Water Law Review

Volume 19 | Issue 1 Article 5

9-1-2015

Green Infrastructure Principles: An Opportunity for Streamlined Stormwater and Floodplain Planning the West

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GREEN INFRASTRUCTURE PRINCIPLES: AN OPPORTUNITY FOR STREAMLINED STORMWATER AND FLOODPLAIN PLANNING THE WEST

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I. INTRODUCTION

The United States has complex federal regulatory regimes governing water pollution, wetland protection, and development in floodplains. The federal government's permitting processes and various regulatory tools implicate land-use decisions like zoning and infrastructure design, which are often made at the local level pursuant to police powers that state governments delegate to local governments. The current array of regulations is inefficient and fails to protect watersheds, people, property, and water quality adequately. The general goal of these complex regulatory structures should be to drive toward a world with low impact development ("LID"), green infrastructure ("GI"), and thoughtful land-use decisions that are sensitive to the risks of floods and water pollution. If the federal government implemented a new, broad requirement that local governments must use green infrastructure principles where feasible, it would reduce pollution from stormwater and decrease risk of flood damage to people, property, and the environment.

In an area of law that is already laden with federal law and policy, it could

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seem that yet another federal requirement might frustrate the problem. A federal mandate compelling local governments to use green infrastructure where feasible, however, would streamline the regulatory process aimed at influencing local land-use decisions. Furthermore, even though GI provide innumerable benefits, most local governments will not implement GI without a federal mandate because they have to be sensitive to local interests. For example, a local government may try to accommodate a constituent who wants to protect his development rights for land in a floodplain even though developing that parcel would likely lead to increased risk of flood damage to people and property in addition to losing water purification (and many other) benefits of the natural landscape. Often a local government wants to do the right thing in this type of circumstance, but it needs a "hammer"—a strong federal mandate—requiring it to implement better land-use practices that the local government can use as a defense to affected constituents.

Currently, the federal government regulates water quality and floodplain management through the Environmental Protection Agency's ("EPA") enforcement of environmental laws, the U.S. Army Corps' ("USAECE") enforcement of engineering standards, and the Federal Emergency Management Agency's ("FEMA") enforcement of federal flood insurance rules. State governments regulate water quality and floodplain through discharge permits and sometimes water courts. When local governments want to improve upon state and federal regulations and implement state and federal programs, it requires local coordination. This "patchwork" of governmental agencies, statutes, and authorities makes it challenging for governmental entities to cooperate and solve watershed management problems—especially because property and political boundaries do not mimic the boundaries of watersheds.[1]

The numerous governmental entities involved in managing flood plains and stormwater do so inefficiently. Strangely, governmental entities' regulation of the resource called *stormwater* is distinct from their regulation of the resource called the *floodplain,* even though the two resources are inextricably intertwined as one resource when stormwater causes floods that flow into floodplains. The floodplain is the area of land that water can inundate during a flood, and includes the land over which water from a reservoir's spillway can flow.[2] Stormwater consists of "stormwater runoff, surface runoff, and drainage from storms and storm melt, which collect in discrete conveyances such as ditches, pipes, and swales and discharge into streams, rivers, or lakes."[3] Stormwater "management is the process of controlling and cleansing the excess runoff" in order to prevent harm to natural resources and human health.[4] Under ideal circumstances, governmental entities' effective regulation of the floodplain

1. Kara Gillon, *Watershed Down?: The Ups and Downs of Watershed Management in the Southwest,* 5 U. DENV. WATER L. REV. 395, 397 (2002).

2. COLO. DEP'T OF NATURAL RES., COLO. WATER CONSERVATION BD., RULES & REGULATIONS FOR REGULATORY FLOODPLAINS IN COLORADO 7 (Nov. 17, 2010), http://www.casfm.org/papers/Colorado_Floodplain_Rules_and_Regs_11-172010_Adopted.pdf.

3. COLORADO LAND PLANNING & DEVELOPMENT LAW 294 (Donald L. Elliott ed., 9th ed. 2012).

4. John R. Nolon, *In Praise of Parochialism: The Advent of Local Environmental Law,* 26 HARV. ENVTL. L. REV. 365, 404 (2002).

would be effective regulation of stormwater and vice versa. Governmental entities' regulation, however, does not occur in ideal circumstances, and "[w]hen a number of interchangeable agencies perform similar regulatory functions for a single resource, the result is inefficient fragmentation, not resilience-inducing diversity."[5]

This Article focuses on prevention of flood damage and water pollution rather than flood response. Section II explores the wider context of water and land-use regulation in the American West with a particular focus on Colorado. Section III describes low impact development and green infrastructure principles. Section IV discusses current federal regulatory approaches to (i) nonpoint source water pollution prevention, (ii) wetlands protection, and (iii) floodplain regulation. Section V concludes the Article by summarizing the benefits of a federal mandate requiring local governments to use green infrastructure principles.

II. STORMWATER AND FLOODPLAIN REGULATION IN THE AMERICAN WEST

Floods have an enormous impact on water quality because of the pollutants and sediment that floodwater collects and distributes. Where there is increased risk of flooding, there may also be an increased risk of water pollution unless local governments mitigate these risks with responsible land-use decisions.

Thoughtful water management in the settlement of the American West is fundamentally important. When the Director of the United States Geological Survey, John Wesley Powell, explored the "Arid Region of the United States" in the late nineteenth century he noted the variability in water availability, "[d]uring the fall and winter the streams are small; in late spring and early summer they are very large. A day's flow at flood time is greater than a month's flow at low water time."[6] Because of the extreme fluctuations in the hydrologic cycles in the West—vast periods of dryness punctuated by potentially devastating floods—Powell urged the U.S. Congress in 1890 to adopt a land development and governance plan based on "watershed units" throughout the nation's western lands before many states' creations.[7] A "watershed is the land area that

5. Nancy P. Spyke, *Heeding the Call: Making Sustainability A Matter of Pennsylvania Law*, 109 PENN ST. L. REV. 729, 756 (2005).

6. J. W. POWELL, REPORT ON THE LANDS OF THE ARID REGION OF THE UNITED STATES iii, 13 (1879), http://pubs.usgs.gov/unnumbered/70039240/report.pdf.

7. *See* Gillon, *supra* note 1, at 396; *see also Arizona*, *in* ENCYCLOPAEDIA BRITANNICA (Melvin E. Hecht ed., online ed. 2015) (Arizona achieved statehood in 1912); *Idaho*, *in* ENCYCLOPAEDIA BRITANNICA (Gregory Lewis McNamee ed., online ed. 2015) (Idaho achieved statehood in 1890); *Montana*, *in* ENCYCLOPAEDIA BRITANNICA (Dorothy M. Johnson ed., online ed. 2015) (Montana achieved statehood in 1889); *New Mexico*, *in* ENCYCLOPAEDIA BRITANNICA (Gregory Lewis McNamee ed., online ed. 2015) (New Mexico achieved statehood in 1912); *North Dakota*, *in* ENCYCLOPAEDIA BRITANNICA (Elwyn B. Robinson ed., online ed. 2015) (achieved statehood in 1889); *Oklahoma*, *in* ENCYCLOPAEDIA BRITANNICA (Dorothy M. Johnson ed., online ed. 2015) (Oklahoma achieved statehood in 1907); *South Dakota*, *in* ENCYCLOPAEDIA BRITANNICA (Herbert S. Schell ed., online ed. 2015) (South Dakota achieved statehood in 1889); Utah *in* ENCYCLOPAEDIA BRITANNICA (Leonard James Arrington ed., online ed. 2015) (Utah achieved statehood in 1896); *Washington*, *in* ENCYCLOPAEDIA BRITANNICA (Eugene Clark ed., online ed. 2015) (Washington achieved statehood in 1889); *Wyoming*, *in* ENCYCLOPAEDIA

drains to a single body of water such as a stream, lake, wetland, or estuary. Hills or ridgelines often bound watersheds; interior valleys collect precipitation in streams, rivers, and wetlands. These physical boundaries define the movement of water and delineate the watershed."[8] Unfortunately, Congress rejected Powell's sensible plan to create 150 self-governing watershed units.[9] Congress, while planning the development of the largely uninhabited frontier, failed to seriously consider Powell's map of the twenty-four river basins in the West.[10]

A widespread drought in the 1890s demonstrated the need for federal intervention in water management throughout the West.[11] Between 1900 and 1920, the population of the West grew from roughly four million to more than nine million people needing land and water.[12] At the beginning of the twentieth century southern California's rapid growth prodded the federal government to tame the Colorado River and plan the Hoover Dam in order to provide water for the ever-increasing population in western states.[13] This decision also impacted the land-use patterns of the West because it sent a message to settlers that they would have enough water to establish their farms and towns in a semi-arid climate with complex hydrological concerns.

Colorado exemplifies the need for better water management. Colorado, often called the "Headwaters State,"[14] has tremendous water management issues due to its long periods of dryness accompanied by seasonal flash floods from snowmelt. The regularity and severity of floods in Colorado's Front Range[15] illustrates this point; for example, Cherry Creek flooded in 1864 and 1933; Boulder Creek flooded in 1894, 1938, and 2013; Tucker Gulch and Clear Creek flooded in 1896; South Platte River flooded in 1965; Big Thompson River flooded in 1976; and Spring Creek flooded in 1997.[16] During the Big Thompson River flood of 1976 a foot of rain fell in the river's watershed in less

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BRITANNICA (Gregory Lewis McNamee ed., online ed. 2015) (Wyoming achieved statehood in 1890).

8. ENVTL. PROTECTION AGENCY, PROTECTING AND RESTORING AMERICA'S WATERSHEDS: STATUS, TRENDS, & INITIATIVES IN WATERSHED MANAGEMENT 9 (2001), http://www.epa.gov/owow/protecting/restore725.pdf.

9. *Id.* at 10; *see also* Gillon, *supra* note 1, at 396.

10. ENVTL. PROTECTION AGENCY, *supra* note 8, at 10; *see also* Gillon, *supra* at note 1, at 396.

11. John E. Thorson, Ramsey Laursoo Kropf, Dar Crammond & Andrea K. Gerlak, *Dividing Western Waters: A Century of Adjudicating Rivers & Streams*, 8 U. DENV. WATER L. REV. 355, 366 (2005).

12. *Id.*

13. *Id.* at 366-67.

14. Colorado State University Libraries, *Colorado Water History*, RESEARCH GUIDES AT COLO. STATE UNIV. FORT COLLINS (Sept. 10, 2015), http://libguides.colostate.edu/waterhistory. The nickname reflects the four major rivers, including the mighty Colorado River, that originate within the boundaries of Colorado. *Id.*

15. "Front Range" is the eastern slope of the Rocky Mountains running roughly from Fort Collins in the north to Colorado Springs in the south. *Understanding Colorado's Regions*, 9NEWS, http://archive.9news.com/weather/resources/region_guide/ (last visited Oct. 3, 2015). The Front Range is home to approximately eighty percent of the state's population. COLO. DEP'T OF LOCAL AFFAIRS, 2014 POPULATION OVERVIEW 1 (2014).

16. *See* URBAN DRAINAGE & FLOOD CONTROL DISTRICT & WRIGHT WATER ENG'RS, A SEPTEMBER TO REMEMBER: THE 2013 COLORADO FLOOD WITHIN THE URBAN DRAINAGE & FLOOD CONTROL DISTRICT 12-15, 17-22 (2014).

than six hours causing the deadliest flash flood in Colorado's history—143 people lost their lives.[17] In the 2013 Boulder Creek flood, nine people died and roughly $2 billion of property damage occurred.[18]

Today, Colorado is home to over 5.3 million people,[19] and current estimates predict the population to double in the next fifty years with a projected population between 8.7 and 10.3 million people by 2050.[20] Colorado's continued population growth will require thoughtful land-use planning that incorporates strategic stormwater and floodplain management using LID and GI principles.

III. GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT: PRINCIPLES AND IMPLEMENTATION CHALLENGES

In the age of global climate change, extreme weather is becoming increasingly common.[21] Planning and design principles that encourage humans to build environments that mimic attributes of natural landscapes will help mitigate damage from extreme weather and facilitate adaptation to the extreme weather that global climate change causes. Colorado faces unique challenges to the implementation of green infrastructure principles due to its semi-arid climate and water law regime.[22]

A. GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT PRINCIPLES

Many consider green infrastructure and low impact development to be interchangeable terms that describe the same approach to land development. But, the EPA differentiates these terms: the EPA defines green infrastructure as "systems and practices that use or mimic natural processes to infiltrate, evapotranspirate (the return of water to the atmosphere either through evaporation or by plants), or reuse stormwater or runoff on the site where it is generated."[23] GI can include green roofs, tree boxes, vegetated swales, pocket wetlands, infiltration planters, reforestation, vegetated median strips, and

17. *Id.* at 21.

18. *Id.* at 10, 21.

19. UNITED STATES CENSUS BUREAU, STATE & COUNTY QUICKFACTS (2014), http://quickfacts.census.gov/qfd/states/08000.html.

20. NICOLE ROWAN, SUSAN MOREA & ERIC HECOX, A 2050 VISION FOR COLORADO'S WATER SUPPLY FUTURE 4 (2010), http://cwcb.state.co.us/water-management/water-supply-planning/documents/watersupplysolutions/2050visionforcowatersupplyfuture.pdf.

21. *See generally* AMBER CHILDRESS ET AL., *COLORADO CLIMATE CHANGE VULNERABILITY STUDY* (Eric Gordon & Dennis Ojima, eds., 2015), http://wwa.colorado.edu/climate/co2015vulnerability/co_vulnerability_report_2015_final.pdf (discussing global climate change's effects on Colorado's natural resources).

22. *See* Water Env't Federation, *Colorado's "Taupe Infrastructure,"* STORMWATER REPORT (Feb. 5, 2014), http://stormwater.wef.org/2014/02/colorados-taupe-infrastructure/.

23. *Low Impact Development (LID)*, U.S. ENVTL. PROTECTION AGENCY (Feb. 12, 2015), http://water.epa.gov/polwaste/green/; *see generally Stormwater Regulation: Geographic Differences, New Approaches, and Environmental Issues*, AMERICAN BAR ASSOCIATION (Feb. 18, 2015) [hereinafter *Stormwater Webinar*] (downloaded through American Bar Association's website) (discussing ecosystem services GI provides in "What is Green Infrastructure" section).

bolstering of riparian buffers and floodplains.[24] While "gray infrastructure," is stormwater in traditional gutters, downspouts, and miles of underground pipes; and gray infrastructure's "general characteristics. . . are that they. . . take water too far and move it too fast and along the way it picks up pollutants."[25]

The EPA defines low impact development, however, with nearly identical language because "GI refers principally to the control practices used to implement LID, and thus with respect to the control measures the two terms overlap. The principal difference between the two concepts is that LID has a very specific target of maintaining pre-development hydrology."[26] The implementation of LID principles leads to water management that promotes the natural movement of water within a watershed and reduces the impact of human-constructed areas.[27] Another key difference between LID and GI is the scale of implementation: "[t]he focus of GI is on the design of the individual GI practices rather than a project or site scale approach. Thus it is possible to implement GI practices without achieving the goal of LID with respect to maintaining pre-development site hydrology."[28] The remainder of this Article will use GI and LID interchangeably because the terms are closely intertwined and much of the literature treats the terms as such.

Implementation of GI and LID principles provides many benefits and has the strong support of the EPA, which creates and compiles many helpful resources on the topic for citizens and local governments to use.[29] Green infrastructure reduces water pollution by allowing soil and vegetation to absorb and clean stormwater.[30] GI also directly mitigates flood risk because GI slows water by removing some of the water from the flow.[31] In 2013, the Natural Resources Defense Coalition released a report demonstrating that the implementation of GI principles can raise property value.[32] Aesthetics may be the reason for the property value increase: green infrastructure is usually above ground and looks more like a native landscape than traditional gray infrastructure.[33] Another key GI benefit is that it can reduce development

24. U.S. ENVTL PROTECTION AGENCY, NATURAL RESOURCES DEFENSE COUNCIL (NRDC), LOW IMPACT DEVELOPMENT CENTER (LID), NATIONAL ASSOCIATION OF STATE & INTERSTATE WATER POLLUTION CONTROL ADMINISTRATORS (ASIWPCA), GREEN INFRASTRUCTURE STATEMENT OF INTENT 2 (Apr. 19, 2007), http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_intentstatement.pdf.

25. *Stormwater Webinar, supra* note 24 ("What is Green Infrastructure" section).

26. MICHAEL CLAR, LOW IMPACT DEVELOPMENT (LID) TECHNOLOGY & GREEN INFRASTRUCTURE (GI) 2 (1998), https://www.asce.org/uploadedFiles/Technical_Areas/Environmental_and_Water_Resources_Engineering/LIDGI__2_.pdf.

27. *Id.* at 1.

28. *Id.* at 2.

29. *See e.g., Green Infrastructure* (last updated Oct. 27, 2014), http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm.

30. U.S. ENVTL PROTECTION AGENCY, *supra* note 25, at 2.

31. *See id.*

32. JANET CLEMENTS ET AL., NRDC REPORT: THE GREEN EDGE: HOW COMMERCIAL PROPERTY INVESTMENT IN GREEN INFRASTRUCTURE CREATES VALUE (2013), http://www.nrdc.org/water/files/commercial-value-green-infrastructure-report.pdf.

33. *Stormwater Webinar, supra* note 24 ("Advantages of Green over Gray" section).

costs.[34] GI is less expensive to maintain because it is above ground and therefore more accessible when compared to gray infrastructure.[35] Additionally, unlike gray infrastructure, GI allows the ground to absorb stormwater and as a result, less water flows to sewage treatment facilities.[36] This absorption enables cities to build sewage treatment facilities with less capacity, so municipal governments save money when they incorporate GI principles into land-use decisions.[37]

Building cities in accordance with GI principles also provides social benefits. Green infrastructure principles can calm traffic "by reducing street widths and introducing curves."[38] GI can beautify neighborhoods by turning concrete into little green spaces.[39] Communities thrive in the presence of parks and slowed traffic.

B. CHALLENGES TO IMPLEMENTING GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT IN COLORADO

Denver's Chief Sustainability Officer, Jerry Tinianow, identified at least five "barriers" to implementation of green infrastructure principles in Colorado in a presentation about stormwater management: (i) "[l]ack of awareness [and] understanding" of methodology; (ii) "fear of rejection" by potential buyers and regulators; (iii) "inertia;" (iv) "legal barriers" such as municipal codes that make GI illegal or more cumbersome; and (v) lack of familiarity among municipal officials.[40] While some of these barriers will likely dissipate with time, community engagement, and municipal staff education and training, some of these challenges will continue to present significant obstacles to implementation of GI principles. For example, Colorado's water allocation system presents a barrier to implementation of crucial GI principles because the system prohibits temporary water storage—such as constructing swales, small ponds, or storing rainwater—because it *may* harm existing water rights.[41]

Colorado became a state in 1876.[42] It is a semi-arid region that receives, on average, less than fifteen inches of rainfall a year.[43] As such, Colorado required

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34. U.S. ENVTL PROTECTION AGENCY, REDUCING STORMWATER COSTS THROUGH LOW IMPACT DEVELOPMENT (LID) STRATEGIES AND PRACTICES (2007), http://water.epa.gov/polwaste/green/costs07_index.cfm (finding GI's "economic benefits are real and significant").

35. *Stormwater Webinar, supra* note 24 ("Advantages of Green over Gray" section).

36. *Id.* ("What is Green Infrastructure" section).

37. *See id.* ("What is Green Infrastructure" section).

38. U.S. ENVTL PROTECTION AGENCY, GREEN INFRASTRUCTURE IN ARID & SEMI-ARID CLIMATES: ADAPTING INNOVATIVE STORMWATER MANAGEMENT TECHNIQUES TO THE WATER-LIMITED WEST 7-8 (2010), http://www.azwater.gov/AzDWR/waterManagement/documents/1050408AridClimatesCaseStudy_v2.pdf.

39. *See id.*

40. *Stormwater Webinar, supra* note 24 ("Barriers to Green Infrastructure" section).

41. *See Rainwater Collection & Graywater Reuse*, COLO. DEP'T. OF NATURAL RES., DIV. OF WATER RESOURCES [hereinafter *Rainwater Collection*], http://water.state.co.us/SURFACEWATER/SWRIGHTS/Pages/RainwaterGraywater.aspx. (emphasis added)

42. *Colorado, in* ENCYCLOPAEDIA BRITANNICA (Gregory Lewis McNamee ed., online ed. 2015).

43. DICK WOLFE & JOSEPH (JODY) GRANTHAM, SYNOPSIS OF COLORADO WATER LAW 1 (2011), http://water.state.co.us/DWRIPub/DWR%20General%20 Documents/SynopsisCOWaterLaw.pdf.

a water allocation system that would "take the environment into consideration and be different from those utilized in areas that normally receive adequate year-round precipitation."[44] Colorado expressly adopted prior appropriation as the state's water allocation system in article XVI of its 1876 constitution:

> The water of every natural stream, not heretofore appropriated, within the State of Colorado, is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state, subject to appropriation as hereinafter provided..... The right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied.[45]

Because the water in every stream is property of the public, an appropriator only owns the right to *use* the water, that is, the appropriator has a usufructuary property right.[46] Within the prior appropriation system, someone seeking to perfect a water right must divert water with the intent to appropriate it for a beneficial use.[47] The goal of this allocation system is "to promote optimum use of a finite resource."[48]

Despite common misconception, water quality protection does fall within the scope of the prior appropriation doctrine.[49] "Colorado law guarantees an appropriator the right to continue to receive *water of sufficient quality* to allow the appropriator to make continued normal use of that water. This has been the law in Colorado for over a century."[50] The ability to use the prior appropriation system to protect water quality through legal challenges in the judicial branch is important. Most people, however, do not own water rights so the fact that a water right holder can protect her water quality through adjudication in Colorado's Water Courts does not prevent pollution from entering Colorado waterways.[51] The fact that most people do not own water

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44. *Id.*

45. COLO. CONST. amend. XVI, §§ 5-6.

46. Ryan Jarvis, *Prior Appropriation and Water Quality: The Water Court's Authority to Protect an Appropriator's Right to Clean Water*, 16 U. DENV. WATER L. REV. 295, 302 (2013).

47. *See* DAVID H. GETCHES, SANDRA B. ZELLMER & ADELL L. AMOS, WATER LAW IN A NUTSHELL 92 (West Academic, 5th ed. 1997).

48. Jarvis, *supra* note 47, at 297 (footnote omitted).

49. *Id.* at 296; *see also id.* at 297 ("[T]he Colorado water law community must fully recognize that Colorado prior appropriation water law, independent of statutory schemes like the WQCA, protects water quality. Water law practitioners in Colorado should use the court's authority to fully protect their clients' water rights.").

50. *Id.* at 295 (emphasis added) (citing City of Thornton v. Bijou Irrigation Co., 926 P.2d 1, 91 (Colo. 1996); Game & Fish Comm'n v. Farmers Irrigation Co., 426 P.2d 562, 566 (Colo. 1967); Slide Mines, Inc. v. Left Hand Ditch Co., 77 P.2d 125, 127 (Colo. 1938); Wilmore v. Chain O'Mines, Inc., 44 P.2d 1024, 1027 (Colo. 1934); Humphreys Tunnel & Mining Co. v. Frank, 105 P. 1093, 1095 (Colo. 1909); Suffolk Gold Mining & Milling Co. v. San Miguel Consol. Mining & Milling Co., 48 P. 828, 832 (Colo. App. 1897); Cushman v. Highland Ditch Co., 33 P. 344, 345 (Colo. App. 1893)).

51. *Cf.* City of Thornton v. Bijou Irr. Co., 926 P.2d 1, 91-92 (discussing how Colorado Water Quality Control Commission and the Water Quality Division regulate water quality "in a manner that [will not] significantly compromise[] the appropriative rights of present or future water users"). The Colorado Water Quality Act's protection of water quality is one example of the legislative branch's strong protection of water. *See id.*; *see also* Colo. Rev. Stat. 37-92-602(8)(a) (2015) ("The general assembly hereby declares that storm water detention and

rights becomes critical within the context of implementing GI development strategies because green infrastructure principles result in slowing down the movement of stormwater, which can be interpreted as illegal impoundment of water in Colorado.

An individual in Colorado may not store rain or stormwater unless he or she owns a water storage right.[52] Although no one is monitoring the rain barrels, senior downstream users could view green infrastructure as an unlawful impoundment that interferes with their existing water rights.[53] Colorado presents an extreme example, where the common wisdom is that rain barrels are "illegal."[54] Recent Colorado legislation, however, indicates that the state is open to changing its law and policy with regard to rainwater collection and thereby dissolving the legal barrier to implementing GI principles.

In 2009, the Colorado General Assembly passed and Governor Ritter signed Senate Bill 09-80 and House Bill 09-1129 into law.[55] The senate bill "allows residents on wells to collect precipitation from up to 3,000 square feet of rooftop if they get a permit from the Colorado Division of Water Resources. . . . [the house bill] directs the state to approve 10 pilot projects, new housing or mixed-use developments designed to include rainwater collection."[56] After studying this small sampling of pilot projects that run until 2019, officials will determine whether it is viable to use rain for household irrigation and will study the streamflow impact.[57] The pilot program's goal is to create a body of knowledge that incorporates field-verified information about rainwater collection "as a water conservation measure in Colorado, through pairing it directly with advanced outdoor water demand management."[58] According to the Colorado Water Conservation Board, allowing storm and rainwater collection did not receive serious consideration in Colorado until recently because "prior to the passage of legislation in the 2008-2009 session, the law required 100% replacement of any precipitation captured out-of-priority, thereby requiring water users to find an equal amount of replacement water in

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infiltration facilities and post-wildland fire facilities are essential for the protection of public safety and welfare, property, and the environment."). This strong protection also appears in the executive branch (e.g. the EPA), but not in the judicial branch. *Compare Water: Water Quality Standards*, U.S. ENVTL PROTECTION AGENCY, http://water.epa.gov/scitech/swguidance/standards/ (last updated July 11, 2014), *with* In re Application for Plan for Augmentation of City & Cnty. of Denver ex rel Bd. of Water Com'rs, 44 P.3d 1019, 1028 (Colo. 2002) (citations omitted) ("It is true, as Denver argues, that Colorado water law has historically focused on water quantity issues so that the law regarding water quality is not well developed. . . . Notwithstanding the lack of focus on water quality issues, [the Court has] protected water quality to the extent necessary to preserve the water's suitability for the uses of appropriators.").

52. *Rainwater Collection*, *supra* note 42.

53. *Stormwater Webinar*, *supra* note 24 ("Western Water Law" section).

54. *Id.*

55. R. Scott Rappold, *New Laws Open the Way for Rain Barrels, for Some*, THE GAZETTE (June 2, 2009), http://gazette.com/new-laws-open-the-way-for-rain-barrels-for-some/article/55602.

56. *Id.*

57. *Id.*

58. COLORADO WATER CONSERVATION BOARD, AUTHORIZATION OF PILOT PROJECTS FOR THE BENEFICIAL USE OF CAPTURED PRECIPITATION IN NEW REAL ESTATE DEVELOPMENTS: CRITERIA AND GUIDELINES FOR THE "RAINWATER HARVESTING" PILOT PROJECT PROGRAM 2 (2010).

like time and place."[59] Homeowners and developers have not been willing to risk possibly having to replace water after illegal impoundment, and this risk aversion hinders the implementation of green infrastructure principles. Hopefully, the rainwater collection pilot program will collect data that demonstrates temporary stormwater storage does not harm downstream users' water rights, thus allowing Colorado municipalities to better incorporate green infrastructure principles that result in temporary water storage.

Another potential area for law and policy change that would impact implementation of GI principles may occur at the federal level: the EPA is considering a national rule that would mandate the retention of stormwater onsite.[60] Andrew Earles, the vice president of Wright Water Engineers, Inc. speaking on the tension between Colorado's doctrine of prior appropriation and green infrastructure said: "There are ways to work within water rights laws. But it won't be easy, and there is no simple solution."[61] Implementation of GI principles presents a compelling dilemma in which water quantity and water quality seem at odds. The rainwater pilot program could put an end to this tension by producing data showing stormwater detention does not adversely impact water rights holders. This data could enable local governments to use GI principles that result in temporary stormwater storage in Colorado.

IV. CURRENT REGULATORY APPROACHES

This section addresses the leading regulatory structures that (i) prevent and mitigate water pollution, (ii) protect wetlands, and (iii) influence floodplain development patterns. The pollution prevention and wetland protection measures this section addresses emerge from the Flood Water Pollution Control Act ("FWPCA"), commonly called the Clean Water Act ("CWA") after amendment in 1972.[62] The 1972 amendments expanded the statute by establishing "effluent limitations, water quality requirements, and the [discharge] permit program. . . [which] remain the foundation of the CWA."[63] The 1987 amendments to the CWA created a timetable for stormwater regulation in addition to enhancing the EPA's enforcement abilities.[64]

The CWA is the principal federal statute that governs water pollution through establishing programs aimed at restoring and improving water quality in the United States, and significant elements of the CWA pertaining to stormwater include a land-use component.[65] The CWA's stormwater programs

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59. *Id.* at 1.

60. Water Env't Federation, *supra* note 23.

61. *Id.*

62. *Laws & Regulation, Summary of the Clean Water Act,* U.S. ENVTL PROTECTION AGENCY (Mar. 13, 2015), http://www2.epa.gov/laws-regulations/summary-clean-water-act; *see also* Clean Water Act, 33 U.S.C. §§ 1251-1387 (1987). When Congress amended the FWPCA again in 1977, the FWPCA officially became known as the CWA. CHRISTOPHER L. BELL et al., ENVIRONMENTAL LAW HANDBOOK 318 (Thomas F. P. Sullivan ed., 21st ed. 2011).

63. CHRISTOPHER L. BELL et al., ENVIRONMENTAL LAW HANDBOOK 317 (Thomas F. P. Sullivan ed., 21st ed. 2011).

64. *Id.* at 318.

65. *Id.* at 319 (elements including: (i) "prohibition on discharges, except in compliance with the [CWA];" (ii) "permit program to authorize and regulate discharges in compliance with the

prohibit the discharge of pollutants into surface waters through the creation of the dredge and fill permit program, the National Pollutant Discharge Elimination System ("NPDES") permit program, and municipal wastewater treatment programs.[66] The EPA has authority to regulate stormwater under the CWA but it delegates much of this authority to state governments.[67] The EPA—along with other agencies at the federal, state, and local levels—administers these programs.[68]

The EPA may regulate "any addition of any pollutant to navigable waters from any point source" and must set ambient water quality standards for the receiving waters.[69] The EPA's authority to regulate point source water pollution comes from the CWA's 1972 amendments.[70] According to the statute, "point source" signifies "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well. . . from which pollutants are or may be discharged."[71]

Under the CWA's NPDES program the EPA—or the discharge permitting program of a state to whom the federal government delegated authority—may issue a permit for all discharged pollutants except dredged and fill material.[72] Additionally, the CWA authorizes tribes to issue discharge permits.[73] The CWA's anti-degradation requirement prevents the issue of discharge permits "if existing water quality is better than state water quality standards. . . [and discharges would] degrade the water to meet the standards."[74] In effect, those seeking to discharge pollutants must obtain permits certifying that the discharge satisfies *both* the CWA's effluent limitations and water quality standards.[75]

Section 402 of the CWA ("Section 402") enables the EPA to regulate stormwater in two phases: Phase I (promulgated in 1990) and Phase II (promulgated in 1999).[76] Municipal Separate Storm Sewer Systems ("MS4s")

[CWA];" (iii) "system for determining the limitations to be imposed on authorized and regulated discharges;" (iv) "permit program governing the discharge or placement of dredged or fill material in the nation's waters;" (v) "system for preventing, reporting, and responding to spills into the nation's waters;" (vi) "procedure for cooperative federal/state implementation of the act;" and (vii) "[s]trong enforcement mechanisms").

66. *Stormwater Basic Information*, U.S. ENVTL PROTECTION AGENCY (July 15, 2014), http://water.epa.gov/polwaste/npdes/stormwater/Stormwater-Basic-Information.cfm.

67. *See generally* COLORADO LAND PLANNING & DEVELOPMENT LAW, *supra* note 3, at 291-301 (discussing CWA's impact on Colorado state law).

68. *See Stormwater Basic Information*, *supra* note 67.

69. 33 U.S.C. § 1362 (12) (2014); *see also* 33 U.S.C. § 1311(a) (1995) ("Except as in compliance with [the CWA]. . . the discharge of any pollutant by any person shall be unlawful."); 33 U.S.C. § 1313(a)(3)(C) (2000) (if state law is absent or insufficient the EPA will promulgate water quality standards).

70. Robin Kundis Craig, *Local or National? The Increasing Federalization of Nonpoint Source Pollution Regulation*, 15 J. ENVTL. L. & LITIG. 179 (2000); *see generally* 33 U.S.C. § 1311 (1995) (discussing pollutant regulation).

71. 33 U.S.C. § 1362(14) (2014).

72. *See* 33 U.S.C. § 1342(a)(1) (2014); Steven M. Neugeboren, *Basics of the Clean Water Act: Law & Regulation*, SL036 A.L.I.-A.B.A. 1, 3-4 (Oct. 26-28, 2005).

73. 33 U.S.C. § 1377(e) (2014); *see also* 33 U.S.C. § 1342(a).

74. Gillon, *supra* note 1, at 399 n.22.

75. *Id.* at 398-99.

76. *Municipal Separate Storm Sewer System (MS4) Mainpage*, U.S. ENVTL. PROTECTION

carry polluted stormwater runoff into local waterbodies, and often this water remains untreated at the time of discharge.[77] "To prevent harmful pollutants from being washing or dumped into an MS4, operators must obtain a NPDES permit and develop a stormwater management program."[78]

The EPA's Best Management Practices ("BMPs") for stormwater pollution control has close ties to land-use decisions.[79] According to the EPA, stormwater pollution's two main components are (i) "the increased volume and rate of runoff from water resistant surfaces, such as roads and parking lots;" and (ii) "the amount of pollutants in the runoff."[80] "Both components are directly related to urban development. They can cause changes in water quality."[81] Water quality concerns caused by development result in other problems like increases in flooding, sedimentation, and erosion; and change and destruction to the environment—among other problems.[82] The BMPs concerning land-use include implementing rain gardens, grassy hollows, environmentally conscious parking design, permeable pavement, rain barrels, riparian buffers, and roofs with vegetation.[83] This means, essentially, means that the EPA's stormwater regulation explicitly encourages implementing green infrastructure principles to improve water quality.[84]

The EPA's two phases for regulating stormwater runoff and obtaining discharge permits under Section 402 also relate to land-use decisions. Phase I requires municipalities with more than 100,000 residents to put forth a sufficiently comprehensive plan that would decrease the amount of pollutants contained in stormwater discharges in order for the municipality to obtain a permit.[85] Comprehensive plans provided by municipalities "must include procedures to implement and enforce controls to reduce stormwater discharges from new development and redevelopment."[86] Phase I regulates the permitting of industrial activities that contain "any construction operation that disturbed land by clearing, grading, or excavating five acres or land or more."[87] If stormwater discharge "contributes to a violation of a water quality standard or significantly contributes to pollutants in United States waters," then the EPA will evaluate the project (or municipality with a population of less than 100,000

AGENCY http://water.epa.gov/polwaste/npdes/stormwater/Municipal-Separate-Storm-Sewer-System-MS4-Main-Page.cfm (last updated Nov. 26, 2014); *see also Clean Water Act, Section 402: National Pollutant Discharge Elimination System*, U.S. ENVTL. PROTECTION AGENCY, http://water.epa.gov/lawsregs/guidance/wetlands/section402.cfm (last updated Mar. 6, 2012) (outlining statutory provisions of Section 402).

77. *Id.*

78. *Id.*

79. *Best Management Practices (BMPs): Stormwater*, U.S. ENVTL. PROTECTION AGENCY, http://web.archive.org/web/20150414040410/http://www.epa.gov/nrmrl/wswrd/wq/stormwater/bmp.html (last updated Sept. 5, 2015).

80. *Id.*

81. *Id.*

82. *Id.*

83. *Id.*

84. *See id.*

85. COLORADO LAND PLANNING & DEVELOPMENT LAW, *supra* note 3, at 294.

86. *Id.*

87. *Id.* at 294–95 (footnote omitted).

residents) based on four factors.[88] These factors include: (i) the discharge location in relation to navigable U.S. waters; (ii) discharge size; (iii) how much and what kind of pollutants enter the U.S.; and (iv) any other pertinent factors.[89] There has been extensive litigation concerning the scope of the phrase "navigable waters."[90]

Phase II expanded the EPA's program to require discharge permits for municipalities with populations greater than 1,000 people and to construction sites impacting more than one acre of land.[91] Now projects must fit into one of those categories to obtain NPDES permits.[92] Today, there are roughly 750 Phase I MS4s and 6,700 Phase II MS4s.[93]

Under Section 402, the EPA may delegate its authority to issue NPDES permits to states, although state-issued permits remain reviewable by the EPA.[94] If the EPA approves the state's program, then the two parties enter into a Memorandum of Agreement stipulating the state program's key elements.[95] A state's discharge permit system may be more stringent than the EPA's standards require as long as the state regulations are consistent with the federal regulations.[96] Colorado went through this process, and now the Water Quality Control Division ("WQCD") administers the Colorado Discharge Permit System.[97]

The CWA recognizes that point source pollution regulation pursuant to Section 402 does not prevent all significant pollution because pollutants enter waterbodies through diffuse means as well as from point sources.[98] "A recent national water quality survey of the nation's rivers and streams showed that 55% of the nation's flowing waters are in poor biological condition and 23% are in fair biological condition."[99] This leaves room for improvement. The following section will examine the CWA's nonpoint source pollution regulation.

A. NONPOINT SOURCE POLLUTION PREVENTION

Section 401 of the CWA ("Section 401") governs the Total Maximum Daily Load ("TMDL") program, which addresses the problem of diffuse entry of pollutants into waterbodies that occurs as a result of land-use decisions.[100] Colorado's WQCD provides Section 401 certifications; oversees TMDL;

88. *Id.* at 295 (footnote omitted).

89. *Id.* at 295.

90. *See, e.g.*, Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps. of Eng'rs, 531 U.S. 159, 167 (2001).

91. COLORADO LAND PLANNING & DEVELOPMENT LAW, *supra* note 3, at 295.

92. *Id.*

93. *Municipal Separate Storm Sewer System (MS4) Mainpage*, *supra* note 77.

94. BELL, *supra* note 64, at 324.

95. *Id.*

96. *See* 33 U.S.C.A. § 1342(5)(b) (2014).

97. *See* COLO. REV. STAT. § 25-8-501(1),(3) (2001).

98. *See Polluted Runoff: Nonpoint Source Pollution*, U.S. ENVTL. PROTECTION AGENCY, http://water.epa.gov/polwaste/nps/index.cfm (last updated Feb. 25, 2015).

99. *Healthy Watersheds*, U.S. ENVTL. PROTECTION AGENCY, http://water.epa.gov/polwaste/nps/watershed/index.cfm (last updated Mar. 18, 2015).

100. *See* 33 U.S.C. § 1313(d)(1) (2000).

manages water quality planning (including Watershed 319, a nonpoint source pollutant regulation program); and created the Statewide Water Quality Management Plan ("SWQMP").[101]

The WQCD issues Water Quality Certifications ("WQC"), which are federal permits that one must obtain in order to construct or operate a facility that may result in any fill or discharge into U.S. navigable waters.[102] WQCs are necessary for any project that involves constructing or operating a facility by the U.S. Army Corps of Engineers ("USACE") under Section 404; hydropower projects with Federal Energy Regulatory Commission licenses; or other federal permits for discharge into waterways the EPA has issued pursuant to Section 402.[103]

States must also set water quality standards, a process that involves the watershed itself.[104] Before states set their standards, they must first take an inventory of all their waters and determine which waters the EPA does not protect with its effluent limits.[105] These "standards divide the waters into segments, determine the present and attainable uses for each segment (endangered species, recreation, domestic use, etc.), and set numeric limits on pollutants that will protect these uses."[106] Additionally, Section 303 requires states to assign TMDLs for "impaired waters"[107] that function as a "pollution budget" for pollutants entering the watercourse by both point and nonpoint sources.[108]

The WQCD develops the allowable TMDL level of a particular pollutant in a body of water or segment of a stream that does not meet existing water quality standards.[109] "TMDL development is a rational method for weighing the competing pollution interests and developing an integrated pollution reduction strategy for point and nonpoint sources."[110] This process involves: (i) "[s]elect[ing] the pollutant to consider;" (ii) "[e]stimat[ing] the water body assimilative capacity;" (iii) "[i]dentify[ing] the contribution of that pollutant from all significant sources;" (iv) "[a]nalyz[ing] information to determine the total allowable pollutant load;" and (v) [a]llocat[ing] (with a margin of safety) the allowable pollution among the sources so water quality standards can be

101. *Clean Water*, COLO. DEP'T. OF PUBLIC HEALTH & ENV'T. (2015), https://www.colorado.gov/pacific/cdphe/clean-water.

102. *State of Colorado Water Quality Certification: Fulfilling the Requirements of Clean Water Act Section 401*, COLO. DEP'T. OF PUBLIC HEALTH & ENV'T, https://drive.google.com/file/d/0B4_2BkAMBRc8VWNlNDR2bFlkM2s/edit (last visited Oct. 3, 2015).

103. *401 Water Quality Certification*, COLO. DEP'T. OF PUBLIC HEALTH & ENV'T (2015), https://www.colorado.gov/pacific/cdphe/wq-401-water-quality-certification.

104. Gillon, *supra* note 1, at 399.

105. *Id.*

106. *Id.* (footnote omitted).

107. *Impaired Waters and Total Maximum Daily Loads*, U.S. ENVTL. PROTECTION AGENCY, http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/index.cfm (last updated Aug. 14, 2015).

108. *Final TMDL Rule: Fulfilling the Goals of the Clean Water Act*, U.S. ENVTL. PROTECTION AGENCY 1 (July 2000), http://www.epa.gov/owow/tmdl/finalrule/factsheet1.pdf.

109. Gillon, *supra* note 1, at 399.

110. *Clean Water: TMDL Development*, COLO. DEP'T. OF PUBLIC HEALTH & ENV'T (2015), https://www.colorado.gov/pacific/cdphe/tmdls-development.

achieved."[111]

The WQCD also administers the Watershed 319 nonpoint source program in order to mitigate pollution. Through Watershed 319, the WQCD seeks to remove pollutants that enter waterbodies as rainfall or snowmelt and pick up fertilizers; pesticides; construction site sediment; salt from irrigation; abandoned mines' leaking acid; livestock's bacteria and nutrients; pet waste; and broken septic systems; and toxins from urban runoff and energy production."[112]

Unsurprisingly, the WQCD engages in water quality planning—an effort that inherently includes land-use planning components. In 2011, the WQCD released the SWQMP.[113] The WQCD's creation of the plan meets the CWA requirements imposed upon states to develop water quality management plans in accordance with Section 208 of the CWA ("Section 208") and Section 303.[114] Section 208 concerns regional water treatment management, while Section 303 concerns water quality standards and implementation plans.[115] "The SWQMP provides a comprehensive information resource for water policymakers and managers to serve as a foundation for setting priorities, developing strategies, and evaluating the progress of water quality restoration, maintenance, and protection activities previously undertaken."[116] The SWQMP provides many strategies for addressing water quality problems ranging from "The Watershed Approach" to "Passive Treatment Strategies for Addressing Acid Mine Drainage."[117]

The SWQMP delivers a Basin Plan for each of the seven major river basins in Colorado: "the Arkansas, Colorado, Green, San Juan, Rio Grande, Platte, and Republican River Basins."[118] John Wesley Powell would likely approve of the way the SWQMP presents water quality information at a basin scale, provides Basin Plans, and aggregates statewide data because the SWQMP's efforts represent policymakers' awareness of the connection between land-use decisions and water quality.[119]

B. WETLANDS PROTECTION

When wetlands are left alone or receive proper land-use management, these valuable areas provide many ecosystem services like flood protection and pollution prevention.[120] Section 404 permitting essentially prevents destruction

111. *Id.*

112. *Watershed 319*, COLO. DEP'T. OF PUBLIC HEALTH & ENV'T (2015), https://www.colorado.gov/pacific/cdphe/watershed-319.

113. *See* Colo. Dept. of Public Health & Env't, *Chapter 2: Water Quality Planning and Management in Colorado*, STATEWIDE WATER QUALITY MGMT. PLAN 2-1 (June 13, 2011), https://docs.google.com/file/d/0B4_2BkAMBRe8eDllakwzQVl2X1E/edit.

114. *Id.* at 2-2.

115. *Id.*

116. COLO. DEP'T OF PUBLIC HEALTH & ENV'T, COLORADO NONPOINT SOURCE PROGRAM 2012 MANAGEMENT PLAN (Feb. 13, 2012), https://www.colorado.gov/pacific/sites/default/files/T1_WQCC_2012-NPS-management-Plan_0.pdf.

117. *Id.*

118. Colo. Dept. of Public Health & Env't, *supra* note 114, at 1-4.

119. *See supra* notes 6–10 and accompanying text.

120. *Coastal Wetlands: Why are Coastal Wetlands Important?*, http://water.epa.gov/type/

of natural wetlands, thus allowing the ecological system to function.[121] It does so by allowing the USACE to issue permits for discharge of dredged or fill material into navigable waters of the United States.[122]

Litigation in the early 2000's resulted in an agency guidance document that the EPA and USACE jointly released in 2007.[123] This document clarifies how to determine whether the USACE has jurisdiction over the receiving waters and thus has Section 404 permitting authority.[124] The document states that USACE and the EPA will assert CWA jurisdiction over (i) "[t]raditional navigable water;" (ii) "[w]etlands adjacent to traditional navigable waters;" (iii) "[n]on-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally;" and (iv) "[w]etlands that directly abut such tributaries."[125] If non-navigable tributaries have no relative permanence; wetlands adjacent to non-navigable tributaries have no relative permanence; or wetlands lie adjacent to but do not directly abut a non-navigable tributary with relative permanence, then the agencies will decide jurisdiction on a "fact-specific analysis" to determine whether the waters have a "significant nexus with a traditional navigable water."[126] Within the context of implementing green infrastructure principles, it is important to note that the agencies generally will not assert CWA jurisdiction over swales, erosional features, or ditches, which are common GI features.[127]

C. FLOODPLAIN REGULATION

The Federal Emergency Management Agency ("FEMA") also weighs in on land-use considerations through its administration of the National Flood Insurance Program ("NFIP").[128] The goal of this program is to protect people and property from flood damage by mapping floodplains and setting different insurance rates for communities based on an individual assessment of its

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wetlands/cwt.cfm#why_imp (last updated Feb. 10, 2014).

121. *See* COLORADO LAND PLANNING & DEVELOPMENT LAW, *supra* note 3, at 296

122. *See id.*; *see also* Gillon, *supra* note 1, at 403 ("[USACE] manages projects, maintains navigation channels, operates and maintains reservoirs and levees to control floods.").

123. ENVTL. PROTECTION AGENCY ET AL., CLEAN WATER ACT JURISDICTION FOLLOWING THE SUPREME COURT'S DECISION IN *RAPANOS V. UNITED STATES* AND *CARABELL V. UNITED STATES* (2008).

124. *Id.* at 1.

125. *Id.*

126. *Id.*; *see also id.* at 2-3 (quoting Rapanos v. United States, 547 U.S. 715, 780 (2006)) (further citation omitted):

> Justice Kennedy concluded that wetlands are 'waters of the United States' 'if the wetlands, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as navigable. When, in contrast, wetlands' effects on water quality are speculative or insubstantial, they fall outside the zone fairly encompassed by the statutory term navigable waters.

127. *Id.* at 8.

128. *The National Flood Insurance Program: Overview*, FED. EMERGENCY MGMT. AGENCY, https://www.fema.gov/national-flood-insurance-program (last updated Oct. 1, 2015).

floodplain land-use restrictions and flood risk mitigation measures.[129] The key concerns when assessing floodplain management include pollution prevention, habitat protection, and preventing damage to people and property. This section primarily addresses FEMA's National Flood Insurance Program, although this discussion necessarily implicates many of FEMA's other programs including its Federal Insurance and Mitigation Administration ("FIMA") and several Hazard Mitigation Assistance ("HMA") grant programs.[130] Additionally, this section considers President Obama's 2013 Climate Action Plan and its implementation through Executive Order 13690.

Congress created the NFIP in 1968 for two reasons. First, Congress wanted to "reduc[e] the impact of flooding on private and public structures. . . . by providing affordable insurance for property owners."[131] Second, Congress wanted to encourage local governments "to adopt and enforce floodplain management regulations."[132] "Participating communities agree to adopt and enforce ordinances that meet or exceed FEMA requirements to reduce the risk of flooding."[133] According to scholars and practitioners, the NFIP program has been a very successful hazard mitigation program because it has prompted over "20,000 local governments to adopt zoning, building codes, and other regulations designed to reduce flood losses."[134] Local governments implement these regulations, which protect people and ecosystems along with preventing a loss of approximately $1.2 billion annually.[135]

Additionally, FEMA uses a Community Rating System ("CRS"), which is "a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements."[136] If a community's floodplain management activities go beyond NFIP minimum requirements, then the flood insurance premium rates drop to reflect the reduced flood risk.[137] In order to trigger this rate reduction, the community actions must meet the following three goals of the CRS: (i) "[r]educe flood damage to insurable property;" (ii) "[s]trengthen and support the insurance aspects of the NFIP;" and (iii) "[e]ncourage a comprehensive approach to floodplain management."[138] NFIP calculates flood insurance premium discounts in increments of five percentage points, communities fall within one of ten possible risk classes, and the substantive evaluation takes into

129. *Id.*

130. *See Protecting Our Communities*, FED. EMERGENCY MGMT. AGENCY, https://www.fema.gov/ protecting-our-communities (last updated Apr. 23, 2015).

131. *The National Flood Insurance Program*, *supra* note 129.

132. *Id.*

133. *Flood Insurance Reform*, FED. EMERGENCY MGMT. AGENCY, https://www.fema.gov/national-flood-insurance-program/flood-insurance-reform (last updated Oct. 1, 2015).

134. Edward A. Thomas, *Protecting the Property Rights of All: No Adverse Impact Floodplain and Stormwater Management*, ROCKY MTN. LAND USE INST., 1, 6 (2008), http://www.law.du.edu/images/uploads/rmlui/rmlui-sustainable-floodplainMgmt.pdf.

135. *Id.*

136. *National Flood Insurance Program Community Rating System*, FED. EMERGENCY MGMT. AGENCY, https://www.fema.gov/national-flood-insurance-program-community-ratingsystem (last updated Aug. 13, 2015).

137. *Id.*

138. *Id.*

account the community's "[p]ublic [i]nformation, [m]apping and [r]egulations, [f]lood [d]amage [r]eduction, and [f]lood [p]reparedness."[139] The FEMA disaster assistance program may require a property owner to purchase flood insurance coverage following a presidentially-declared disaster if the property owner receives financial assistance from the federal government.[140]

According to FEMA, over 5.6 million Americans participate in the NFIP to protect their homes and businesses from financial loss due to flooding, and more than 20,500 communities–working together with state and local agencies–acknowledge their flood risks with flood hazard maps.[141] "All the knowledge, all the planning, all the experience only matter when put into action."[142] The high level of participation of individuals and communities nationwide in the NFIP along with enforcement of "strong hazard-resistant building code regulations and [adherence to] comprehensive hazard mitigation plans to guide development. . . . [reflect] mitigation in action."[143]

President Obama has improved federal support for flood resilience measures and the NFIP throughout his second term. In June 2013, President Obama released the President's Climate Action Plan ("Climate Action Plan")[144] in order to better prepare the nation for extreme weather events resulting from climate change.[145] The Climate Action Plan "directs federal agencies to the appropriate actions to reduce risk to federal investments, specifically to 'update their flood-risk reduction standards.'"[146] President Obama released Executive Order 13690 to further the Climate Action Plan by establishing a Federal Flood Risk Management Standard ("FFRMS") and a Process for Further Soliciting and Considering Stakeholder Input.[147]

Under the FFRMS, federal agencies must consider current and future risk when using taxpayer dollars to build or rebuild in floodplains; the agencies, however, may use their discretion "to select one of three approaches for establishing the flood elevation and hazard area they use in siting, design, and construction."[148] Additionally, President Obama signed the Homeowner Flood Insurance Affordability Act of 2014 into law.[149] President Obama, by doing so, repealed and modified provisions of the Biggert-Waters Flood Insurance

139. *Id.*

140. *National Flood Insurance Program: Flood Insurance Requirements for Recipients of Federal Disaster Assistance*, FED. EMERGENCY MGMT. AGENCY 1, 2 (Aug. 2011), http://www.fema.gov/media-library-data/20130726-1630-204906612/f695_firequirements_11agu11.pdf.

141. *Protecting Our Communities*, *supra* note 129.

142. *Id.*

143. *Id.*

144. *See* Exec. Office of the President, *The President's Climate Action Plan*, WHITE HOUSE (June 2013), http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf.

145. *Federal Flood Risk Management Standard (FFRMS): An Introduction to the Federal Flood Risk Management Standard ("Standard")*, FED. EMERGENCY MGMT. AGENCY, http://www.fema.gov/federal-flood-risk-management-standard-ffrms (last updated Sept. 30, 2015).

146. *Id.* (quoting Exec. Office of the President, *supra* note 146).

147. *Id.*

148. *Id.*

149. *The National Flood Insurance Program*, *supra* note 134.

Reform Act of 2012,[150] an act which extensively reformed NFIP and extended its funding for five years.[151]

According to FEMA, the United States sustained over $260 billion of flood-related damages between 1980 and 2013.[152] The monetary damages caused by flooding are staggering but so are the human and environmental costs. FEMA reports that flooding is the natural hazard that causes the most deaths annually, and that the federal government bears the costs of flooding more than any other hazard.[153]

These facts demonstrate the need for preventative action to build flood resilience and thoughtful planning at every level of government.[154] A few strategic ways to build flood resilience include preserving wetlands, incentivizing communities to make sound land-use decisions by setting insurance rates based on land-use planning in floodplains, and requiring local governments to implement green infrastructure principles to mitigate flood-related pollution and reduce the speed and accumulation of floodwaters.[155] Requiring floodplains management to conform to GI principles will result in more coherent, efficient, and fair outcomes with respect to both human communities and ecosystems.

V. CONCLUSION

The connection between land-use planning, pollution, and flood prevention is evident throughout the federal government's stormwater and floodplain regulations. The problem is that three disparate federal agencies—the EPA, USACE, and FEMA—are each trying to control aspects of this critical connection between land-use patterns, pollution, and flood risks through different regulatory structures that involve complex permitting and insurance programs. A federal mandate stating that local governments must require implementation of green infrastructure principles where feasible would provide a shortcut for local governments trying to comply with these various federal programs.

If local governments applied green infrastructure principles when planning communities and regulating building permits, they could prevent significant amounts of water from entering the Section 402 stormwater permitting regime because the green spaces could absorb the water. This means that the water would never enter a pipe and become a point source. Applying green infrastructure concepts to land-use development would also help improve overall water quality in streams because more water would have a chance to filter through soil and plants, thereby removing toxins. This type of water

150. *Id.*

151. *Bigger-Waters Flood Insurance Reform Act of 2012*, FED. EMERGENCY MGMT. AGENCY, https://www.fema.gov/media-library/assets/documents/31946 (last updated May 1, 2014).

152. *Federal Flood Risk Management Standard (FFRMS)*, *supra* note 146.

153. *Id.*

154. *See id.*

155. *See, e.g.*, *E. Coli Found in Colorado Flood Zones, but No Oil, Gas Contamination*, DENVER POST (Oct. 8, 2013), http://www.denverpost.com/breakingnews/ci_24264793/e-coli-found-colorado-flood-zones-but-no?source=infinite ("State health department engineers estimate about 20 million gallons of raw sewage poured into floodwaters untreated, as well as 150 million to 270 million gallons of partially treated sewage.")

quality improvement could bring many streams out of the "impaired" category, pursuant to Section 401. Additionally, if local governments incorporated GI principles when planning areas near wetlands and floodplains, then those areas would retain their natural qualities and ecosystem service benefits and reduce the risk of floods, death, property damage, and ecosystem destruction. Furthermore, mandatory implementation of green infrastructure principles could lead to reduced flood insurance rates and avoid the USACE's involvement in Section 404 permitting requirements altogether.

As we enter an age of increased extreme weather events, local governments need direction from the federal government in order to prevent flood-related water pollution and the risk of damage from floods to people, property, and the environment. The first generation of environmental laws constructed a regulatory apparatus that complicated land-use and watershed planning. The drafters of the next generation of environmental laws should strive for simplicity in the language of the laws and policies, and straightforwardness with respect to application of the laws. We should try to create environmental laws that capture the benefits of the current barrage of federal statutes without adding to the complexity of the current laws. Requiring local governments to implement green infrastructure principles provides an opportunity to test out this new method of regulation that is clear, concise, and streamlined while at the same time maintaining the benefits of local control and site-specific planning currently in place.