to require tenant farmers implement conservation practices.¹⁶⁴ This may be especially effective considering “60% [of Iowa farm land] is not farmed by the people who own it — it is instead rented out.”¹⁶⁵ The current system creates little incentive for landowners who rent out the property for farming to “prioritize sustainable management,” or “take preventative action against climate change.”¹⁶⁶

V. CONCLUSION

This Note has discussed the water eras chronicling the United States’ water regulation along the Mississippi River, modern water policy regulation and two different state approaches to improving water quality, the holistic One Water Approach, navigating water policy in light of the COVID-19 pandemic, and potential legislation presented in the Green New Deal.¹⁶⁷

To understand where water quality along the Mississippi River is heading, it is vital to understand where we have been and what precedent has been set.¹⁶⁸ It is also important to understand modern water policy approaches as this sets the stage for how other states may choose to act.¹⁶⁹ For example, Iowa showcases a voluntary approach under the Iowa NRS, while Minnesota utilizes a more regulatory approach with forceful penalties and enforcement measures, both state approaches having their respective pros and cons.¹⁷⁰

It is also important to understand that, regardless of whether a voluntary or regulatory approach works better, any action to improve water quality along the Mississippi River will be insufficient if river-bordering states fail to work toward better water quality.¹⁷¹ It is also unproductive to discuss water policy and where

163. *See id.*

164. *Id.*

165. *Id.*

166. *Id.*

167. *See id.*; Stets, *supra* note 4; Riessen, *supra* note 49, at 5; *Water Quality Standards*, *supra* note 96; *One Water, One Future*, *supra* note 107; Mukherjee et al., *supra* note 124, at 1; *See generally* NAT’L RSCH. COUNCIL, *supra* note 45.

168. *See* Stets, *supra* note 4.

169. *See* Riessen, *supra* note 49, at 5; *Water Quality Standards*, *supra* note 96; *see generally* NAT’L RSCH. COUNCIL, *supra* note 44.

170. *See* Riessen, *supra* note 49, at 5; *Water Quality Standards*, *supra* note 96.

171. *See* Riessen, *supra* note 49, at 5; *Water Quality Standards*, *supra* note 96; *One Water, One Future*, *supra* note 107.

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the United States is heading without acknowledging the impact the COVID-19 pandemic has had on the environment and environmental policy.¹⁷² This Note evaluated the initial impact of the pandemic on the environment, as well as the potential federal funding opportunities to tie water quality funding into areas that will help struggling communities.¹⁷³ Lastly, this Note addressed the current reactions to the Green New Deal at the local, state, and federal levels, and how political divides may be fueling the discrepancy between support and hate for the Green New Deal.¹⁷⁴

172. *See generally* Mukherjee et al., *supra* note 124.

173. *See id.*

174. Smith-Schoenwalder, *supra* note 149; Friedman, *supra* note 150.