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TROUBLED WATERS: THE QUEST FOR ELECTRICITY IN WATER-CONSTRAINED CHINA, FRANCE, INDIA, AND THE UNITED STATES

BENJAMIN K. SOVACOOL, SARA IMPERIALE, ALEX GILBERT, JAY EIDSNESS & BRIAN THOMSON*

Electricity is necessary for maintaining standards of living in advanced economies, such as the United States and France, and is equally crucial to poverty reduction strategies in developing economies, such as China and India. Yet in the coming decades, the water needed to generate electricity will become increasingly scarce. Relying on a series of GIS-based cartographic assessments tied to specific estimates of growth in electricity demand, population, and water resource use, this article examines the electricity-water nexus through four unique case studies: the North China Grid, the Indian power grid, the French power grid, and the ERCOT grid in Texas. In each case, our analysis shows how "business as usual" trends will lead to potentially catastrophic shortages of water, electricity, or both by 2040. All is not lost, however, as the article concludes by providing a variety of legal and technological recommendations for how policymakers in each of our case studies—and indeed elsewhere—can successfully avert these crises.

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INTRODUCTION

Imagine if, in 1924, the Coolidge Administration had been able to warn President Roosevelt about the attack on Pearl Harbor in 1941. Or if President Nixon had been able to predict the 1986 Challenger disaster, or President Reagan the September 11, 2001 terrorist attacks on the Pentagon and World Trade Center. Consider, if these leaders had possessed advanced knowledge, how different our world might be.

In a fortuitous twist of fate, in 2014 we are able to foresee with some analytical rigor the likelihood of a major crisis in 2040. We know, to a reasonable degree, where this crisis will occur, and we have all of the necessary preventative tools at our disposal. The only thing impeding us from acting to avert this crisis is a combination of shortsighted thinking and fragmented decision making.

The problem, simply put, is that existing and planned electricity supply—generally from thermoelectric power plants, facilities that combust fuels or cause the fission of atoms—depends too heavily on assumptions of widespread, abundant water resources. Due to its perceived cheapness and abundance, water is often overlooked as a critical constraint in electricity and energy decisions, one that when included challenges us to think more broadly about integrated resource planning, reliability challenges, and resource selection. This article assesses the electricity-water nexus in four different locations: the North China Grid, the Indian power grid, the French power grid, and the Electric Reliability Council of Texas (ERCOT) grid. Our analysis

shows how "business as usual" trends will lead to potentially catastrophic shortages of water, electricity, or both by 2040. To make this point, Part I of the article introduces readers to the electricity-water nexus (EWN): the extent to which power generation depends on water availability.

Part II uses the EWN to demonstrate how water may become a key limitation to thermoelectric power generation in case studies of the four locations. Each case reveals something different about the electricity-water nexus: China, the sheer quantity of water needed to meet future electricity demand; France, the water-related vulnerability of nuclear power units; India, the water vulnerabilities of coal-fired power; and Texas, the significance of wind energy and natural gas in enabling power providers there to generate electricity in times of drought while reducing water dependencies. Our analysis is based on current measurements and future projections of water use, population, and power demand through 2040, and is presented with a collection of digital maps made with Geographic Information Systems (GIS) software.

Finally, Part III of the article recommends several regulatory and technical solutions to avert EWN crises by reducing water vulnerabilities at thermoelectric power plants. These solutions include, among others, incorporating water as a resource constraint in integrated resource planning, refining and developing alternative cooling technologies, promoting energy efficiency, and deploying electricity generation technologies that are minimally water dependent, including wind and solar.

I. THE ELECTRICITY-WATER NEXUS

Intense water use may cause conventional electricity generators to become obsolete in the near future in places of water stress and water scarcity.[1] As one independent study recently

[1] The term "use" denotes water withdrawals and consumption for both the production and combustion of various electricity fuels. The term "water stress" refers to when annual water supplies drop below 1,700 cubic meters per person per year. The term "water scarcity" refers to when water supplies drop below 1,000 cubic meters per person per year. *See* Benjamin K. Sovacool & Kelly E. Sovacool, *Identifying Future Electricity-Water Tradeoffs in the United States*, 37 ENERGY POL'Y 2763, 2764 (2009) ("Thermoelectric power plants—power stations that combust coal, oil, natural gas, biomass, and waste to produce electricity, or fission atoms in a nuclear reactor—use water by 'consuming' and 'withdrawing' it. These plants 'withdraw' water from rivers, lakes, and streams to cool equipment before returning it to its source, and they 'consume' water

summarized, "Water and electricity are inexorably linked and mutually dependent, with each affecting the other's availability. Electricity is required to supply, purify, distribute, and treat water and wastewater; water is needed to generate electricity and to extract and process fuels used to generate electricity."[2] Water is also becoming a salient energy security concern internationally among energy experts. One broad-ranging survey of 2,167 energy experts in ten countries, including the United States, Japan, China, India, and Saudi Arabia, found that "enhancing the availability and quality of water" was the *highest* rated energy security dimension among sixteen choices.[3] Respondents rated it more highly than the security of fossil fuel and uranium supplies, promoting energy efficiency, and responding to climate change, among others.[4]

Studying water in this capacity is not merely an academic venture, as these recent, real world consequences demonstrate:

- In 2006, "[a] heat wave forced nuclear plants [throughout the Midwestern United States] to reduce their output because of the high water temperature of the Mississippi River";[5]
- In 2007, the Tennessee Valley Authority had to curtail its hydroelectric generation during a drought and also operate nuclear and fossil fuel plants at partial capacity in the Southeastern United States;[6]
- In 2008, the government of China abandoned dozens of anticipated coal-to-liquids projects due to concerns that "they would place heavy burdens on scarce water resources";[7]
- In 2009, electricity supply to some parts of Southern Iraq

(often through evaporative loss) that does not return to the local water table. For this study, the term use is therefore meant to encompass both water withdraws and consumption together unless otherwise specified."). *See also* SUPRIYA KUMAR, WORLDWATCH INST., VITAL SIGNS: THE LOOMING THREAT OF WATER SCARCITY 1 (2013), *available at* http://vitalsigns.worldwatch.org/vs-trend/looming-threat-water-scarcity (quoting the United Nations).

[2] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-10-23, ENERGY WATER NEXUS: IMPROVEMENTS TO FEDERAL WATER USE DATA WOULD INCREASE UNDERSTANDING OF TRENDS IN POWER PLANT WATER USE 1 (2009).

[3] Benjamin K. Sovacool, *Exploring Propositions About Perceptions of Energy Security: An International Survey*, 16 ENVTL. SCI. & POL'Y 44, 46–49 (2012).

[4] *Id*. at 49.

[5] INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2012, at 513 (2012).

[6] *Id*.

[7] *Id*.

dropped by 50 percent because of falling surface water levels of the Euphrates river;[8]

- In 2010, extended droughts brought on by the El Niño weather phenomenon reduced hydroelectricity generation in the Philippines and Vietnam for several months, resulting in blackouts throughout both countries;[9]
- In 2011, Chinese provinces along the Yangtze River had to ration electricity due to drought-restricted hydroelectric generation and coal mining;[10]
- In 2012, a delayed monsoon raised electricity demand for irrigation and simultaneously reduced hydroelectricity generation, contributing to blackouts that affected more than 600 million people in India;[11]
- In 2013, operators in Panama had to declare a "state of emergency" after a drought impaired electricity production from the country's hydroelectric dams, leading to energy-saving measures such as the closure of public schools and shortening of hours atgovernment offices for three days;[12]
- Most recently, in July, 2013, Pacific Gas & Electric, a large electric utility in California, had to shut down one of its large reactors at the Diablo Canyon nuclear power plant because it could not operate during a heat wave.[13]

This is just a short list of how water and electricity generation interact; there are countless other examples. As laid out by one peer-reviewed study, this strongly implies that "[f]ailure to consider the interdependencies of energy and water introduces vulnerabilities whereby constraints of one resource introduce

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[8] Martin Chulov, *Water Shortage Threatens Two Million People in Southern Iraq,* THE GUARDIAN (Aug. 26, 2009), http://www.guardian.co.uk/world/2009/aug/26/water-shortage-threat-iraq.

[9] INTERNATIONAL ENERGY AGENCY, *supra* note 5, at 513.

[10] *Id*.

[11] *Id*.

[12] *Panama Takes Measure to Save Power as Drought Hits Output of its Hydroelectric Plants*, FOX NEWS (May 8, 2013),http://www.foxnews.com/world/2013/05/08/panama-takes-measure-to-save-power-as-drought-hits-output-its-hydroelectric/#ixzz2X3Od3K3i.

[13] Paul Gipe, *Nuclear Reactor Down with Leak During Serious California Heat Wave*, WIND-WORKS (July 1, 2013), http://www.windworks.org/cms/index.php?id=496&tx_ttnews[tt_news]=2504&cHash=2779fc565877733c6866f0d4e5d43384.

constraints in the other. That is, droughts and heat waves create water constraints that can become energy constraints."[14]

Why does electricity production use so much water? Conventional thermoelectric power plants—those that combust fuel or fission atoms, unlike those that capture sunlight, wind, or falling water—need millions of gallons of water for the condensing, or cooling, portion of the thermodynamic cycle.[15] Many conventional power plants employ one of two types of wet cooling: once-through or re-circulating.[16] Once-through cooling systems withdraw water from a source, circulate it, and return it to the surface body.[17] Re-circulating, "wet tower" or closed-loop systems, withdraw water and then recycle it within the power system rather than discharging it.[18] Although often cost-prohibitive—including an energy penalty—and not yet widely used, alternatives such as dry cooling and hybrid wet-dry cooling systems play a niche role in water stressed regions.[19] "Dry" cooling systems are useful in arid areas because they rely on air as the primary coolant medium, rather than water.[20] "Hybrid" systems incorporate both wet and dry cooling, allowing for operational flexibility in response to changes in water availability.[21]

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[14] Ashlynn S. Stillwell et al., *The Energy-Water Nexus in Texas*, 16 ECOLOGY & SOC'Y 2, 2 (2011).

[15] Thomas J. Feeley III et al., *Water: A Critical Resource in the Thermoelectric Power Industry*, 33 ENERGY 1, 2 (2008).

[16] ELEC. POWER RESEARCH INST., WATER & SUSTAINABILITY (VOLUME 1): RESEARCH PLAN 2-12 (2002), *available at* http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001006784 (showing that most power plants use either once-through cooling or cooling ponds, i.e. recirculating).

[17] *Id*.

[18] *Id*. at 2-11.

[19] *See* UNIV. OF MICH. SCHOOL OF NAT. RES. & ENV'T, RENEWABLE ENERGY DEV. IN THE CALIFORNIA DESERT 3-9 (2010), *available at* http://webservices.itcs.umich.edu/drupal/recd/sites/webservices.itcs.umich.edu.drupal.recd/files/Utility-Scale%20Solar%20Technologies_0.pdf [hereinafter DRY COOLING]; *see* INTERNATIONAL ENERGY AGENCY, *supra* note 5, at 508.

[20] DRY COOLING, *supra* note 19, at 9; TUNCAY YILMAZ ET AL., AN ALTERNATIVE COOLING SYSTEM FOR HOT, ARID REGIONS (1998) *available at* http://eng.harran.edu.tr/~hbulut/KUweyt_Paper.pdf ("A number of studies have shown that evaporative cooling systems have the potential to satisfy comfort conditions especially in arid regions and can be applied to both commercial and residential buildings.").

[21] INTERNATIONAL ENERGY AGENCY, *supra* note 5, at 508.

Coal plants use water to clean and process fuel,[22] and many types of thermoelectric power plants lose water through evaporation.[23] Table 1 illustrates that coal-fired power plants, which account for about 40 percent of the electricity generated in the United States and even more in China, require a range of 27 to 40 gallons of water to produce one kilowatt hour (kWh) of electricity, depending on the power plant technology. A conventional 500 megawatts (MW) coal plant, for instance, consumes about 7,000 gallons of water per minute, or the equivalent of 17 Olympic-sized swimming pools every day.[24] The coal-fired 1,800 MW San Juan Generating Station, operated by Public Service Company of New Mexico, uses 7.3 billion gallons of water per year from the San Juan River.[25] Given that the electric utility sector as a whole generated 3,749 terawatt hours (TWh) in 2011[26] and required 25 gallons per kWh,[27] power plants collectively needed 93.7 trillion gallons of water in the United States that same year.[28]

As Table 1 also illustrates, nuclear reactors require massive supplies of water to cool reactor cores and spent nuclear fuel rods. Because much of the water is turned to steam, substantial amounts are lost entirely to the local water cycle. One nuclear plant in Georgia withdraws an average of 57 million gallons every day from the Altamaha River, and actually consumes only 33 million

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[22] *Water Consumption from Coal Plants*, SOURCEWATCH, http://www.sourcewatch.org/index.php?title=Water_consumption_from_coal_plants#Processing_and_Cleaning (explaining the use of water in "processing and cleaning") (last updated Sept. 24, 2012).

[23] ELECTRIC POWER RESEARCH INST., *supra* note 16, at 2-11 (identifying water being "consumed," which is water lost through evaporation).

[24] Thomas J. Feeley III, Nat'l Energy Tech. Lab., Tutorial on Electric Utility Water Issues at the 28th International Technical Conference on Coal Utilization and Fuel Systems (Mar. 10–13, 2003), *available at* http://www.alrc.doe.gov/technologies/coalpower/ewr/pubs/Clearwater031003.pdf.

[25] KENT ZAMMIT & MICHAEL N. DIFILIPPO, ELEC. POWER RESEARCH INST., USE OF PRODUCED WATER IN RECIRCULATING COOLING SYSTEMS AT POWER GENERATION FACILITIES: DELIVERABLE NUMBER 6 COST/BENEFIT ANALYSIS ES-1 (2004).

[26] *See Summary Statistics for the United States, 2002–2012*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/electricity/annual/html/epa_01_02.html (last visited Nov. 4, 2013).

[27] Sovacool & Sovacool, *supra* note 1, at 2764.

[28] This figure is the result of multiplying the 3,749 TWh, *supra* note 26, times the 25 gallons per KWh, *supra* note 27.

gallons per day because of losses from water vapor.[29]

Table 1: Water Use Needs for Power Plants (inclusive of consumption and withdrawals), Gallons per kWh[30]

	Withdrawals	Consumption	Withdrawals	Consumption	Total
	(Combustion/Downstream)		(Production/Upstream)		
Nuclear	43	0.4	0	0.11	43.5
Coal (mining)	35	0.3	0.17	0.045	35.5
Coal (slurry)	35	0.3	0	0.05	35.3
Biomass/ waste	35	0.3	0.03	0.03	35.3
Natural Gas	13.75	0.1	0	0.01	13.9
Solar Thermal	4.5	4.6	0	0	9.1
Hydroelectric	0	0	0	4.5	4.5
Geothermal (steam)	2	1.4	0	0	3.4
Solar PV	0	0	0	0.3	0.3
Wind	0	0	0	0.2	0.2
Energy Efficiency	0	0	0	0	0

Outside of the United States, many power plants are just as thirsty. In India, the average coal-fired thermal power plant consumes as much as 7 cubic meters of water (about 1,800 gallons) per MW per hour, meaning a plant drains the equivalent amount of an Olympic size swimming pool every 20 to 40 minutes.[31] In China, thermal power plants collectively utilize enough energy to pump more than 34 million gallons of water *per minute*.[32] In France, the 3,000 megawatt electrical (MWe)[33] Civaux Nuclear Power Plant can only operate safely and reliably when it stores at least 20 *billion* liters, or 5.3 billion gallons, of

[29] U.S. NUCLEAR REGULATORY COMM'N, NUREG-1437, GENERIC ENVIRONMENTAL IMPACT STATEMENT FOR LICENSE RENEWAL OF NUCLEAR PLANTS: REGARDING EDWIN I. HATCH NUCLEAR PLANT, UNITS 1 AND 2 - FINAL REPORT 25 (2001), *available at* http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/supplement4/#_1_22.

[30] Sovacool & Sovacool, *supra* note 1, at 2771.

[31] GRACE BOYLE ET AL., GREENPEACE, ENDANGERED WATERS: IMPACTS OF COAL-FIRED POWER PLANTS ON WATER SUPPLY 3 (2012), *available at* http://www.greenpeace.org/india/Global/india/report/Endangered-waters.pdf.

[32] *McIlvaine: Chinese Will Buy Power Plant Pumps to Move 34 Million Gallons per Minute This Year*, WATERWORLD (Sept. 1, 2009), http://www.waterworld.com/articles/2009/09/mcilvaine--chinese.html.

[33] In the electric power industry, megawatt electrical (MWe or MW(e)) is a term that refers to electric power, while megawatt thermal or thermal megawatt (MWt, MWth) refers to thermal power. INT'L ATOMIC ENERGY ASSOC. GLOSSARY OF TERMS IN POWER REACTOR INFORMATION SYSTEM REPORTS, http://www.iaea.org/PRIS/Glossary.aspx (last visited Apr. 23, 2014).

water upstream in reservoirs to ensure adequate supply through droughts.[34]

II. MAPPING FOUR ELECTRICITY-WATER CRISIS AREAS

Unfortunately, the water-intensity of the electricity sector poses major challenges for regions of the globe experiencing rapid, simultaneous growth in population and demand for electricity and water. To illustrate the severity of these trends, this section of the article uses a series of GIS-based maps and integrated projections about electricity supply and demand, population growth, and water resource use from 2010 to 2040 to present four case studies. The data for the case studies are summarized in Table 2.[35] Each case study describes a grid where the electricity-water nexus may induce significant crises in the coming decades: the North China Grid, the national grids in France and India, and ERCOT in Texas.

Table 2: Key Electricity and Water Statistics for the North China Grid, France, India, and ERCOT (Texas)

		North China Grid	France	India	ERCOT (Texas)
Installed Capacity (MW)	2010	247,840	117,671	189,000	58,083
	2040	631,444	224,354	802,000	78,688
Contribution of Thermoelectric Power Plants (%)	2010	97 (mostly coal)	84 (mostly nuclear)	86 (mostly coal)	97 (mostly gas)
	2040	93 (mostly coal)	61 (mostly nuclear)	75 (mostly coal)	96 (mostly gas)
Electricity's Share of Water Use (%)	2010	12	65	2	6
	2040	12	80	15	9
Total Water Demand (in trillion liters, with gallons given in parentheses)	2010	66.9 (17.7)	33.4 (8.8)	55.1 (14.6)	13.4 (3.5)
	2040	311.1 (82.2)	40.4 (10.7)	76.5 (20.2)	16.4 (4.3)

Source: Institute for Energy & the Environment, Vermont Law School[36]

Our primary method of data collection for this article is a

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[34] *Cooling Power Plants*, WORLD NUCLEAR ASS'N, http://www.world-nuclear.org/info/Current-and-Future-Generation/Cooling-Power-Plants/#.UWWBCas4WiY (last updated Sept. 2013).

[35] PAUL FAETH, ET AL., A CLASH OF COMPETING NECESSITIES: WATER ADEQUACY AND ELECTRIC RELIABILITY IN CHINA, INDIA, FRANCE, AND TEXAS (2014), *available at* https://www.cna.org/research/2014/clash-competing-necessities; PAUL FAETH & BENJAMIN K. SOVACOOL, CAPTURING SYNERGIES BETWEEN WATER CONVERSATION AND CARBON DIOXIDE EMISSIONS IN THE POWER SECTOR (2014), *available at* https://www.cna.org/sites/default/files/research/EWCEWNRecommendationsReportJuly2014FINAL.pdf. This data derives from a collaborative research project undertaken with the authors, the Regulatory Assistance Project (RAP) in Montpelier, Vermont, and the Center for Naval Analysis (CNA) in Alexandria, Virginia. This data has been compiled and coded for the report.

[36] *Id*.

database we constructed to estimate existing and future electricity capacity, fuel mix, and water resource needs (both by type of demand and overall volume) across our four case studies from 2010 to 2040. To build this database, we started by collecting data from the International Energy Agency and U.S. Energy Information Administration but quickly identified a series of data holes. We "filled" these holes through a complex process of contacting experts across our four case studies and verifying data with both officials and colleagues, a process explained in greater detail in a forthcoming report.[37] We then supplemented our database with a number of secondary sources that we reference below. The datasheets involved in our analysis (and key inputs for our four figures presented in this article) are fully available to the public.[38]

A. *The North China Grid*

China is the world's largest energy consumer,[39] the biggest emitter of carbon dioxide,[40] fifth largest producer of oil,[41] seventh largest producer of natural gas,[42] and the largest miner of coal.[43] Over the past ten years, 70 million new jobs were created in the Chinese economy.[44] The country now leads the world in markets for automobiles, steel, cement, glass, housing, power plants, renewable energy, highways, rail systems, and airports.[45] China's economy is growing so fast that analysts anticipate its GDP will

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[37] *See generally id.*

[38] *Id.*

[39] Spencer Swartz & Shai Oster, *China Tops U.S. in Energy Use*, WALL ST. J., July 18, 2010, http://online.wsj.com/news/articles/SB10001424052748703720504575376712353150310.

[40] *China Overtakes U.S. in Greenhouse Gas Emissions*, N.Y. TIMES, June 20, 2007, http://www.nytimes.com/2007/06/20/business/worldbusiness/20ihtemit.1.6227564.html?_r=2&.

[41] BJ Doyle, *Locking Oil Up*, PEAK OIL BARREL, http://peakoilbarrel.com/locking-oil/ (last visited Nov. 4, 2013).

[42] ZHENYA LIU, ELECTRIC POWER AND ENERGY IN CHINA 21 (2013).

[43] U.S. ENERGY INFO. ADMIN., CHINA (2012), *available at* http://www.eia.gov/countries/analysisbriefs/China/china.pdf; *see also Energy Statistics: Coal Consumption*, NATIONMASTER.COM, http://www.nationmaster.com/graph/ene_coa_con-energy-coal-consumption (last visited Nov. 4, 2013).

[44] Keith Schneider et al., *Choke Point China: Confronting Water Scarcity and Energy Demand in the World's Largest Country*, 12 VT. J. ENVTL. L. 713, 714 (2011).

[45] *Id.*

grow from $6 trillion in 2010 to $9 trillion by 2015.[46] If it sustains that rate of growth, China will overtake the United States as the world's biggest economy sometime in the 2020s.[47] In order to feed this growth, energy use in China grew a staggering 146 percent between 1990 and 2008.[48]

Like the United States, China is a massive country with distinct geography fragmenting the landmass into discrete regions. Though the country is home to roughly one-quarter of the world's population, most Chinese live in urban areas.[49] Sprawling metropolitan areas characterize the eastern seaboard where some coastal population densities average between 110 and 1,600 people per square kilometer in rural areas and as high as 2,000 people per square kilometer in urban areas.[50] Multiple cities, such as Beijing, Shanghai, and Guangzhou, rank within the 25 largest in the world.[51] Energizing a population of this scale requires robust electricity transmission and generation infrastructure. The State Grid Corporation of China ("SGCC") is responsible for building and operating the Chinese power grids and providing secure and reliable power for its customers.[52] The SGCC is divided into five regional power grid companies, the North Grid, the Northeast Grid, the Northwest Grid, the East Grid, and the Central Grid, with each grid containing provincial electric power companies.[53] Within each grid are numerous generation facilities deriving energy from various fuels. The SGCC manages and facilitates intra and inter-regional flows of electricity aimed at preventing regional power

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[46] *Id*. at 733.

[47] *Id*.

[48] INT'L ENERGY AGENCY, 2010 KEY WORLD ENERGY STATISTICS 48 (2010).

[49] Peter Simpson, *China's Urban Population Exceeds Rural for First Time Ever*, THE TELEGRAPH, Jan. 17, 2012, http://www.telegraph.co.uk/news/worldnews/asia/china/9020486/Chinas-urban-population-exceeds-rural-for-first-time-ever.html.

[50] Don Hinrichsen, *The Coastal Population Explotion*, *in* NAT'L OCEANIC & ATMOSPHERIC ADMIN. ET AL., TRENDS AND FUTURE CHALLENGES FOR U.S. NATIONAL OCEAN AND COASTAL POLICY 27 , available at http://oceanservice.noaa.gov/websites/retiredsites/natdia_pdf/3hinrichsen.pdf.

[51] *Id*.

[52] *Brief Introduction*, STATE GRID CORP. OF CHINA, http://www.sgcc.com.cn/ywlm/gsgk-e/gsgk-e/gsgk-e1.shtml(last visited Sept. 13, 2013).

[53] *Organizational Structure,* STATE GRID CORP. OF CHINA, http://www.sgcc.com.cn/ywlm/gsgk-e/zzjg-e/zzjg-e1.shtml (last visited Apr. 10, 2013).

outages and reducing transmission line loss.[54]

The North China Grid serves the municipalities of Beijing and Tianjin as well as the provinces of Hebei, Shanxi, Shandong, and parts of Inner Mongolia.[55] In terms of its size, the North China Grid serves nearly 250 million people, nearly a quarter of China's population.[56] According to the most recently available data, the North China Grid Company Limited operated a grid constituting 247,840 MW of capacity in 2010, but this is projected to jump to 631,444 MW of capacity by 2040.[57] Most of that growth will occur in Shanxi, Shandong, and Tianjin Provinces, as Figure 1 shows. Rapid growth is not unique to the North China Grid; the International Energy Agency (IEA) projects a near doubling of China's domestic electricity generation by 2035.[58] Unlike our other case studies, capacity growth in the North China Grid is not driven by the construction of new power plants, but rather by increasing capacity at existing facilities.[59]

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[54] *Conservation and Environmental Protection*, GRID CORP. OF CHINA, http://www.sgcc.com.cn/ywlm/kcxfz/ce-e/default.shtml (last visited Aug. 11, 2013).

[55] According to the State Grid Corporation of China, the North China Grid "consists of Beijing Electric Power Co. and Tianjin Electric Power Co. as two municipal branches, Hebei Electric Power Co., Shanxi Electric Power Co. and Shandong Power (Group) Corp. as three provincial subsidiaries, Qinhuangdao Power Generation Co., Ltd. and North China Electric Power Research Institute Co., Ltd. as two share-holding subsidiaries and other 23 directly-operated subsidiaries including Tianjin Dagang Power Plant, Shisanling Pumped Storage Power Plant and Panjiakou Pumped Storage Power Plant as three power generators, Tangshan Power Supply Co., Qinhuangdao Electric Power Co., Zhangjiakou Power Supply Co., Chengde Power Supply Co., Langfang Power Supply Co., Beijing EHV Power Transmission Co. and Datong EHV Power Transmission Co. as seven transmission & distribution subsidiaries, Beijing Electric Power Construction Co., Tianjin Electric Power Construction Co., Beijing Power Transmission and Transformation Co. and Beijing Power Equipment Group as four construction & manufacture subsidiaries and other nine subsidiaries, such as hospitals, schools and sanatoriums." *About Us*, GRID CORP. OF CHINA, http://www.nc.sgcc.com.cn/english/submodal01_01.htm (last visited Sept. 13, 2013).

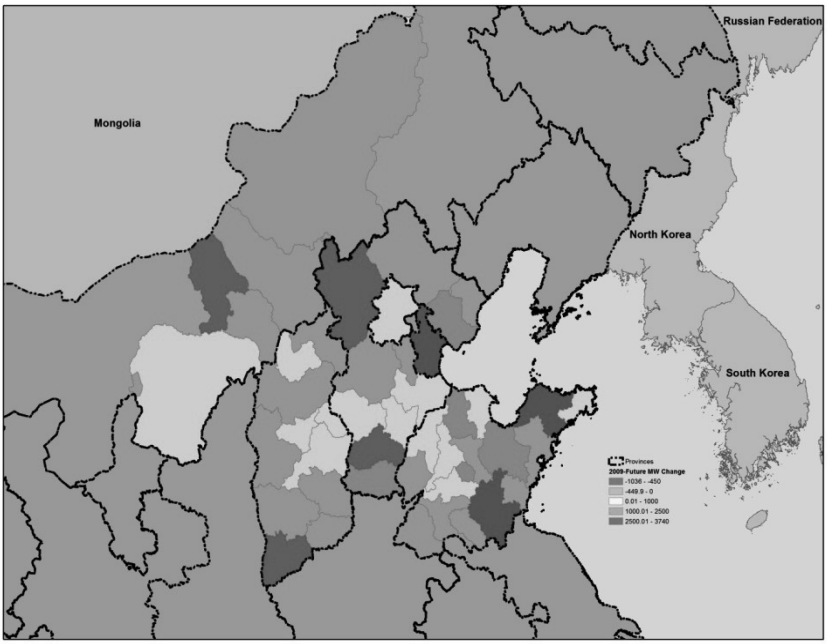
[56] *See Prefectures of China*, STATOIDS, http://www.statoids.com/ycn.html (last visited Apr. 17, 2013) (showing current populations for China's prefectures that can be used to calculate rough population in the North China Grid).

[57] BENJAMIN K. SOVACOOL ET AL., THE REGULATORY ASSISTANCE PROJECT, THE ELECTRICITY-WATER NEXUS (forthcoming 2013).

[58] U.S. ENERGY INFO. ADMIN., INTERNATIONAL ENERGY OUTLOOK 2011, at 86 (2011), *available at* http://www.eia.gov/forecasts/archive/ieo11/pdf/0484%28 2011%29.pdf [hereinafter INTERNATIONAL ENERGY OUTLOOK].

[59] *See Dig Deeper: Plants in the World*, CARMA, http://carma.org/dig/

Figure 1: Projected Changes in Installed Electricity Capacity in the North China Grid, 2010–2040 (MW)



Note: The map shows negative growth in electricity capacity in red and orange (light shaded areas) and positive growth in the green areas (darker shaded areas in black and white).
Source: Institute for Energy & the Environment, Vermont Law School, designed by Stone Environmental.[60]

Additionally, much of the capacity in the North China Grid is coal fired, and the majority of China's coal production is in the region.[61] Shanxi and Inner Mongolia account for almost half of China's total coal production.[62] Chinese production levels in 2010 dwarfed the United States, the second largest producer, by more than three to one.[63] Unsurprisingly, China's dependence on coal

show/carbon+plant (last visited Apr. 17, 2013) (showing power plant information for 2009 and "future," which demonstrates increasing existing capacity over new capacity construction).

[60] Drawn from data available in REGULATORY ASSISTANCE PROJECT, *supra* note 35.

[61] U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 43.

[62] *China Climate & Energy Map*, NATURAL RES. DEF. COUNCIL, http://www.nrdc.cn/english/E_info_library.php (follow "China Climate & Energy Map" hyperlink; then follow "GRAPHS" hyperlink).

[63] INTERNATIONAL ENERGY OUTLOOK, *supra* note 58, at 73.

production leads to high levels of coal generating capacity in the North China Grid. For example, Shandong Province consumes the most coal per province in China, more than three times the national average.[64] Recent figures indicate fossil fuel generation—coal and a minor amount of natural gas—accounted for over 95 percent of generation across the entire North China Grid.[65] Rather than reduce regional coal dependency, China's Twelfth Five-Year Plan (2011–2015) explicitly aims to increase rates of coal extraction.[66] Production of coal nationwide already tripled between 2000 and 2010; government projections suggest that China will need to add another *billion* tons of coal production annually by 2020, requiring an additional 30 percent increase this decade.[67]

In terms of water, China has only 6 percent of the planet's water resources but almost 20 percent of the world's population.[68] China's per capita water resources of 2,200 cubic meters, or 581,000 gallons, is approximately one quarter of the global average, and it also means China is one of the 13 countries with the least per capita resources.[69] Water efficiency in China is also comparatively poor, requiring four times more water per unit of GDP than a country like the United States.[70] China's role as the world's largest producer of grain, a water intensive crop, only heightens efficiency concerns.[71] Table 2 shows that overall water demand within the North China Grid will likely jump by a factor of 4.6 between 2010 and 2040.

Exacerbating China's water challenges, the country's resources are not evenly distributed. Southern China, with 55 percent of the country's population and 84 percent of its water resources, is home to only 40 percent of cropland; northern China, however, supports 45 percent of the population and 60 percent of

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[64] U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 43.

[65] *See supra* Table 2.

[66] *Leading the Charge,* ENERGY GLOBAL, http://www.energyglobal.com/news/coal/articles/China_coal_mining_industry_prepares_for_a_strong_future.aspx (last visited Aug. 11, 2013).

[67] Schneider et al., *supra* note 44, at 716.

[68] MU YANG & SIOW SONG TENG, CHINA'S LOOMING WATER CRISES, at i (2008), *available at* http://www.eai.nus.edu.sg/BB386.pdf.

[69] *Id.*

[70] RESPONSIBLE RESEARCH, WATER IN CHINA: ISSUES FOR RESPONSIBLE INVESTORS 11 (Lucy Carmody ed., 2010).

[71] *Grain Production*, STATE ADMIN. OF GRAIN, http://www.chinagrain.gov.cn/english/Grain%20Production.html (last visited Apr. 17, 2013).

all cropland with a mere 16 percent of the country's water.[72] Inner Mongolia, an area roughly equal to the size of France and Ukraine, is projected to host three *times* more coal-fired capacity than the entire European Union by 2015.[73] However, the National Bureau of Statistics warns that the total water resources available to China have actually *dropped* by 13 percent from 2000 to 2010.[74]

Two independent assessments beyond our own confirm the likelihood of future water conflicts. The first, from the nonprofit group Circle of Blue, looked at the confluence of coal use, water use, and economic growth for China as a whole (rather than the North China Grid).[75] The study projected a 30 percent increase in coal use from 2010 to 2020,[76] but noted that an increase of that magnitude will *double* the water use of the electricity sector.[77] The assessment also cautioned that a changing climate will interrupt snowfall in the northern regions dependent on snowmelt as a source of water for coal mining and coal generation.[78] Circle of Blue concluded, "there is considerable evidence of a potentially ruinous confrontation between growth, water, and fuel already visible across China and virtually certain to grow more dire over the next decade."[79]

The second study, from the IEA, noted that "China's water resources are set to become more strained with the country's ongoing urbanization" and that water scarcity is "a potential bottleneck to economic and social development."[80] The assessment warned that China's regions of highest thermoelectric capacity, such as the North China Grid, are already water stressed or experiencing "absolute scarcity."[81] The IEA projects that water

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[72] Julian L. Wong, *The Food–Energy–Water Nexus: An Integrated Approach to Understanding China's Resource Challenges*, 7 HARVARD ASIA Q. 15, 16 (2010).

[73] Natalie Obiko Pearson, *Asia Risks Water Scarcity Amid Coal-Fired Power Embrace*, BLOOMBERGBUSINESSWEEK (Sept. 9, 2012), http://www.bloomberg.com/news/2012-09-09/asian-water-scarcity-risked-as-coal-fired-power-embraced.html.

[74] Schneider et al., *supra* note 44, at 716.

[75] *See generally id*. (identifying the subject area for the Circle of Blue study).

[76] *Id*. at 725.

[77] *Id*. at 717.

[78] *Id*. at 716–17.

[79] *Id*. at 715.

[80] INTERNATIONAL ENERGY AGENCY, *supra* note 5, at 518–19.

[81] *Id*. at 518.

withdrawals for energy production in China will rise almost 40 percent between 2010 and 2035, or by 40 billion cubic meters (10.5 trillion gallons).[82] Overall water consumption is projected to rise by an even greater percentage during the same period—by 83 percent, a total of 14 billion cubic meters (3.7 trillion gallons).[83] Water use at coal mines is also projected to increase by 18 percent; the IEA noted that "[w]ater requirements per tonne of coal produced are expected to rise as coal mining operations move deeper underground and washing becomes more widespread."[84] Lastly, the IEA cautioned that "[w]hile all existing nuclear plants in China use seawater for cooling, future plans include the development of inland nuclear power facilities . . . that will add to competition for scarce water resources where the plants are sited."[85]

B. *The French National Grid*

Slightly smaller than Texas but the largest nation in Western Europe, France is the tenth largest producer of electricity in the world and the eleventh largest consumer at 451.4 billion kWh with a population of approximately 62.8 million in 2009.[86] Although only 20.5 percent of France's total installed capacity in 2009 came from fossil fuels, due to its sheer economic size the country is the nineteenth biggest emitter of carbon dioxide in the world.[87] France is also the largest net exporter of electricity in the world—it exports electricity to Switzerland, Italy, Germany, Belgium, Spain, and the UK.[88] The majority of France's 119 million kilowatt installed generating capacity comes from nuclear power, making it the most nuclear-reliant country in the world.[89]

France is highly dependent on nuclear power, a water-

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[82] *Id*. at 519.
[83] *Id*.
[84] *Id*.
[85] *Id*. at 520.
[86] U.S. CIA, THE WORLD FACTBOOK: FRANCE (2013), *available at* https://www.cia.gov/library/publications/the-world-factbook/geos/fr.html (follow "People and Society" and "Energy" hyperlinks).
[87] *Id*.
[88] *Nuclear Power in France*, WORLD NUCLEAR ASS'N, http://www.world-nuclear.org/info/Country-Profiles/Countries-A-F/France/#.UWRqsjf0fh8 (last updated Jul. 31, 2013).
[89] U.S. CIA, *supra* note 86.

intensive process, partly because it has a paucity of primary energy resources. Its national coal reserves could barely cover consumption in the 1980s and domestic natural gas reserves were largely depleted during that same decade.[90] France thus embarked on a centralized energy policy, run by state elites, oriented towards investments in nuclear infrastructure and technology.[91] That reliance on nuclear power continues to this day, with 58 nuclear power plants meeting 78 percent of the country's electricity needs through 63,130 megawatts of installed capacity.[92] The electric grid's high dependency on nuclear power means that some reactors serve peak instead of base-load power,[93] sometimes closing down during the weekends due to a lack of demand.[94] As a result, the French nuclear industry's capacity factor is relatively low compared to other nations ("in the high 70s as a percentage").[95]

Overall, France is expected to increase its thermoelectric capacity by more than 100,000 MW by 2040; the numbers are summarized by Table 2 above. Additional nuclear capacity constitutes 35 percent of total new generation capacity and includes plans to build two reactors of a new class—the 1650 MWe European Pressurized Reactor—in Flamanville and Penly, both on the northwest coast of Normandy.[96] Collectively, French nuclear units are very water intensive compared to other types of power plants. French institutions divide water use between four sectors: energy, agriculture, industry, and residential or household use. Across the four sectors, water use is far from equal, with electricity production constituting approximately *two-thirds* of the total, far more than in any of our other sectors.[97] Figure 2 maps the

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[90] Guy de Carmoy, *The New French Energy Policy*, 10 ENERGY POL'Y 181 (1982).

[91] James M. Jasper, *Gods, Titans and Mortals: Patterns of State Involvement in Nuclear Development*, 20 ENERGY POL'Y 653 (1992).

[92] WORLD NUCLEAR ASSOCIATION, *supra* note 88; SOVACOOL ET AL., *supra* note 57.

[93] *See* WORLD NUCLEAR ASSOCIATION, *supra* note 88 (noting that "in a coordinated system the nuclear fleet is capable of a degree of load following," i.e., operating in a peaking capacity when needed).

[94] *Id*.

[95] Steve Kidd, *Nuclear in France - What Did They Get Right?* NUCLEAR ENG'G INT'L (June 22, 2009), http://www.neimagazine.com/opinion/opinion nuclear-in-france-what-did-they-get-right.

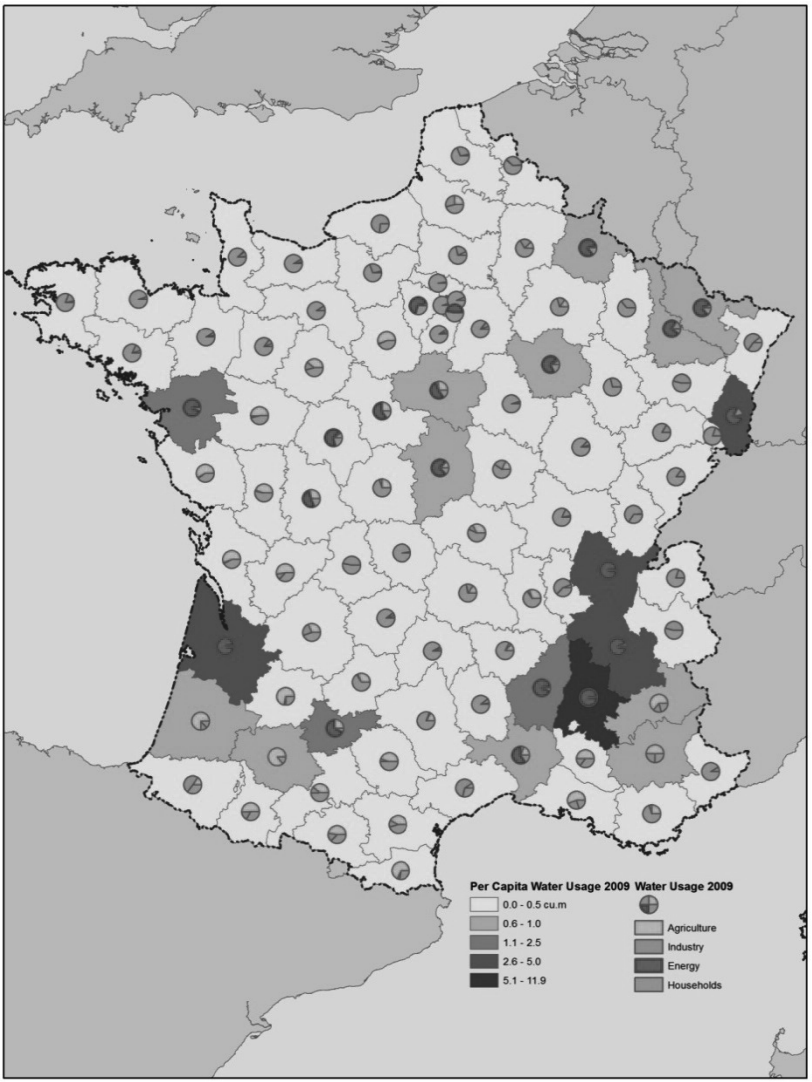
[96] WORLD NUCLEAR ASSOCIATION, *supra* note 88.

[97] COMMISSARIAT GÉNÉRAL AU DÉVELOPPEMENT DURABLE, CHIFFRES ET STATISTIQUES: LES PRÉLÈVEMENTS D'EAU EN FRANCE EN 2009 ET LEURS

specific dynamics of water use for every district in France for 2009. France's projected future reliance on thermoelectric power facilities makes it especially susceptible to water shortages.

ÉVOLUTIONS DEPUIS DIX ANS 1 (2012), *available at* http://www.developpement-durable.gouv.fr/IMG/pdf/CS290.pdf.

Figure 2: Water Resource Use for France for 2009



Note: Darker areas of the map show greater per capita water usage, and the red parts of the pie charts indicate energy usage as a share of overall water usage.
Source: Institute for Energy & the Environment, Vermont Law School, designed by Stone Environmental.[98]

[98] Drawn from data available in REGULATORY ASSISTANCE PROJECT, *supra* note 35.

C. *The National Indian Grid*

India is the fourth largest energy consumer in the world[99] and a significant contributor of global greenhouse gas emissions.[100] Yet, the average Indian citizen uses 15 times less energy annually than does a U.S. citizen, produces 17 times fewer greenhouse gas emissions, and uses 30 times less electricity.[101] Similarly, India's per capita energy consumption is lower than that of Africa.[102] These discrepancies are in part explained by the fact that 25 percent of the Indian population, or 306 million people, live without access to electricity, and 66 percent, or about 818 million people, are dependent on solid fuels for cooking and household energy needs.[103]

India has the world's second largest population (more than 1.2 billion people), seventh largest landmass, and tenth largest economy (third largest when adjusted for purchasing power parity).[104] In 2011, India's GDP was slightly more than $1.87 trillion.[105] With a young population—the median age is 26—analysts expect India to overtake China as the world's most populated nation in 2025.[106] India is expected to lead the world in

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[99] U.S. ENERGY INFO. ADMIN., INDIA (2013), *available at* http://www.eia.gov/countries/analysisbriefs/India/india.pdf.

[100] *Energy Profile: India*, CLIMATE IMPACTS: GLOBAL AND REGIONAL ADAPTATION SUPPORT PLATFORM, http://cigrasp.pikpotsdam.de/countries/19949 5847/energy_profile (last visited Aug. 11, 2013).

[101] *Id*.

[102] INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 2010, at 90 (2010).

[103] *World Energy Outlook*, INT'L ENERGY AGENCY, http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessdatabase/ (last visited Nov. 1, 2014).

[104] U.S. CIA, THE WORLD FACTBOOK: INDIA (2013), *available at* https://www.cia.gov/library/publications/the-world-factbook/geos/in.html; *GDP (Current US$)*, THE WORLD BANK, http://data.worldbank.org/indicator/NY.GDP.MKTP.CD (last visited Sept. 9, 2013) [hereinafter *GDP Current US$*]; *GDP, PPP (Current International $)*, THE WORLD BANK, http://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD (last visited Sept. 9, 2013).

[105] U.S. CIA, *supra* note 104.

[106] Sam Roberts, *In 2025, India to Pass China in Population, U.S. Estimates*, N.Y. TIMES, Dec. 16, 2009, at A24, *available at http://www.nytimes.com/2009/12/16/world/asia/16census.html?_r=0*; Adam Freedman, *The Median Age in India: 26*, BLOOMBERG, July 2, 2012, http://www.bloomberg.com/portfolio-impact/2012-07-02/the-median-age-in-india-26.html; Girija Shivakumar, *India Is Set to Become the Youngest Country by 2020*, THE HINDU, http://www.thehindu.com/news/national/india-is-set-to-become-the-youngest-

urban population growth, with 497 million more people living in its cities by 2050.[107]

India's growing economy and population are dramatically increasing demand for electricity. With an installed capacity of 189,000 MW in 2010, India is already the fifth largest consumer of electricity in the world.[108] Coal-fired thermoelectric power plants produced about 71 percent of the country's electricity in 2011–2012, with nuclear, hydropower, diesel and natural gas making up the remainder.[109] India is both the third largest consumer and producer of coal in the world.[110] Further, India's electricity sector relies on low quality coal, rendering coal-fired electricity generation inefficient and necessitating the import of metallurgical coal.[111] According to the Indian government's economic survey, the gap in supply and demand of electricity was roughly 9 percent from 2007 to 2012, and, despite adding 55,000 MW of new generation capacity, the gap is expected to remain unchanged for the fiscal year beginning in April 2012.[112] This shortfall for energy

country-by-2020/article4624347.ece (last updated Apr. 17, 2013, 19:07 IST).

[107] India completed its last census in 2011, but did not make projections for future population growth. To project population growth out into the future, we used the United Nations Statistics Division's projection of 1,627,029,000 for the national population in 2040. We then applied a uniform growth rate of 1percent per year, which reflects that average rate of growth between 2011 and 2040. This is significantly lower than the 1.4 percent growth rate between 2000 and 2010 reported by the United Nations. This approach gives a rough estimate for growth in most provinces, but does not account for uneven growth rates in the various states. For example, it does not take into account that some states are losing population. The projected state level population growth rates were used to estimate future water demand.

[108] SUN-JOO AHN & DAGMAR GRACZYK, INT'L ENERGY AGENCY, UNDERSTANDING ENERGY CHALLENGES IN INDIA: POLICIES, PLAYERS, AND ISSUES 46 (2012), *available at* http://www.iea.org/publications/freepublications/publication/India_study_FINAL_WEB.pdf.

[109] *Id*. at 34 fig.11.

[110] U.S. ENERGY INFORMATION ADMINISTRATION, *supra* note 99; U.S. ENERGY INFO. ADMIN., INTERNATIONAL ENERGY OUTLOOK 2013 71, 75 (2004), *available at* http://www.eia.gov/forecasts/ieo/pdf/0484(2013).pdf.

[111] Justin Guay, *India, Coal Imports, and Energy Security*, SIERRA CLUB (July 29, 2013), http://sierraclub.typepad.com/compass/2013/07/india-coal-imports-energy-security.html (noting the low quality of the domestic Indian coal industry and constraints in not producing it quickly enough, creating a need for importation).

[112] *India Suffered 9 Pc Peak Power Shortage During 2007-12: Economic Survey*, THE HINDU (Feb. 27, 2013), http://www.thehindu.com/business/Economy/india-suffered-9-pc-peak-power-shortage-during-200712-economic-survey/article4458734.ece.

is daunting, with nearly 92,000 gigawatt hours (GWh) of demand going unmet.[113]

Therefore, India has planned to increase capacity by 613,000 MW by 2040, which is more than the planned increases in the entire North China Grid and French national grid combined.[114] Figure 3 illustrates that during the period 2010–2040, India's generation capacity is projected to grow exponentially. Currently, no state has an installed capacity of more than 6,200 MW, but by 2040 11 states are planned to have more than 10,000 MW of capacity.[115] The state of Gujarat alone is expected to increase its capacity by 50,000 to 78,000 MW over the next 30 years.[116]

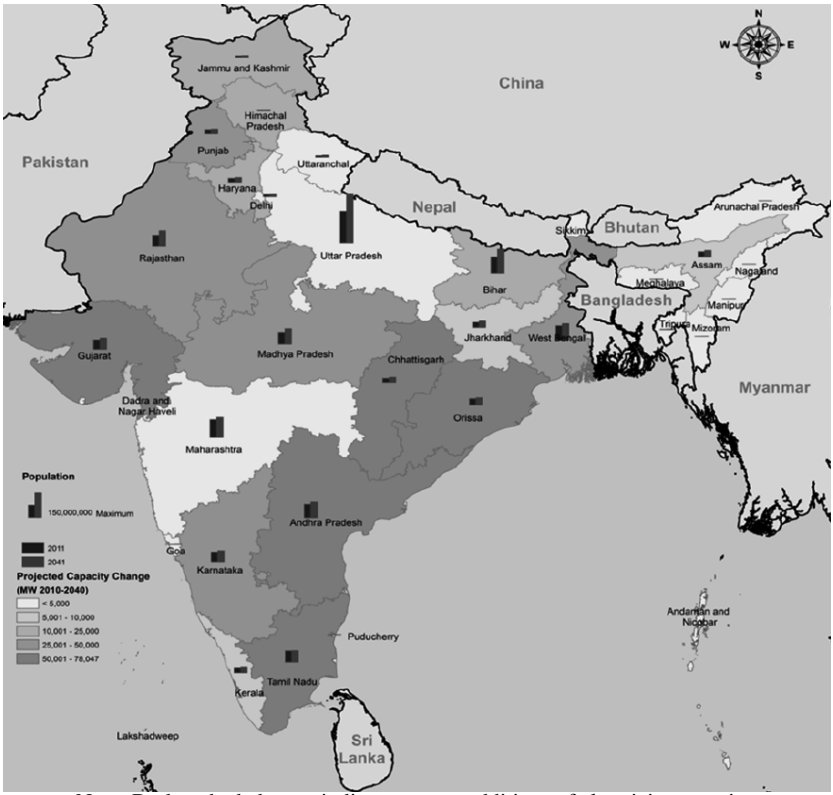
[113] CENT. ELEC. AUTH., MINISTRY OF POWER, GOV'T OF INDIA, LOAD GENERATION BALANCE REPORT 2012–2013, at 1 (2013), *available at* http://www.cea.nic.in/reports/yearly/lgbr_report.pdf.

[114] *See supra* Table 2.

[115] *Id*.

[116] PAUL FAETH ET AL., A CLASH OF COMPETING NECESSITIES: WATER ADEQUACY AND ELECTRIC RELIABILITY IN CHINA, INDIA, FRANCE, AND TEXAS 30 (CNA Analysis and Solutions 2014).

Figure 3: Projected Changes in Installed Electricity Capacity for India, 2010–2040 (MW)



Note: Darker shaded areas indicate greater additions of electricity capacity.
Source: Institute for Energy & the Environment, Vermont Law School, designed by Stone Environmental.[117]

The water-intensive nature of Indian electricity generation causes competition with other water-intensive sectors. The conflicts will likely worsen as national water use grows by more than 50 percent between 2010 and 2040, as projected in Table 2. The northwest and southern regions, where power plants are highly dependent on surface water, are especially vulnerable to water shortages.[118] Indian power plants have had to shut down repeatedly during the driest months of the year when Indian rivers experience

[117] *Id*.
[118] INTERNATIONAL ENERGY AGENCY, *supra* note 5, at 521.

low flow.[119]

Our assessment is not the first to suggest troubling implications for the electricity-water nexus in India. At least three other independent studies have raised similar concerns. The first, a 2010 joint report from HSBC Bank and the World Resources Institute, warned that new investments in thermoelectric and hydropower plants are planned for the same regions of the country that suffer from the most water stress.[120]

The second study, from the Prayas Energy Group in 2011, assessed environmental clearances for large coal- and natural gas-fired power plants totaling 192,913 MW of planned additions.[121] It also assessed an additional 508,907 MW at various stages of the approval process: plants that were awaiting clearances, had terms of reference granted, or were awaiting terms of reference.[122] The Prayas study noted that coal-based power plants represent 84 percent of these planned projects, and that such additions are more than *six times* the current installed thermoelectric capacity of 113,000 MW.[123] However, this added capacity will collectively increase the amount of water needed per year by an estimated 4.6 billion cubic meters (1.2 trillion gallons), and most of these plants are concentrated in areas that lack the water resources to support them.[124]

The third study, from Greenpeace in 2012, argued that the more than 100 GW in thermoelectric capacity that India intends to add under its Twelfth Five Year Plan will require an additional 2.5

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[119] VLADIMIR SMAKHTIN ET AL., TAKING INTO ACCOUNT ENVIRONMENTAL WATER REQUIREMENTS IN GLOBAL-SCALE WATER RESOURCES ASSESSMENTS 4 (2004), *available at* core.kmi.open.ac.uk/download/pdf/6405183.pdf; AHN & GRACZYK, *supra* note 108, at 36 ("Hydro rich states in the northern region, including Himachal Pradesh, and Jammu and Kashmir, have a surplus of electricity during monsoon season, but face shortages during winter when precipitation is low.").

[120] *See* AMANDA SAUER ET AL., WORLD RES. INST., OVER HEATING: FINANCIAL RISKS FROM WATER CONSTRAINTS ON POWER GENERATION IN ASIA 4 (2010), *available at* http://pdf.wri.org/over_heating_asia.pdf ("74 GW—over half of existing and planned capacity for major power companies—is located in areas that are considered to be water scarce or stressed.").

[121] PRAYAS ENERGY GRP, THERMAL POWER PLANTS ON THE ANVIL: IMPLICATIONS AND NEED FOR RATIONALIZATION, at v (2011), *available at* http://www.ercindia.org/files/Prayas_Paper_TPP_Aug_2011.pdf.

[122] *Id*. at 2.

[123] *Id*. at v.

[124] *Id*. at 6.

to 2.8 billion cubic meters (660 billion to 739 billion gallons) of water per year.[125] This is equivalent to the irrigation water for more than 400,000 hectares of farmland.[126] The study explained that "[t]here seems to be no consideration of the cumulative impact of this water use when sanctioning projects . . . ."[127]

D. *The Electric Reliability Council of Texas Grid*

Some have called Texas the "heart of darkness" and the "global energy capital" for its long history promoting fossil fuels.[128] Today, a barrel of West Texas Intermediate is still the benchmark for global oil pricing, and the state's 27 petroleum refineries account for 27 percent of nationwide capacity.[129] The state also produces more than one-quarter (28 percent) of the country's natural gas.[130] In 2012, Texas was first among U.S. states for total energy production, crude oil production, natural gas production, and electricity generation.[131] It was also first in the nation for its carbon dioxide emissions, and fifth in the country for coal production.[132] However, Texas also led the country in the installed capacity of wind-powered electricity, and it was the first state to reach 10,000 MW of wind capacity in 2010.[133] The Electric Reliability Council of Texas (ERCOT) Grid, nonetheless, is vulnerable to electricity and water crises because of its size and its susceptibility to droughts.

With a population of approximately 25 million people, projected to reach 41 million by 2050, and $1.3 trillion in GDP, Texas touts the second largest population and second largest economy of any state in the country, following California on both counts.[134] ERCOT manages the flow of electric power to 85

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[125] *See* GRACE BOYLE ET AL., *supra* note 31, at 11.

[126] *Id.*

[127] *Id.* at 12.

[128] John Laumer, *Ted Turner's Journey into the Heart of Darkness*, TREEHUGGER (Feb. 10, 2007), http://www.treehugger.com/corporate-responsibility/ted-turneratms-journey-into-the-heart-of-darkness.html.

[129] *State Profile and Energy Estimates: Texas*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/beta/state/?sid=TX (last updated Mar. 27, 2014).

[130] *Id.*

[131] *Id.*

[132] *Id.*

[133] *Id.*

[134] *Interactive Population Map*, UNITED STATES CENSUS 2010, http://www.census.gov/2010census/popmap/index.php (last visited Apr. 2,

percent of the state's electric load and schedules power on 40,500 miles of transmission lines and more than 550 generation units totaling about 58,000 MW of operational capacity, almost 7 percent of the United States' total installed capacity.[135] As Figure 4 shows, ERCOT expects to add about 23,000 MW—equivalent to one-third of today's installed capacity—by 2040, with most of these additions concentrated around Houston, the Dallas-Fort Worth Metroplex, and Austin.[136] Indeed, these capacity additions make Texas *first* compared to all other states—that is, state planners intend to add more power capacity to the Texas grid between 2010 and 2030 than any other state surveyed.[137]

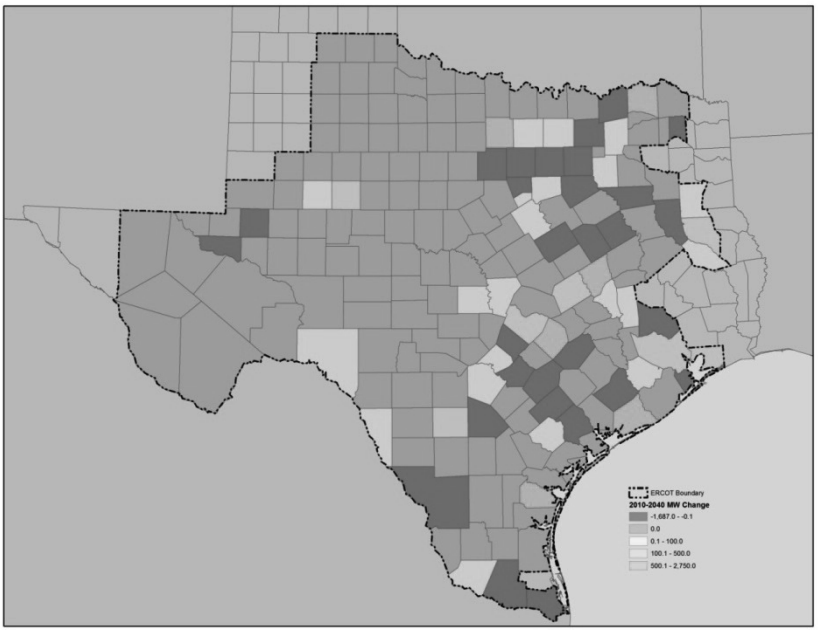
2014); U.S. DEP'T OF COMMERCE, WIDESPREAD ECONOMIC GROWTH ACROSS STATES IN 2011, at 11 (2012), *available at* http://www.bea.gov/newsreleases/regional/gdp_state/2012/pdf/gsp0612.pdf; *Texas Population Projections Program*, TX STATE DATA CENTER, http://txsdc.utsa.edu/data/TPEPP/Projections/Index.aspx (last visited Apr. 11, 2013) (follow "Population Projections for the State of Texas" hyperlink under "By Age Group for 2010–2050).

[135] *About ERCOT,* ERCOT (Sept. 3, 2013), http://www.ercot.com/about/.

[136] *See infra* Table 4.

[137] *See* RON BINZ ET AL., CERES, PRACTICING RISK-AWARE ELECTRICITY REGULATION: WHAT EVERY STATE REGULATOR NEEDS TO KNOW 16 fig. 4 (2012), *available at* http://www.ceres.org/resources/reports/practicing-risk-aware-electricity-regulation.

Figure 4: Projected Changes in Installed Electricity Capacity for ERCOT, 2010–2040 (MW)



Note: The map shows negative growth in electricity capacity in red and orange (light shaded areas) and positive growth in the green areas (darker shaded areas in black and white).
Source: Institute for Energy & the Environment, Vermont Law School, designed by Stone Environmental.[138]

Texas, however, is prone to frequent droughts, meaning these capacity additions may exacerbate water shortages. During the summer of 2011, this powerhouse state found itself in the midst of the worst single-year drought on record.[139] Severe heat accompanied the dry weather with thirteen locations recording at least 50 days above 100 degrees Fahrenheit.[140] Figure 5 illustrates pervasive "exceptional drought" conditions in August of 2011. As air conditioners strained to cool buildings, demand for electricity broke records for days on end, topping 68,000 MW in early

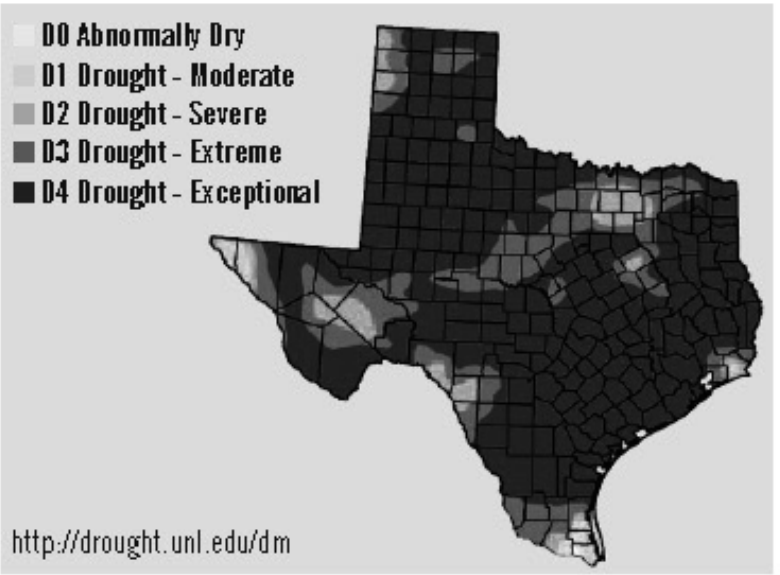
[138] *Cf.* REGULATORY ASSISTANCE PROJECT 60, *supra* note 35.

[139] TEX. COMPTROLLER OF PUB. ACCOUNTS, THE IMPACT OF THE 2011 DROUGHT AND BEYOND, at ii (2012), *available at* http://www.window.state.tx.us/specialrpt/drought/pdf/96-1704-Drought.pdf.

[140] Chris Dolce & Jonathan Erdman, *Record Heat of 2011*, THE WEATHER CHANNEL (Sept. 21, 2011), http://www.weather.com/outlook/weather-news/news/articles/2011-heat-superlatives_2011-07-15.

August.[141] These weather conditions brought the water-energy nexus to the forefront in ERCOT. Continuing drought conditions threatened to close 3,000 MW of thermoelectric capacity in 2011.[142] In east Texas, some power plant owners were forced to pipe in water from other rivers so plants could continue to operate and meet electricity demand.[143]

Figure 5: Drought Conditions in Texas on August 2, 2011



Source: U.S. Drought Monitor[144]

The summer of 2011 was not an anomaly. In 2003, the Natural Resources Defense Council warned that parts of western Houston would face "severe shortage[s] of water in the future" even without accounting for new power plants.[145] During the last

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[141] TRIP DOGGETT, ERCOT, ERCOT'S CHALLENGES & OPPORTUNITIES 10 (2012), *available at* http://www.ercot.com/content/news/presentations/2012/Doggett-AECT%20May%2017%202012.pdf.

[142] Eileen O'Grady, *Drought Adds to 2012 Texas Power Supply Worry*, REUTERS (Oct. 18, 2011), http://www.reuters.com/article/2011/10/18/utilities-texas-drought-idAFN1E79H1L620111018.

[143] *Id*.

[144] *Drought Monitor Archives*, DROUGHT MONITOR, http://droughtmonitor.unl.edu/data/pdfs/20110802/20110802_south_cat.pdf (last visited Apr. 22, 2014).

[145] NATURAL RES. DEF. COUNCIL, WHAT'S ON TAP? GRADING DRINKING WATER IN U.S. CITIES 146 (2003) (internal quotation marks omitted), *available*

serious drought in 1996, the agricultural sector suffered as water was diverted to supply power plants and drinking water systems.[146] In June of that year, the water shortage caused agricultural losses for cotton, wheat, feed grains, cattle, and corn at a cost of $2.4 billion for Texas.[147] An additional $4.1 billion was lost in agriculturally related industries such as harvesting, trucking, and food processing.[148] Reduced irrigation also contributed to reduced vegetable production, with concomitant losses in jobs and income and drastic increases in the price of food.[149] Texas could be headed for a similar disaster in the future, especially since state water planners are already cautioning that the agricultural sector could be short 8 million acre-feet of water, roughly 2.6 trillion gallons, by 2050.[150] The *New York Times* reported that available water for the state could decrease by 19 percent as soon as 2050.[151] These incidents provoked the Texas Chamber of Commerce to declare electricity and water a "double dilemma" for the state in 2012.[152]

The economic and social impacts of water shortages will not be limited to the agricultural sector. Based on these regional reports, the Texas Water Development Board has estimated that if the state does not ensure it has enough water to meet projected need, the state will have 7.4 million fewer jobs, 13.8 million fewer people, and 38 percent less income by 2050.[153] As one recent study blithely put it, "[t]he free lunches of the original Texas water endowment have been consumed."[154]

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at http://www.nrdc.org/water/drinking/uscities/pdf/houston.pdf.

[146] Sovacool & Sovacool, *supra* note 1, at 2767.

[147] *Id*.

[148] *Id*.

[149] *Id*.

[150] Ron Smith, *Severe Water Shortage Forecast for Texas Agriculture,* SOUTHWEST FARM PRESS (Sept. 22, 2006), http://southwestfarmpress.com/severe-water-shortage-forecast-texas-agriculture.

[151] Douglas Jehl, *Saving Water, U.S. Farmers are Worried They'll Parch*, N.Y. TIMES, Aug. 28, 2002, http://www.nytimes.com/2002/08/28/international/worldspecial/28WATE.html.

[152] *Texas Water, Electricity Shortages A Concern with Water-Energy Nexus*, WATERWORLD (Oct. 31, 2012), http://www.waterworld.com/articles/2012/10/tccea-looks-at-water-energy-nexus-in-texas.html.

[153] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-03-514, FRESHWATER SUPPLY: STATES' VIEWS OF HOW FEDERAL AGENCIES COULD HELP THEM MEET THE CHALLENGES OF EXPECTED SHORTAGES 67 (2003).

[154] RONALD C. GRIFFIN, WATER POLICY IN TEXAS: RESPONDING TO THE RISE

III. ELECTRICITY-WATER NEXUS SOLUTIONS

Despite the seriousness of the electricity-water nexus challenges confronting China, France, India, and Texas, regulators and electric utilities are well-positioned to respond, as local, state, provincial, and national actors have a long history of policy intervention on environmental and energy issues.[155] This final section argues that while a cornucopia of different technologies and mechanisms are available to regulators and utilities, the following combination of six solutions would be most effective at avoiding future water shortages: (1) improving data collection and monitoring; (2) increasing research and development funding to minimize water use by thermoelectric power plants; (3) changing permitting and licensing requirements to better consider water use; (4) placing a moratorium on thermoelectric power generation; (5) promoting energy efficiency and water-efficient renewable electricity sources; and (6) changing electricity pricing and giving customers more feedback and information.

A. *Improve Data Collection and Monitoring*

The existing quality and availability of data limit policy responses to the electricity-water nexus, even in the United States, which arguably has some of the best freely available data related to energy (published by the U.S. Energy Information Administration) and water (published by the U.S. Geological Survey) in the world. However, in the United States, § 979 of the Energy Policy Act of 2005 only mentions the importance of water and energy, but provides no funding for the matter.[156] Sections 316(a) and 316(b) of the Clean Water Act regulate the discharge of cooling water and power plant intake procedures without monitoring the effects of a water-intensive system.[157] The U.S. Energy Information Administration (EIA) used to compile a national database of thermoelectric plants and their water use, using information collected through "Form EIA-767," but the agency terminated this

OF SCARCITY 238 (2011).

[155] *See* Benjamin K. Sovacool, *The Best of Both Worlds: Environmental Federalism and the Need for Federal Action on Renewable Energy and Climate Change*, 27 STAN. ENVTL. L.J. 397 (2008) (arguing in favor of a "decentralized" mode of environmental policymaking).

[156] *See* Energy Policy Act of 2005, 42 U.S.C. §§ 15801–16524 (2006).

[157] 33 U.S.C. § 1326(a)–(b) (2006).

process in 2005 due to budgetary constraints.[158] The EIA's replacement "Form EIA-860" has only incomplete data on power plant water use.[159] For several plants, the form either fails to include the water source or uses general terms such as "aquifer" or "municipal utility" without ever naming a particular aquifer or utility.[160]

The Union of Concerned Scientists examined more than a decade's worth of water data related to electricity generation in the United States. It concluded, "[c]ollisions and near-misses between energy and water needs point to the importance of accurate, up-to-date information on power plant water demand."[161] However, the analysis identified "a number of gaps and apparent inaccuracies in federal data."[162] Similarly, the National Renewable Energy Laboratory noted, "existing data [for the electricity-water nexus] collected from federal agencies are currently inconsistent and incomplete."[163]

A lack of accurate and reliable data in developing countries negatively affects those countries in many ways.[164] Unlike developed countries, developing countries often lack baseline data and have weak data tracking systems.[165] Even vital statistics, such

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[158] Letter from Arthur N. Marin, Exec. Dir., Clean Air Ass'n of the Ne. States, to Jorge Luna-Camara, U.S. Energy Info. Admin. (Mar. 30, 2007) Regarding: Proposed Changes to Power Generator Data Collection Activities and Form EIA-767 2, *available at* www.nescaum.org/documents/nescaum-comments_eia-forms-2007-may30-final.pdf/.

[159] *Form EIA-860 Detailed Data*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/electricity/data/eia860/ (last updated Dec. 4, 2013).

[160] *Form EIA-860 Detailed Data***,** U.S. ENERGY INFO. ADMIN., http://www.eia.gov/electricity/data/eia860/xls/eia8602011.zip (open "EnviroEquip.xlsx"; then open sheet titled "Cooling") (last visited Apr. 15, 2013).

[161] UNION OF CONCERNED SCIENTISTS, FRESHWATER USE BY U.S. POWER PLANTS: ELECTRICITY'S THIRST FOR A PRECIOUS RESOURCE 3 (2011), *available at* http://www.ucsusa.org/assets/documents/clean_energy/ew3/ew3-freshwater-use-by-us-power-plants.pdf.

[162] *Id*. (original emphasis removed).

[163] JORDAN MACKNICK ET AL., NATIONAL RENEWABLE ENERGY LABORATORY, A REVIEW OF OPERATIONAL WATER CONSUMPTION AND WITHDRAWAL FACTORS FOR ELECTRICITY GENERATING TECHNOLOGIES 16 (2011), *available at* http://www.nrel.gov/docs/fy11osti/50900.pdf.

[164] CHRISTOPHER SCOTT, MEASURING UP TO THE MEASUREMENT PROBLEM: THE ROLE OF STATISTICS IN EVIDENCE-BASED POLICY-MAKING 18 (2005), *available at* http://www.paris21.org/sites/default/files/1509.pdf.

[165] *Data for Development: Household Surveys and Other Assessments,* U.N. POPULATION FUND, http://www.unfpa.org/public/datafordevelopment/survey

as demographic information, are "nonexistent or incomplete in some developing countries."[166] The international community recognizes data limitations as a major challenge in achieving development goals. In order to improve the quality of data in developing countries, the United Nations, European Commission, Organization for Economic Co-operation and Development, International Monetary Fund, and the World Bank founded the Partnership in Statistics for Development in the 21st Century (PARIS21).[167] The PARIS21 consortium created a global network of policymakers and statisticians to "promote, influence and facilitate statistical capacity development" and to improve the use of statistics.[168] Nevertheless, major data limitations remain. Our study ran into several specific data challenges in developing countries. Basic data on water use, future electricity demand, and even projections for population growth were difficult to obtain. There is a lack of data disaggregated at state, provincial, or municipal levels. Even when this data has been gathered, it was not accessible on government websites. A lack of transparency in accounting procedures further raises questions about the quality of the data.

B. *Fund Research to Minimize Water Use By Thermoelectric Power Plants*

New technologies can reduce thermoelectric power plant water vulnerabilities. As shown in Table 3, there are several types of technological solutions, each with a set of specific strengths and weaknesses: alternative cooling systems, untraditional sources of water, power plant water production, and increased water efficiency through plant design. Alternative cooling systems reduce water use by adapting cooling systems to local water constraints. Nontraditional water sources include municipal wastewater, treated coalmine drainage, and water recycled from plant processes.[169] Power plants can produce water by capturing

(last visited Apr. 15, 2013).

[166] *Id*.

[167] *History*, PARIS21, http://paris21.org/history (last visited Apr. 15, 2013).

[168] *Id*.

[169] THOMAS J. FEELEY III ET AL., DEP'T OF ENERGY, DEPARTMENT OF ENERGY/NATIONAL ENERGY TECHNOLOGY LABORATORY'S POWER PLANT-WATER R&D PROGRAM 11 (2010), *available at* http://www.circleofblue.org/waternews/wp-content/uploads/2010/08/Thermoelectric-Power-Plants.pdf.

water in flue gas, desalinating seawater using waste thermal heat, and transforming water intensive procedures to dry processes.[170] Improved plant design reduces water use by increasing overall plant efficiency. Table 3 also demonstrates that alternative technologies face unique constraints. There is no proverbial silver bullet; technology effectiveness varies depending on local geographies, plant economies, and technological maturity.

Table 3: Advantages and Disadvantages of Advanced Cooling Cycles

Technology	Type	Advantages	Disadvantages
Alternative Cooling Systems	Once-through cooling	Lower water consumption Mature technology Lower capital cost	Higher water withdrawals Impacts on ecosystems Exposure to thermal discharge limits
	Wet recirculating cooling	Significantly lower water withdrawals than once-through Mature technology	Higher water consumption than once-through Lower plant efficiency Higher capital cost than once-through
	Dry cooling	Zero or minimal water withdrawals and consumption Increased siting opportunities	Highest cooling system capital cost Lower plant efficiency, particularly when ambient temperatures are high Large land area requirements
	Hybrid systems	Lower capital costs than dry cooling Reduced water consumption than wet cooling processes No efficiency penalty on hot days Operational flexibility	Higher capital costs than wet systems Limited technological experience
Untraditional Sources of Water	Alternative Water Sources	Reduce freshwater needs	Adverse effects on plant cooling equipment Regulatory compliance challenges Limited accessibility High capital costs
	Recycling water from plant processes	Reduce freshwater needs Reduce treatment needs compared to alternative water sources Some recycling processes are mature	Requires capital investment Needs chemical treatment
	Capturing water vapor from flue gas	Reduce freshwater needs	Unknown impact on emissions control technologies Not commercially available Minimal water savings Limited to high ambient temperature Decreased power plant performance
Power Plant Water Production	Diffusion driven desalination	Eliminate need for freshwater withdrawals Not vulnerable to droughts or water shortages	Limited to coastal power plants Coastal siting challenges Ecological emissions concerns Expensive
	Increasing cycles of concentration	Moderate water savings Retrofit opportunity	Requires installation of new materials
	Dry flue gas desulphurization	Reduce water use	Lower pollutant removal efficiencies
	Dry bottom ash handling	Increase plant efficiency Decrease costs Eliminate process water needs	Higher initial investment
Increasing Water Efficiency	Supercritical coal plants	Consume less water than subcritical plants Mature technology Lower lifecycle costs	Higher maintenance costs Higher boiler stress and fatigue Sensitive to water quality
	Integrated Gas Combined Cycle (IGCC)	Use up to 35-40% less water than pulverized coal plants	Emerging technology Higher capital costs than pulverized coal plants.

Source: Compiled by the authors

170 EDWARD LEVY ET AL., ENERGY RESEARCH CENTER, RECOVERY OF WATER FROM BOILER FLUE GAS, at iv (2008), *available at* http://www.academia.edu/3400151/Recovery_of_water_from_boiler_flue_gas; Jonathan M. Gitlin, *Using Waste Heat to Fill the Bath: Desalination in Abu Dhabi*, ARS TECHNICA (Mar. 15, 2011, 10:31 AM), http://arstechnica.com/science/2011/03/using-waste-heat-to-fill-the-bath-desalination-in-abu-dhabi/.

C. *Change Permitting and Licensing*

Another solution would be altering the permitting and licensing requirements for power plants so that they better incorporate water needs. In China, the National Reform and Development Council or the provincial and municipal governments can decline to issue permits based on any criteria that they select. They could, for instance, refuse to license a power plant unless water is expressly accounted for in Environmental Impact Assessments.[171] In France, the Commission de regulation de l'énergie (CRE) is in charge of the power supply for the entire country, and it has the authority for licensing and re-licensing power plants.[172] India's electricity market is regulated by the Central Electricity Regulatory Commission (CERC), a national agency under the umbrella of the Ministry of Power.[173] CERC is the entity responsible for the development of the nation's grid and is vested with licensing and permitting power for new intrastate generation projects.[174] Unlike the other cases, "the United States has a highly fragmented electric utility industry, which is composed of three federal agencies, over seventy investor-owned power companies and numerous municipal and rural power cooperative organizations."[175] In the United States, licensing for power plant facilities generally falls to the state public utility commissions,[176] except for hydropower facilities, which are

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[171] *National Energy Administration (NEA)*, NAT'L DEV. & REFORM COMM'N, http://en.ndrc.gov.cn/mfod/200812/t20081218_252224.html (last visited Apr. 22, 2013); E-mail from Frederick Weston, Principal & Dir., The Regulatory Assistance Project, to author (Oct. 18, 2013, 01:27 EST) (on file with author).

[172] *See Powers*, COMMISSION DE RÉGULATION DE L'ÉNERGIE, http://www.cre.fr/en/presentation/powers (last visited Nov. 4, 2013); MICHAEL W. GOLAY ET AL., COMPARATIVE ANALYSIS OF UNITED STATES AND FRENCH NUCLEAR POWER PLANT SITING AND CONSTRUCTION REGULATORY POLICIES AND THEIR ECONOMIC CONSEQUENCES 3 (1977), *available at* http://dspace.mit.edu/bitstream/handle/1721.1/31297/MIT-EL-77-044WP-04830583.pdf?sequence=1.

[173] The Electricity Act, 2003 No. 36, Acts of Parliament, 2003 (India).

[174] *Id.*

[175] Chi-Jen Yang, *A Comparison of the Nuclear Options for Greenhouse Gas Mitigation in China and in the United States*, 39 ENERGY POL'Y 3025, 3027 (2011), *available at* http://people.duke.edu/~cy42/US-CN-FR.pdf.

[176] LAWRENCE R. GREENFIELD, AN OVERVIEW OF THE FEDERAL ENERGY REGULATORY COMMISSION AND FEDERAL REGULATION OF PUBLIC UTILITIES IN THE UNITED STATES 9, 11–12 (2010), *available at* http://www.ferc.gov/about/ferc-does/ferc101.pdf.

overseen by the Federal Energy Regulatory Commission.[177] In Texas specifically, the Texas Commission on Environmental Quality (TCEQ) can require a statement of environmental, social, and economic impacts (covered under the category of "any other information") for any proposals for new sources of electricity generation.[178]

D. *Place a Moratorium on New Thermoelectric Power Generation*

Perhaps the simplest response electric utilities can take is to stop building new thermoelectric generation in areas where water shortages are expected to occur or where water prices are anticipated to rise rapidly. The addition of new conventional power plants has two inherent water-related risks that suggest electric utilities should think carefully before constructing them: they are unable to withdraw water needed for normal operation in times of scarcity, and new plants can increase water demands, worsening existing shortages.

China's rapid economic growth has led to the construction of many new coal-fired power plants to meet rising electricity demand. While the government has not issued any moratoriums based on water shortages, recent actions indicate the central government recognizes impending water limitations. The Twelfth Five-Year Plan contains ambitious goals to reduce energy and water intensities.[179] Reducing overall energy consumption and growth will limit new freshwater withdrawals. During the 11th Five-Year Plan, water saving measures checked consumption growth, which only increased by one percent annually over the five-year period.[180] However, the central government's goal of reducing energy intensity is dependent on provincial governments acting to limit new capacity installations.

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[177] *Licensing*, FED. ENERGY REG. COMM'N (Oct. 3, 2013), http://www.ferc.gov/industries/hydropower/gen-info/licensing.asp; *Overview of FERC*, FED. ENERGY REG. COMM'N (May 28, 2013), http://www.ferc.gov/about/ferc-does/overview.asp.

[178] 30 TEX. ADMIN. CODE §§ 281.4(7), 281.5(7) (2012).

[179] Keith Schneider & Nadya Ivanova, *China Responds to Explosive Growth, Pollution, and Water Scarcity in Latest Five-Year Plan,* CIRCLE OF BLUE, (Mar. 15, 2011, 3:15 PM), http://www.circleofblue.org/waternews/2011/world/china-responds-to-explosive-growth-pollution-and-water-scarcity-in-latest-five-year-plan/.

[180] *Id*.

In France, no serious proposals for a moratorium on thermoelectric power plants have yet arisen because the country is so dependent on nuclear power; yet, in June 2011, likely motivated both by a desire to protect the incumbent nuclear industry and water scarcity concerns, the French parliament did vote to ban the hydraulic fracturing of unconventional shale gas (a process known as "fracking").[181]

In India, the nongovernmental organization Greenpeace has called for a moratorium on granting environmental clearances to inland coal-fired thermal plants until their impact on water resources has been taken into account.[182] Greenpeace also suggested placing a moratorium on allocating water to power generation in Vidarbha District in Maharashtra State.[183] The Prayas Energy Group, a nonpartisan energy think tank, has also argued that "[t]here should be an immediate moratorium on any further grant of environmental clearances to [thermal power plants.]"[184] However, unlike in China, France, and Texas (see below), Indian policymakers seem reluctant to act on these sorts of recommendations.. One recent study noted that India "is tugged backwards by inefficiency and corruption in its operating and governing practices" and that "India's insistence on managing its energy, food, and water sectors as a social policy program needed an urgent update."[185]

In Texas, no moratoriums have been proposed as a response to water scarcity. However, there was a concerted effort to enact a moratorium on coal-fired plants due to worries over air pollution. In 2007, a coalition of over thirty groups supported a bill that called for a "time out" for building new coal-fired power plants.[186]

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[181] Davide Castelvecchi, *France Becomes First Country to Ban Extraction of Natural Gas by Fracking*, SCI. AM., (June 30, 2011), http://blogs.scientificamerican.com/observations/2011/06/30/france-becomes-first-country-to-ban-extraction-of-natural-gas-by-fracking/.

[182] GRACE BOYLE ET AL., *supra* note 31, at 65.

[183] *Thirsty Coal Poses Risk to India's Farmers,* GREENPEACE, (Aug. 7, 2012), http://www.greenpeace.org/international/en/news/features/Thirsty-coal-makes-hungry-people/?accept=05961e07fb00ed0f68e094406646c961.

[184] PRAYAS ENERGY GROUP, *supra* note 121, at 17.

[185] Keith Schneider, *On Water and Energy, India is Different*, CIRCLE OF BLUE, (Jan. 16, 2013, 9:52 AM), http://www.circleofblue.org/waternews/2013/commentary/editorial-in-the-circle-fresh-focus/on-water-and-energy-india-is-different/.

[186] STATE CAPITOL REPORT, LONE STAR CHAPTER, SIERRA CLUB 1 (2007).

The bill was primarily aimed at halting the construction of nineteen new coal plants that would have worsened air quality.[187] It called for, among other things, a greater role for renewable energy in the Texas energy mix.[188]

There have been many calls for moratoriums on new thermal coal-fired power plants in the past. In the United States, groups as diverse as the League of Women Voters,[189] the Union of Concerned Scientists,[190] and Trillium Asset Management[191] have called for halting new coal plants because of their carbon emissions or other environmental problems. In 2006, California passed SB-1368 that stipulates that all new coal plants must have the same carbon emissions as combined cycle natural gas plants.[192] While not a direct moratorium, SB-1368 is often called a de-facto ban on building new coal plants, as no conventional coal plant can meet this standard.[193] The U.S. EPA's proposed New Source Performance Standards for carbon dioxide were similarly designed such that no existing coal plants can meet the standard, effectively banning the use of coal in new power generation.[194]

Other states have enacted moratoriums when faced with water scarcity issues. In an effort to address environmental and water concerns, the Idaho House Committee adopted a two-year moratorium on construction of new coal plants in 2006.[195] Around

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[187] *Id*.

[188] *Id*.

[189] *Moratorium on New Coal-Fired Electric Power Plants is Imperative to Address Global Warming*, LEAGUE OF WOMEN VOTERS, http://www.lwv.org/content/moratorium-new-coal-fired-electric-power-plants-imperative-address-global-warming (last visited Apr. 15, 2013).

[190] *So-Called "Clean Coal" Technology Offers Promise Along with Considerable Risks, New Report Finds*, UNION OF CONCERNED SCIENTISTS (Oct. 15, 2008), http://www.commondreams.org/newswire/2008/10/15/so-called-clean-coal-technology-offers-promise-along-considerable-risks-new.

[191] *Bank of America-Moratorium on Coal Financing*, TRILLIUM ASSET MGMT., http://www.trilliuminvest.com/resolutions/moritorium-on-coal-financing (last visited Apr. 15, 2013).

[192] NATURAL RES. DEF. COUNCIL, CALIFORNIA TAKES ON POWER PLANT EMISSIONS: SB 1368 SETS GROUNDBREAKING GREENHOUSE GAS PERFORMANCE STANDARD (2007), *available at* www.nrdc.org/globalWarming/files/sb1368.pdf.

[193] *Id*.

[194] *See, e.g*., Marlo Lewis, *EPA's 'Carbon Pollution Standard': Bait-and-Fuel Switch*, GLOBALWARMING.ORG (Apr. 13, 2012), http://www.globalwarming.org/2012/04/13/epas-carbon-pollution-standard-bait-and-fuel-switch/.

[195] ERIK SHUSTER, NAT'L TECH. ENERGY LAB., NETL FOSSIL ENERGY "ISSUES NOTE" 6 (2007).

the same time, Arizona also rejected a permit for a coal-fired plant based on water issues.[196] In addition, in 2007, the Kansas State Assembly considered but ultimately voted down a moratorium on coal plants in the state.[197] One of the principle concerns was the effect that new plants would have on groundwater supplies.[198]

One possible objection to a moratorium would be that future increases in electricity demand can only be reliably met by fossil-fueled and nuclear base-load power plants. While this concern is a legitimate one, the next two sections show that the promotion of energy efficiency and renewable energies, demand-side management (DSM), and improved feedback to electricity customers could offset the need to build any new thermoelectric capacity.

E. *Promote Energy Efficiency and Renewable Electricity*

To offset the risks associated with placing a moratorium on future thermoelectric generators, electric utilities should rigorously implement energy efficiency and DSM programs. Such actions would not only address impending electricity-related water shortages, but would also improve energy security, lower electricity and water prices, and enhance reliability.[199] Evidence suggests that energy efficiency, DSM, and load management practices represent the most feasible way of responding to increases in electricity demand. Increasing energy efficiency, one study concluded, "is generally the largest, least expensive, most benign, most quickly deployable, least visible, least understood, and most neglected way to provide energy services."[200] As Jon Wellinghoff, the Commissioner of the FERC, put it, "these potential benefits from the incorporation of demand response into wholesale markets indicate that a considerable margin of gain is

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[196] *Id*.

[197] Scott Rothschild, *House Committee Rejects Moratorium on Coal Plants*, LJWORLD.COM (Feb. 2, 2007), http://www2.ljworld.com/news/2007/feb/02/house_committee_rejects_moratorium_coal_plants/.

[198] Scott Rothschild, *Coal Plant Moratorium Likely to Fail*, LJWORLD.COM, Jan. 29, 2007, http://www2.ljworld.com/news/2007/jan/29/coal_plant_moratorium_likely_fail/.

[199] *Demand Side Management,* INT'L ENERGY AGENCY, http://www.iea.org/techno/iaresults.asp?id_ia=8 (last visited Apr. 17, 2013).

[200] AMORY B. LOVINS, ROCKY MOUNTAIN INST., ENERGY END-USE EFFICIENCY 1 (2005).

possible from accelerating such activity."[201]

The DOE recently calculated the benefits of DSM and found that it lowers wholesale electricity prices as costly power plants are displaced and total demand on the system decreases.[202] Generating peak electricity is extremely expensive, often exceeding $5,000 to $10,000 per installed kW (meaning a 100 MW plant can cost $750 million to build and require seventy-five million dollars per year to operate); therefore, it is likely that DSM would be profitable for *all* utilities.[203]

In situations where energy efficiency and DSM programs are unable to completely offset the need to construct new generation capacity, utilities could rely on wind turbines and solar panels to produce electricity. These two technologies use almost no water to generate electricity and need only a very small amount for cleaning and maintenance.[204] Cost is not a barrier; the marginal levelized cost of building offshore and onshore wind turbines in 2008—that is, the cost of constructing, operating, maintaining, and fueling a new facility—was between 2.6 and 5.6 cents per kilowatt hour (¢/kWh), making them two of the six cheapest sources of power.[205] Solar photovoltaic panels (PV) are the most expensive at 39 ¢/kWh, but not far behind expensive natural gas peaking plants that cost between 32.5 and 35.6 ¢/kWh to operate.[206] Wind, in other words, is already cheap, and solar (which is getting cheaper) is nearing parity with natural gas peaking facilities. Costs of renewable energies have continued to decrease since 2009, increasing their economic feasibility.

F. *Change Electricity Prices and Improve Information Access*

A moratorium on thermoelectric generation, energy efficiency and DSM programs, and wind and solar PV deployment could be

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[201] Hon. Jon Wellinghoff & David L. Morenoff, *Recognizing the Importance of Demand Response: The Second Half of the Wholesale Electric Market Equation*, 28 ENERGY L.J. 389, 396 (2007).

[202] BENJAMIN K. SOVACOOL, THE DIRTY ENERGY DILEMMA: WHAT'S BLOCKING CLEAN POWER IN THE UNITED STATES 80 (2008).

[203] U.S. DEP'T OF ENERGY, BENEFITS OF DEMAND RESPONSE IN ELECTRICITY MARKETS AND RECOMMENDATIONS FOR ACHIEVING THEM 74 (2006).

[204] Sovacool & Sovacool, *supra* note 1, at 2771.

[205] Benjamin K. Sovacool, *Renewable Energy: Economically Sound, Politically Difficult*, 21 ELEC. J. 24 (2008).

[206] *Id.*

supplemented by utility efforts to alter electricity prices and provide better feedback and information to electricity customers. Though they would need to be properly incentivized, three changes would be most significant: more accurate electricity pricing, altered electricity billing practices, and a utility-wide information program to educate consumers.

Consumers are generally unaware of daily, weekly, and seasonal changes in electricity prices, and instead see only a monthly electricity bill. Therefore, many consumers presumably consume electricty without consideration of fluctuating prices. Utility programs that reflect time-of-use through "real-time," "interval metering," "time-of-use," or "seasonal" rates could show customers how electricity production and consumption varies according to the time of day, week, and month. Most electricity bills combine charges into a lump sum, making it difficult for consumers to tell how much of the bill results from the individual use of appliances or technologies, how much the bill could be decreased by using more efficient models, or how much electricity use can be shifted to off-peak hours.[207]

Because most people remain uninformed about the electricity-water nexus, a second form of feedback could be useful: making water usage associated with electricity generation "visible" by including it in people's electricity bills. California, for example, was the first state in the country to enact an Advance Recovery Fee on sales of some electronics.[208] Whenever customers purchase new cell phones and televisions, a visible fee between six and ten dollars appears separately on receipts, showing consumers how much it will cost to collect and recycle some of the toxic elements inside their products.[209] The same technique could be used in electricity billing by showing consumers a separate line estimating the number of gallons of water used (and/or its associated cost) to

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[207] William Kempton & Linda L. Layne, *The Consumer's Energy Analysis Environment*, 22 ENERGY POL'Y 857–66 (1994), *available at* http://homepages.rpi.edu/~laynel/pdf/articles/The_consumers_energy_analysis_environment.pdf.

[208] *Electronic Waste: Can the Nation Manage Modern Refuse in the Digital Age?: Hearing Before the H. Comm. on Sci. and Tech.*, 110th Cong. (2008), *available at* http://www.gpo.gov/fdsys/pkg/CRPT-110hrpt935/html/CRPT-110hrpt935.htm.

[209] Noah Sachs, *Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States*, 30 HARV. ENVTL. L. REV. 51, 62 (2006).

produce the electricity they used within their home that day, week, or month.

Finally, utilities could be motivated—paid, or forced by regulation—to offer consumers education. The National Environmental Education & Training Foundation has estimated that 88 percent of Americans would fail even a "basic" electricity-literacy test.[210] Another recent study in Kentucky found that 41 percent of respondents identified coal, steel, and oil as "renewable resources."[211] Since they remain uninformed and misinformed about electricity, many consumers do not understand the scope and scale of the electricity industry's water needs. Utilities could fund and promote electricity information and education campaigns to teach the public about electricity and water use. These could include grade-school classes on energy and the environment; public demonstrations and tours of renewable power facilities; free energy audits and training sessions for industrial, commercial, and residential electricity customers; and utility sponsored document "clearing houses" that offer websites, free books, and articles to help consumers gather and process information in order to make more informed choices about their electricity use.

CONCLUSION

Of the commodities necessary for continued economic stability, water and electricity are two of the most vital. Yet existing global reliance on thermoelectric power generation could contribute to potentially massive shortages of water in China, France, India, and the United States (and possibly everywhere else). The energy sector, predominantly electricity generation, already accounts for roughly 15 percent of water withdrawals globally.[212] Thankfully, we have shown that the technology and policy tools needed to lower the water intensity of electricity

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[210] KEVIN COYLE, THE NAT'L ENVTL. EDUC. & TRAINING FOUNDATION, ENVIRONMENTAL LITERACY IN AMERICA viii (2005), *available at* http://www.neefusa.org/pdf/ELR2005.pdf; THE NAT'L ENVTL. EDUC. & TRAINING FOUNDATION & ROPER ASW, AMERICANS' LOW "ENERGY IQ:" A RISK TO OUR ENERGY FUTURE, at ii (2002), *available at* http://www.neefusa.org/pdf/roper/Roper2002.pdf.

[211] KENTUCKY ENVTL. EDUC. COUNCIL, THE 2004 SURVEY OF KENTUCKIANS' ENVIRONMENTAL KNOWLEDGE, ATTITUDES AND BEHAVIORS (2005), *available at* http://cfpub.epa.gov/npstbx/files/2004KYfinalenvsurvey.pdf.

[212] INTERNATIONAL ENERGY AGENCY, *supra* note 5, at 501.

generation are widely available and include clean power technologies in the form of energy efficiency, wind farms, and solar PV panels, as well as alternate cooling technologies, combined cycle natural gas power plants, and some shrewd changes in pricing and policy. With this in mind, we advance three key conclusions.

First, the electricity-water nexus makes "business as usual" completely nonviable. Combined trends in population growth, increasing electricity consumption, and increasing water usage indicate that we cannot, and should not, continue to generate electricity the way we do today. Because water is an essential part of the cooling process for thermoelectric power plants, such sources of electricity supply may become wholly unsuitable as the globe enters a new era of accelerated water stress and water scarcity.

Second, including consideration of water availability in electricity planning fundamentally "changes the game" of how we make future projections about power plants and capacity additions. Accounting for water constraints in electricity planning will become a critical component of maintaining system reliability. Location-specific assessment of water resources can thus help guide new generation and decrease electricity-water nexus vulnerabilities.

Third, our study is yet another reason, on top of climate change and energy security, to promote energy efficiency, wind turbines, and solar panels. As we have shown, the electricity generation technologies that are beneficial for reducing greenhouse gas emissions correspond with those that require less water to operate, providing crucial benefits on both ends of the scale: reducing the inputs that contribute to the severity of climate change, avoiding additional stresses on water resources (so-called "mitigation"), and minimizing water use as climate change inevitably stresses water resources (so-called "adaptation"). Policies that promote renewables and efficiency thus provide multiple benefits beyond technical reliability and economic cost.

FROM BROKEN PROMISES TO SUSTAINABLE FORESTRY: REGULATION OF PRIVATE FORESTS IN LIBERIA

AKIVA FISHMAN*

Liberia is again facing a forest governance crisis, just a decade after the conclusion of its civil war made infamous in part by the role of blood timber in funding and arming Charles Taylor's murderous forces. Nearly one quarter of Liberia's landmass has been leased to private logging interests in a manner that does not legally oblige them to comply with most of the robust environmental and social protections enshrined in Liberia's reformed forestry regime. The President convened an inter-agency panel in August of 2012 to draft a regulation that would address this gap, but a text has yet to be brought before decision-makers. The regulation will have to ensure sustainable management of forest resources, while fitting into Liberia's broader forestry legal infrastructure, and paying careful mind to the post-conflict context and its effects on financial and human resource capacity. This paper analyzes Liberian forestry law and compares it with Brazil's forestry legal regime in order to distill regulatory approaches in line with these objectives that could be incorporated into the new regulation.

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* Masters of Forestry, anticipated 2015, Yale School of Forestry & Environmental Studies; Juris Doctor, anticipated 2016, New York University School of Law. The author spent the summer of 2012 working for the Liberian Environmental Protection Agency, and joined a few colleagues following the summer to draft a PUP regulation. The research and analysis in this paper emerged from the drafting exercise, and was completed in the spring of 2013. The Liberian forestry sector has continued to evolve since then, but there remained no regulation addressing PUPs at the time that this paper was published. The author wishes to thank Professor Bryce Rudyk for his comments and suggestions throughout the development of this article, and the members of the *New York University Environmental Law Journal* who provided editorial assistance.

INTRODUCTION

Liberia's forest sector experienced a dramatic overhaul in the aftermath of the country's bloody civil war from 1989–2003. A series of legal reforms passed in 2006 and 2007 injected transparency and accountability into the concession process, disrupting a system in which forests controlled by foreign interests and armed groups had provided a source of revenue to finance the war effort. The new legal infrastructure that President Johnson

Sirleaf's post-conflict administration erected, complete with provisions guaranteeing benefit sharing and public participation in decision-making around forests, garnered praise as Africa's most progressive forest management regime.[1]

However, the National Forest Reform Law (NFRL) and its accompanying regulations left a gap that now threatens to undermine the advances made in the forest sector. The NFRL defines three types of licenses that authorize commercial timber harvest. The two that apply to government-held land are governed by a robust suite of rules detailed in the NFRL itself and in the regulations. In contrast, the license that applies to private land, termed the "Private Use Permit" (PUP), is governed by only skeletal provisions in the NFRL, which defer elaboration to a future regulation.[2] The regulations that flesh out the rules for the other license types do not, for the most part, apply to PUPs, and no dedicated implementing regulation for PUPs has yet been drafted.

The Board of Directors that oversees the Forest Development Authority (FDA)—the agency responsible for managing and developing Liberia's forest resources—recently acknowledged, albeit timidly, that "the limitation of the existing regulations seems to provide a loophole that can be exploited."[3] This loophole posed little trouble for the first few years of the reformed forestry regime because no PUPs were issued until 2009, and these initial permits covered only a small area of land. Beginning in 2010, however,

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[1] Stephanie L. Altman et al., *Leveraging High-Value Natural Resources to Restore the Rule of Law: The Role of the Liberia Forest Initiative in Liberia's Transition to Stability*, *in* HIGH-VALUE NATURAL RESOURCES AND POST-CONFLICT PEACEBUILDING 337, 348 *Päivi Lujala & Siri Aas Rustad eds., 2012) (citing T. Pichet, manager of the *Société Générale de Surveillance*). The U.N. Panel of Experts on Liberia summarizes the sense of the international community that Liberian forest law is "a model for sound and equitable post-conflict resource management." U.N. Chairman of the S.C., *Final Report of the Panel of Experts on Liberia submitted pursuant to paragraph 6(f) of the Security Council resolution 1961*, ¶ 169, U.N. Doc. S/2011/757 (Dec. 7, 2011), *available at* http://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/Liberia%20S2011%20757.pdf.

[2] An Act Adopting the National Forestry Reform Law § 5.2 (a)(iii) (2006) (Liber.) [hereinafter NFRL].

[3] U.N. Chair of the S.C., *Final Report of the Panel of Experts on Liberia submitted pursuant to paragraph 5(f) of Security Council resolution 2025*, ¶ 114, U.N. Doc. S/2012/901 (Dec. 4, 2012) [hereinafter UNSC] (citing correspondence from the FDA Board, dated Feb. 28, 2012), *available at* http://www.sipri.org/databases/embargoes/un_arms_embargoes/liberia/panel-of-experts-report-on-liberia.pdf.

PUP issuance exploded. At present, "over 40 percent of Liberia's forests, including 46 percent of the country's intact rainforest" falls under PUPs,[4] representing about one quarter of Liberia's total land area.[5] 89 percent of the acreage licensed in this way was licensed in 2011 alone,[6] including a veritable licensing spree on October 6 when licenses were granted for nearly half of the entire area that has to date been authorized for commercial logging under PUPs.[7] Vast swaths of the country are now controlled by foreign companies that have come to dominate timber exports,[8] and which remain "largely unregulated," according to a 2011 U.N. report.[9] Moreover, there have been suggestions that PUPs are enabling groups with interests not directly connected with timber to engage in illegal activity beyond public scrutiny. For example, owners of oil palm plantations may be negotiating PUPs as a means to sidestep their international obligations to refrain from destroying primary forest under the Roundtable on Sustainable Palm Oil in order to plant oil palm trees.[10] Moreover, some areas covered by PUPs overlap with Liberian territories from which armed groups

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[4] GLOBAL WITNESS, SAVE MY FUTURE FOUNDATION & SUSTAINABLE DEVELOPMENT INSTITUTE, SIGNING THEIR LIVES AWAY: LIBERIA'S PRIVATE USE PERMITS AND THE DESTRUCTION OF COMMUNITY-OWNED RAINFOREST 2 (2012) [hereinafter SIGNING THEIR LIVES AWAY], *available at* www.globalwitness.org/sites/default/files/library/Signing%20their%20Lives%20away%20%20Liberian%20Private%20Use%20Permits%20%204%20Sept%202012%20U_0.pdf.

[5] PAUL DE WIT, LAND RIGHTS, PRIVATE USE PERMITS AND FOREST COMMUNITIES 4 (2012), *available at* http://eeas.europa.eu/delegations/liberia/documents/press_corner/20130916_01.pdf (prepared for the Land Commission of Liberia).

[6] UNSC, *supra* note 3, ¶ 108.

[7] *Id.* ¶ 123.

[8] *Id.* ¶ 125 ("According to the Société Générale de Surveillance (SGS), the company contracted to monitor Liberia's timber chain of custody, 64% of all logs exported between January and October 2012 came from land covered by private use permits."); *id.* ¶¶ 139–48 (describing the holdings and ownership of the three companies that have secured rights to the bulk of the land covered under PUPs).

[9] *Id.* ¶ 107. One Malaysian company alone—Samling Global Limited—has ties possibly amounting to control over logging companies that together control about 15 percent of Liberia's land area. *Id.* ¶¶ 139–45. Samling has been accused of illegal logging in Malaysia, Papua New Guinea, Cambodia, and Guyana. SIGNING THEIR LIVES AWAY, *supra* note 4, at 4.

[10] MINHWAN AN ET AL., COLUMBIA UNIV. CTR. FOR INT'L CONFLICT RESOLUTION, CHOPPING PROGRESS: AN ASSESSMENT OF LIBERIA'S FORESTRY SECTOR AND ITS IMPACT ON STATE-BUILDING 86–87 (2013), *available at* http://www.cicr-columbia.org/wp-content/uploads/2012/10/CICR_Chopping-Progress.pdf.

have staged attacks into neighboring Cote d'Ivoire.[11]

The President initiated a process in August 2012 to draft a PUP regulation that would fill the governance vacuum in the area of private forested land. This Article seeks to inform the drafting process through two analytical steps. First, it scrutinizes the existing laws and regulations that comprise the legal framework governing Liberia's forest sector in order to define the limits of the PUP regulation and to identify issues it will need to address. Second, it examines analogous Brazilian law and the degree to which it has been effective at promoting sustainable forestry, in the hope of distilling useful approaches that the PUP regulation might apply.

The Article proceeds as follows. Section I briefly describes the political context in which the PUP controversy has developed and which provides the background out of which the new regulation will emerge. Section II analyzes the portions of the NFRL and accompanying FDA regulations that set out elements that the PUP regulation will have to include, as well as parameters that it may not exceed. These provisions leave a great deal of ambiguity and certain outright gaps that the new regulation will have to address. Section III presents the elements of Brazil's Forest Code and other relevant laws that govern private forested land in that country. Section IV analyzes the regulatory regime that Brazil's laws establish and discusses whether this regime is conducive to environmental sustainability. It then examines the scholarly and practitioner literatures that speak to the effectiveness of Brazilian law in achieving this goal. Section V takes stock of the lessons from the analysis of Liberia's forest regulatory regime and from the discussion of the Brazilian experience, and provides specific policy recommendations for drafting the PUP regulation in ways that should promote both compliance and the regulation's likelihood of achieving sustainable forestry. The Article concludes by considering the relevance of this analysis for other countries.

I. POLITICAL CONTEXT

The Liberian civil war was perhaps initially infamous for its brutality and use of child soldiers, but it also came to earn notoriety for its association with conflict resources. Recognizing the importance of diamond revenues to President Charles Taylor's

[11] UNSC, *supra* note 3, ¶ 109.

war efforts, the U.N. Security Council imposed a ban in 2001 on imports of Liberian rough diamonds.[12] In response, Taylor turned his efforts to building the forest sector, ostensibly to fund development projects.[13] Liberian NGOs understood that this was merely a subterfuge and drew attention to the role that timber proceeds had assumed in replacing lost revenues from diamonds.[14] The Security Council reacted in 2003 by banning imports of Liberian round logs and timber products, citing illegitimate uses of revenues from the timber industry.[15]

By the war's end in 2003, the forest sector was in disarray. A review of wartime forest concessions revealed that they covered more than double the area of existing forestland and that not a single company that had been harvesting timber met all the legal conditions to operate in Liberia.[16] Moreover, many laws had been violated and logging companies owed the government $64 million in taxes[17]—a sum equal to 15 percent of Liberia's GDP.[18]

Upon taking office in 2006, President Ellen Johnson Sirleaf acted quickly to restore order in the forest sector. Her first executive order canceled all timber concessions and froze timber exports and the granting of new concessions until the relevant laws could be reformed.[19] Later that same year, the legislature passed

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[12] S.C. Res. 1343, U.N. Doc. S/RES/1343 (Mar. 7, 2001), *available at* http://www.sipri.org/databases/embargoes/un_arms_embargoes/liberia/UNSC_res1343.

[13] Altman et al., *supra* note 1, at 341. By the late 1990s, forest products were already important to the economy, accounting for 20 percent of GDP. FORESTRY DEV. AUTH., REPUBLIC OF LIBER., NATIONAL FORESTRY POLICY AND IMPLEMENTATION STRATEGY § 1.1 (2006), *available at* http://www.fao.org/forestry/16167-0dd77b0af6b1e94481d519ab979fd40db.pdf. They were responsible for 60 percent of export revenues in 2002, and the forest sector provided a significant source of employment. *Id*.

[14] Altman et al., *supra* note 1, at 341.

[15] S.C. Res. 1478, ¶ 17(a), U.N. Doc. S/RES/1478 (May 6, 2003), *available at* http://www.sipri.org/databases/embargoes/un_arms_embargoes/liberia/UNSC_res1478.

[16] JOHN WOODS ET AL., FOREST TRENDS, INVESTMENT IN THE LIBERIAN FOREST SECTOR: A ROADMAP TO LEGAL FOREST OPERATIONS IN LIBERIA 2 (2008), *available at* http://forest-trends.org/documents/files/doc_1320.pdf.

[17] *Id*.

[18] *GDP (Current US$)*, WORLD BANK, http://data.worldbank.org/indicator/NY.GDP.MKTP.CD?page=2 (last visited Jan. 21, 2013).

[19] OFFICE OF THE PRESIDENT, REPUBLIC OF LIBERIA, EXEC. ORDER NO. 1, GOL FOREST SECTOR REFORM ¶¶ 2, 4 (Feb. 2, 2006), *available at* http://www.emansion.gov.lr/doc/EXECUTIVE%20ORDER%20_%201%20-%2

the NFRL,[20] and the following year the FDA promulgated regulations governing the issuance of new forest resource licenses.[21] These new legal instruments, which laid the foundation for the current forest management regime, embrace principles of public participation,[22] transparency,[23] benefit sharing,[24] and environmental sustainability.[25] Satisfied that the executive order and legal reforms reflected Liberia's "commitment to transparent management of the country's forestry resources for the benefit of all Liberians," the Security Council lifted timber sanctions.[26]

The earliest official recognition (to the author's knowledge) that something might be amiss in the post-reform forest sector was a recommendation in 2011 by the Land Commission that a moratorium be placed on issuance of any new concessions.[27] Several other statements by governmental and civil society organizations added to a growing perception that there was a problem, but this failed to bring about a change in PUP administration (see Figure 1). The clearest indication that the government appreciated the need to act was an order by the FDA Board of Directors in February 2012 prohibiting issuance of new PUPs in acknowledgment of the questionable legal grounds on which PUPs had been issued. The NFRL does not expressly authorize the Board to dictate whether the FDA may issue permits. However, provisions that require Board approval before the FDA may promulgate a National Forest Policy or National Forest

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[20] NFRL § 5.2 (a)(iii) (2006) (Liber.).

[21] FORESTRY DEV. AUTH., REPUBLIC OF LIBER., TEN CORE REGULATIONS (2007).

[22] *See, e.g.*, *id*. Reg. No. 104-07 § 22 (requiring consultation with affected communities prior to issuance of concessions).

[23] *See, e.g.*, NFRL § 5.8 (2006) (Liber.) (requiring concession holders to publish identifying and financial information regarding their concessions).

[24] *See, e.g.*, *id*. § 5.3(b)(vi) (requiring concession holders to enter into "a social agreement with local forest-dependent communities").

[25] *See, e.g.*, *id*. § 3.1(a) (ordering the FDA to "exercise its powers under [the NFRL] to assure sustainable management of the Republic's Forest Land, Conservation of the Republic's Forest Resources, protection of the Republic's Environment, and sustainable development of the Republic's economy").

[26] S.C. Res. 1689, U.N. Doc. S/RES/1689 (June 20, 2006), *available at* http://www.peacewomen.org/assets/file/SecurityCouncilMonitor/Resolution/Liberia/unmil_res1689_2006.pdf.

[27] Draft Memorandum from Sandra Nichols 8 (June 14, 2012) (on file with author) (regarding legality of PUPs).

Management Strategy,[28] and that authorize the Board to issue resolutions,[29] raise a question regarding the exact level of control the Board was intended to exert. Lawfully or not, the FDA ignored the moratorium and continued to issue new PUPs.

The immediate precursor to the current effort to draft a PUP regulation was a letter, sent to President Johnson Sirleaf on August 3, 2012 by international watchdog Global Witness and local NGOs Save My Future Foundation and the Sustainable Development Institute, detailing the problems associated with the PUP regime.[30] Three days later, the President renewed the FDA Board's moratorium, and on August 7, a meeting was convened to initiate the process of drafting a PUP regulation.[31]

The NFRL grants the FDA broad authority to issue regulations concerning "any measure that needs to be efficiently regulated under this Law,"[32] as well as specific authority to regulate "the allocation, monitoring, enjoyment, transfer, or termination of . . . Private Use Permits."[33] Any proposed regulation must be published at least sixty days before its effective date to provide an opportunity for public comment.[34] The Managing Director of the FDA must then collect and summarize the comments and refer them, along with the proposed regulation, to the Board of Directors no later than fourteen days before the effective date; the Board's role is to offer comments and advice, but its approval is not required.[35]

In a procedure not specified in the NFRL, the initial drafting of the PUP regulation is being overseen by a committee comprised of representatives of government (including but not limited to FDA staff) and civil society. The committee tasked an attorney from the Liberian Ministry of Justice to initiate drafting, and the attorney worked with a policy advisor at Global Witness and the author of this Article to draw up a first draft. Meanwhile, the

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[28] NFRL § 4.1(b) (2006) (Liber.).

[29] *Id*. § 18.15(a).

[30] Letter from Global Witness, Save My Future Foundation, & Sustainable Development Institute, to President Johnson Sirleaf (Aug. 3, 2012) (on file with author).

[31] Memorandum from Sandra Nichols (Aug. 27, 2012) (on file with author).

[32] NFRL § 19.1(a) (2006) (Liber.).

[33] *Id*. § 19.1(c).

[34] *Id*. § 19.2(a).

[35] *Id*.

committee hired a Liberian attorney to review and contribute to the draft. At the time of writing, the committee is planning a consultation process to solicit feedback on the draft regulation and build national support.

Figure 1: Timeline of Events Surrounding PUP Controversy

2009	First few PUPs are issued.[36]
2011	Land Commission recommends moratorium on issuance of any new concession.[37]
Jan. 12, 2012	NGO Coalition for Liberia sends letter to FDA Director expressing concerns regarding PUPs.[38]
Jan. 18, 2012	FDA angrily denies allegations in NGO Coalition for Liberia letter.[39]
Unknown	President directs FDA Board to investigate concerns raised by NGO Coalition for Liberia.[40]
Feb. 18, 2012	FDA Board concludes that FDA had not violated forest laws, but nonetheless takes the following actions: (a) places moratorium on issuance of PUPs; (b) calls for recall of all PUPs except the four with operations already underway; (c) calls for a PUP regulation; (d) calls for renegotiation of all other PUPs to comply with the regulation.[41]
June 13, 2012	Land Commission renews its call for moratorium on issuance of any new concessions.[42]
July 2012	FDA Board decides PUP regulation should be written.[43]

[36] Draft Memorandum from Sandra Nichols, *supra* note 27, at 7.

[37] *Id*. at 8.

[38] Letter from NGO Coal. for Liber., to Moses Wogbeh, Managing Dir., Forestry Dev. Auth., Republic of Liber. (Jan. 12, 2012) (on file with author).

[39] Letter from Forestry Dev. Auth., Republic of Liber., to Kula Jackson, Facilitator, NGO Coal. for Liber. (Jan. 18, 2012) (on file with author).

[40] The President's directive took place either in January or February; the author was unable to ascertain a more precise date. Draft Management Letter from Gen. Auditing Comm'n, Republic of Liber. (Aug. 2012) (on file with author) (regarding FDA PUPs for the Period January 2006 to July 2012).

[41] FORESTRY DEV. AUTH., REPUBLIC OF LIBER., REPORT OF THE BOARD OF DIRECTORS ON THE INQUIRY REGARDING THE ISSUANCE OF PRIVATE USE PERMITS (PUPS) (2012) (on file with author).

[42] Draft Memorandum from Sandra Nichols, *supra* note 27, at 8.

[43] Memorandum from Sandra Nichols, *supra* note 31, at 4.

Aug. 3, 2012	Global Witness, Save My Future Foundation, and Sustainable Development Institute send letter raising concerns regarding PUPs to President.[44]
Aug. 6, 2012	President renews FDA Board moratorium.[45] Within the same month, she establishes Special Independent Investigating Body to investigate allegations of illegality in PUP administration.[46]
Aug. 7, 2012	Public consultation meeting initiates PUP regulation drafting process.[47]
Aug. 8, 2012	Liberian Timber Association files protest to President's moratorium renewal with Senate.[48]
Aug. 23, 2012	Senate declares moratorium should be lifted (with unclear legal effect).[49]
Sept. 4, 2012	Liberian Timber Association sues FDA, arguing the moratorium is illegal.[50]
Oct. 23, 2012	Supreme Court upholds legality of moratorium.[51]
Nov. 8, 2012	President announces it likely that logging contracts under PUPs will be revised or renegotiated.[52]
Jan. 4, 2013	Executive Order No. 44 restates moratorium and ban on logging under PUPs.[53]
Sept. 2013	FDA Managing Director reports that 17 PUPs will

[44] Letter from Global Witness to President Johnson Sirleaf, *supra* note 30.

[45] SIGNING THEIR LIVES AWAY, *supra* note 4, at 2.

[46] SPECIAL INDEP. INVESTIGATING BODY, REPORT ON THE ISSUANCE OF PRIVATE USE PERMITS (PUPS) vii (2012), *available at* http://www.cental.org/SIIB%20Report%20on%20PUPs.pdf.

[47] Memorandum from Sandra Nichols, *supra* note 31.

[48] SIGNING THEIR LIVES AWAY, *supra* note 4, at 3.

[49] *Id*.

[50] UNSC, *supra* note 3, ¶ 153.

[51] *Id*.

[52] *Liberia Likely to Revise Logging Contracts over Graft: President*, REUTERS (Nov. 8, 2012), http://www.reuters.com/article/2012/11/08/ozatp-liberia-resources-idAFJOE8A702M20121108.

[53] OFFICE OF THE PRESIDENT, REPUBLIC OF LIBERIA, EXEC. ORDER NO. 44, PROTECTING LIBERIAN FORESTS BY A TEMPORARY MORATORIUM ON PRIVATE USE PERMITS (Jan. 4, 2013), *available at* http://emansion.gov.lr/doc/Executive%20Order%20_44%20-%20Moratorium%20on%20Private%20Use%20Permits.pdf.

	be reviewed and that "more will come."[54]
Dec. 23, 2013	29 PUPs are reported to have been revoked, with cancellation of remaining 34 in process.[55]

A question that often confronts reform efforts in developing countries is whether political will can be sustained throughout the reform process and into the enforcement phase. There is reason to be optimistic that in the case of the PUP regulation there is enough high-level political will to carry the regulation through. Global Witness continues to monitor developments in Liberia's forest sector, and African, British, and international news outlets have been reporting on the unfolding drama around PUPs. Despite open hostility to logging restrictions in the Senate and powerful corporate interests that favor the status quo, the President has consistently shown support for PUP administration reform, ordering that allegations of maladministration be investigated and several times issuing or reiterating a moratorium on new PUPs and on logging under existing permits (see Figure 1). This support is complemented, and perhaps in part motivated, by international pressure to improve governance of the forest sector. Sanctions on Liberian timber were only lifted on the condition that Liberia implement the legal reforms designed with the help of the international community,[56] and a Panel of Experts continues to monitor developments in the forest sector and to make reports to the Security Council. In addition, Liberia recently finished negotiating a Voluntary Partnership Agreement that commits it to certifying the legal origin of all timber exported to the European Union.[57] This mix of carrots and sticks in the context of international scrutiny provides ample incentive for serious government action to control illegal logging, in order to avoid

[54] *Liberia Takes Steps to Revoke Logging Permits that Claimed 40 Percent of Country's Forests*, FOX NEWS (Sept. 17, 2013), http://www.foxnews.com/world/2013/09/17/liberia-takes-steps-to-revoke-logging-permits-that-claimed-40-percent-country/.

[55] David Blair, *Saved: Liberia's Rainforests Win Reprieve from Logging*, TELEGRAPH (Dec. 23, 2013), http://www.telegraph.co.uk/news/worldnews/africaandindianocean/liberia/10535265/Saved-Liberias-rainforests-win-reprieve-from-logging.html.

[56] S.C. Res. 1689, *supra* note 26.

[57] Press Release, European Comm'n, Fight Against Illegal Logging: The European Union and Liberia Team Up To Ensure Legal Origin of Imported Wood Products to the EU (May 9, 2011), *available at* http://europa.eu/rapid/press-release_IP-11-548_en.htm?locale=en.

jeopardizing the viability of Liberia's timber export industry or angering important contributors of foreign aid.

II. ANALYSIS OF LIBERIAN LAWS AND REGULATIONS

Liberia's modern forestry legal regime owes its structure and some of its substance to the NFRL. It derives the remainder of its substance from the FDA's ten core regulations and the Community Rights Law (CRL).[58]

The NFRL establishes four types of forestry licenses: Forest Management Contracts (FMCs), Timber Sale Contracts (TSCs), Forest Use Permits (FUPs), and, as discussed, PUPs.[59] The CRL establishes a fifth license type—Community Forest Contracts (CFCs).[60] These licenses are issued for forestry activities occurring on different types of land: FMCs and TSCs are issued on public land,[61] CFCs cover community land,[62] and PUPs apply to private land. FUPs, which authorize non-logging commercial activities in forests rather than facilitating commercial logging as do the other license types,[63] may be granted on either public or private land.[64]

The government's authority to issue PUPs and regulate forestry activities on private land is predicated on the forest ownership provision of the NFRL, which declares that the Government of Liberia holds all forest resources in trust for the

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[58] An Act To Establish Community Rights Law of 2008 with Respect to Forest Lands (2009) (Liber.) [hereinafter CRL].

[59] NFRL § 1.3 (2006) (Liber.) ("Forest Resources License").

[60] CRL § 1.3 (2009) (Liber.). Although the term "Community Forest Contract" is used in the definitions section, the provision that describes how these licenses operate refers to the license as a "commercial use contract." *Id*. The author assumes that the two terms are equivalent.

[61] This is not stated explicitly in the NFRL, but it is evident from the prohibitions in §§ 5.3(b)(ii) and 5.4(b)(ii) against the issuance of these permits for activities on private land and from the exclusive treatment of community land in the CRL. *See* NFRL §§ 5.3(b)(ii), 5.4(b)(ii) (2006) (Liber.); *see generally* CRL (2009) (Liber.).

[62] The analysis in this section will not focus on CFCs. The CFC provisions largely ensure that decisions about community-owned forest resources are made in an inclusive fashion. Such safeguards are not relevant for our purposes because PUPs are not designed to govern communal land.

[63] NFRL § 5.5(c) (2006) (Liber.). Non-logging commercial uses include charcoal production, tourism, research and education, wildlife related activities, limited timber harvest for local use, and harvest of non-timber forest products. *Id*.

[64] *Id*. § 5.5(h) (prohibiting harvest of forest resources on private land under a FUP unless the landowner has granted permission).

benefit of the people.[65] The only exceptions to this default position are: "(1) Forest Resources located in Communal Forests; and (2) Forest Resources that have been developed on private or deeded land through artificial regeneration."[66] Thus, private land ownership does not extend to the naturally occurring trees on the land.[67] Trees cannot be owned unless they are owned by communities (in which case they are governed by the CRL) or they are artificially planted. One commentator notes that the post-conflict context necessitated government ownership of trees; rather than allow the land ownership complexities that emerged from the war to forestall development, this provision enabled economic growth to proceed without first resolving ownership questions.[68]

A. *Rules That Apply Across Forest License Types*

Certain provisions of the NFRL apply across the board to the four license types it describes. For example, all parties who commercially harvest forest products must follow international timber standards and "carry out extraction activities in such a manner as to ensure sustainable development of the Forest Resource base."[69] Specifically, operators must not waste forest resources, cause damage to other natural resources, destroy long-term forest productivity, or cause any other significant harm to the forest environment unless certain requirements are met.[70] For example, the FDA must require license holders to identify and protect wetlands and areas with fragile soils within the license

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[65] *Id*. § 2.1.

[66] *Id*. *See also id*. § 11.3 (lending support to the ownership provision by denying the right of private landowners to bar a use of forest resources on their land that the government has granted).

[67] One might wonder whether the forest ownership provision amounts to an illegal governmental taking. This question is not considered in depth because the point is probably moot. Although the Supreme Court could strike down the provision in the future, the provision has not been challenged in the six years since the NFRL was enacted. The provision is so prominent and the logging companies that would stand to benefit from its repeal so relatively powerful that it is likely a lawsuit would have been brought by now if there were a strong case against its constitutionality. Moreover, the circumstances of the law's passage strongly suggest that it will not be repealed. Liberia is unlikely to jeopardize the international goodwill on which it so heavily relies by striking down the very forestry regime to which the UN cited in deciding to lift trade sanctions.

[68] Draft Memorandum from Sandra Nichols, *supra* note 27, at 2.

[69] NFRL § 18.10 (2006) (Liber.).

[70] *Id*. § 8.1(d).

area.[71] The FDA must further conduct an annual audit of all forestry permits to ensure compliance with legal, regulatory, and permit requirements,[72] and must require all license holders to pay performance bonds to "assure performance of work, . . . payment of fees, redress of injuries, compensation of employees, reclamation of land, and return of property."[73]

Similarly, certain provisions of the FDA core regulations apply to all forest resource license types. Harvested timber must be entered into a chain of custody system and must comply with a suite of rules governing timber identification and transport.[74] All parties operating under forest licenses must pay specified fees,[75] and any party that has not fully paid particular fees may not fell trees, process timber, or trade or export forest products.[76] Exporting forest products in violation of this rule may result in suspension or termination of one's license.[77]

Although sparse in their requirements, the generally applicable NFRL and core regulation provisions together accomplish two things. First, they set certain minimum substantive requirements for treatment of any forest resources, providing some flesh to the NFRL's general goals of "sustainable management of the Republic's Forest Land, Conservation of the Republic's Forest Resources, protection of the Republic's Environment, and sustainable development of the Republic's economy."[78] Second, they create a governance structure premised on provision of information and fees to central regulatory bodies with responsibility for monitoring compliance with the substantive provisions. This system is fairly rigid; certain standards must be met, and certain processes must be followed to achieve those standards.

B. *Rules That Apply Specifically to PUPs*

Sections 5.6 and 5.7 of the NFRL add rules specific to PUPs

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71 *Id*. § 8.3(b).

72 *Id*. § 3.4(a). The contents of the audit report are described in § 3.4(b).

73 *Id*. § 5.1(e).

74 *See generally* FORESTRY DEV. AUTH., REPUBLIC OF LIBER., TEN CORE REGULATIONS (2007) Reg. No. 108-07.

75 *Id*. Reg. No. 107-07 § 2.

76 *Id*. Reg. No. 107-07 §§ 64(a)–(b).

77 *Id*. Reg. No. 107-07 § 64(d).

78 NFRL § 3.1(a) (2006) (Liber.).

that expand upon the broadly applicable procedural requirements above and give some shape to the PUP regime. These may be divided into requirements governing harvester eligibility, land eligibility, and operations, as well as rules regarding fees.

1. *Harvester Eligibility*

The parties eligible to commercially harvest forest resources on private land are restricted to landowners themselves and to those with written permission from landowners.[79] In addition, applicants for PUPs are categorically disqualified if they meet any of the criteria expressly listed in the basic qualifications section of the NFRL.[80] Discussed further below, these criteria include being underage, improperly registered to do business in Liberia, or in a position that might create a conflict of interest.[81]

Prior to commencing harvesting activities, qualified eligible parties must obtain both an Annual Harvesting Certificate and a PUP from the FDA.[82] The FDA will grant the former when an applicant has developed an annual operations plan that meets FDA approval.[83] To obtain a PUP, an applicant must develop a business plan and demonstrate technical and financial capacity to sustainably manage the forest area in question, prepare a five-year management plan, comply with any requirements imposed by an environmental impact assessment, and enter into a written social agreement that defines benefits and access rights for local forest-dependent communities.[84]

2. *Land Eligibility*

In order for land to be eligible for issuance under a PUP, it need only have been previously classified under the National Forest Management Strategy and validated as appropriate for commercial activity.[85]

3. *Operations*

Only two restrictions are placed on how activities may be

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79 *Id*. § 5.6 (c)(i).
80 *Id*. § 5.6 (d)(iii).
81 *Id*. § 5.2(b).
82 *Id*. §§ 5.6 (c)(ii)–(iii).
83 *Id*. § 5.6 (f).
84 *Id*. §§ 5.6 (d)(iv)–(vi).
85 *Id*. § 5.6 (d)(ii).

conducted under a PUP (in addition to those that apply to all forest resource license types). First, a PUP should be granted only for the period of time "necessary to carry out the activities described in the management plan, and in no case longer than the expected rotation age of the forest."[86] Second, activities under the PUP must comply with the Forest Management Guidelines and the Code of Forest Harvesting Practices, as well as the annual operations plan and land management plan that were submitted to obtain the Annual Harvesting Certificate and PUP, respectively.[87]

4. *Fees*

Section 14 of the NFRL and FDA Regulation No. 107-07 set out the fees that are levied on the forest sector. These include stumpage fees associated with the harvest of forest resources, land rental fees associated with the use of forest land, and forest product fees associated with the production, transport, and use of forest products.[88] Section 5.7 of the NFRL indicates that these fees apply equally to PUPs with the exception that area-based land rental fees apply only to the extent that they are directly tied to FDA-provided services such as permit administration.[89]

C. *Gaps in the PUP Regime*

The PUP regime appears to be designed so as to provide two primary means for ensuring desirable forestry objectives. First, prospective timber harvesters on private land must provide the FDA with information sufficient to enable it to make informed decisions when granting or denying permission to harvest. Requirements of an annual operations plan, five-year management plan, and other documents build upon the general information-forcing provisions that apply to all license types. The obligation to provide information represents a procedural requirement that ensures adequate information is at least available when forest management decisions are made. Second, explicit rules place limits on who may harvest, on what type of land, for how long, and

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[86] *Id*. § 5.6 (e).

[87] *Id*. §§ 5.6 (g)–(h).

[88] *Id*. §§ 14.2(b)(i)–(iii); FORESTRY DEV. AUTH., REPUBLIC OF LIBER., TEN CORE REGULATIONS (2007) Reg. No. 107-07 § 2.

[89] NFRL § 5.7(b) (2006) (Liber.). In addition, stumpage fees must be reduced by half where harvested timber is from private land where forest resources have been artificially regenerated. NFRL § 5.7(c) (2006) (Liber.).

under what circumstances. These are substantive requirements that place boundaries on the extent of FDA discretion to granting permits based on the information provided through the procedural requirements. The problem is that at present, both the procedural and substantive prongs of the PUP regime are rife with ambiguity that could generate problems in the granting and administering of PUPs if not clarified.

1. *Informational Requirements*

The documents required to obtain an Annual Harvesting Certificate and a PUP should theoretically provide a great deal of information about a prospective harvester's plans. The annual operations plan would reflect short-term plans, the five-year management plan would capture mid-range objectives, and the business plan and any documents demonstrating technical and financial capacity would give a sense of long-term plans and capabilities. In addition, the environmental impact assessment would detail the adverse environmental consequences of envisioned operations and the steps that the prospective harvester would take to mitigate them. The social agreement would state how the needs of local communities that depend on the private forest would be met.

However, criteria for writing these documents and by which their completeness may be judged are almost entirely lacking. The NFRL is silent on the matter and there are no regulations defining the required content of most of these documents. The sole exception is environmental impact assessments, the contents of which are governed by a separate law administered by the Environmental Protection Agency,[90] and an accompanying regulation.[91] As a result, FDA decisions about whether to grant or deny PUPs on the basis of the information provided in these documents is almost entirely within its discretion. Such decisions are thus susceptible to arbitrariness and could lead to decisions to grant PUPs even when the documents give little confidence that the prospective harvester will harvest sustainably and adequately protect the interests of local communities.

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[90] An Act Adopting the Environment Protection and Management Law of the Republic of Liberia, Part III (2003) (Liber.).

[91] ENVTL. PROT. AGENCY, REPUBLIC OF LIBER., ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURAL GUIDELINES (2006).

2. *Size Restrictions*

Unlike the other forest license types, there is no mention in the NFRL or the FDA regulations about the permissible size of a PUP. FSCs are issued for areas of 50,000–400,000 hectares and TSCs are issued for areas of up to 5000 hectares.[92] No maximum size is given for FUPs, but the requirement that they be limited to under 1000 hectares if assigned for exclusive use to a particular license holder provides at least some guidance.[93] CFCs also contain size restrictions, although ambiguity poses a challenge to their administration.[94]

There is indirect evidence to suggest that PUPs were not intended to be large. The requirements of the Public Procurement and Concession Act—designed in part to inject transparency into large government contracts—apply to FMCs and TSCs, but not to PUPs.[95] Similarly, the fact that only holders of FMCs and TSCs are specifically authorized to establish wood mills and other industrial infrastructure[96] suggests that only these licenses were envisioned to result in operations large enough to merit use of large-scale processing equipment. Legislative history is not available in Liberia, but a statement by John Woods—FDA Director at the time that the NFRL was drafted—may provide a clue as to the intention of the drafters. When news of the massive issuance of PUPs began to surface, he reported that he never imagined PUPs would be issued for large tracts of land.[97] Indeed, the first PUP that he approved was for a paltry 203 hectares.[98] At least two other commenters and Government of Liberia officials cited by the U.N. Panel of Experts on Liberia concur that PUPs were meant to be used for small-scale logging.[99]

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92 NFRL §§ 5.3(b)(ix), 5.4(b)(iv) (2006) (Liber.).

93 *Id*. § 5.5(g).

94 Medium-scale CFCs must be 5,001–49,999 hectares, but no size is given for small-scale or large-scale CFCs. CRL, *supra* note 58, § 6.2.

95 NFRL § 3.3 (2006) (Liber.).

96 *Id*. §§ 18.6(a), 18.8.

97 MINHWAN AN ET AL., *supra* note 10, at 29.

98 UNSC, *supra* note 3, ¶ 121.

99 UNSC, *supra* note 3, ¶ 113; DE WIT, *supra* note 5, at 5 ("There is . . . some common agreement that PUPs were created to allow smaller scale extraction of commercial timber standing on private, individual land."); Tamasin Ford, *Avoiding a 'Wild West' Logging Sector in Liberia*, GUARDIAN (Nov. 13, 2012), http://www.guardian.co.uk/sustainable-business/sustainable-logging-liberia-private-use-permits (claiming that PUPs "don't adhere to many of

A related question is whether the PUP regulation should limit the number of contiguous parcels for which any particular individual or company may hold a permit. Without such a restriction, permit holders could theoretically skirt size restrictions by lining up multiple adjacent permits. While the FDA would review each permit application and could see the location of a proposed PUP relative to others that already exist, the absence of a clear rule regarding the permissibility of huge patchwork concession areas would leave this issue in the FDA's discretion. Discretion in this area is not necessarily something to be feared, but the FDA's recent record with respect to PUP administration suggests that clear rules may be advisable.

In addition to being silent on the size of individual PUPs, the NFRL does not explicitly state whether there is a limit on the total forest area that may be issued under PUPs or any of the other license types. The result of this ambiguity is that the FDA is theoretically free to grant concessions to Liberia's entire forest stock so long as it would be able to justify such a move as being sustainable. Section 9.1(a) seems to anticipate this possibility and responds by requiring the FDA to establish a Protected Forest Areas Network comprising "at least 30 percent of the existing forested areas of Liberia." On its face, this provision appears to require that at least 30 percent of Liberia's standing forest at the time of enactment of the NFRL be set aside and protected from commercial use. However, the categories of "Protected Areas" include National Forests, which may be legally logged.[100] Further, despite the requirement that the Network incorporate "Conservation Corridors," these are also defined as including National Forests.[101] Timber harvesting from National Forests must be "sustainable,"[102] but one of the goals of the forest permit regime is to achieve sustainable logging;[103] thus the Protected Forest Areas Network provision places no additional restrictions on the areas for which forest licenses may be issued.[104]

Liberia's carefully crafted sustainably forestry laws," because they "were never intended to be used for large-scale logging").

[100] NFRL § 9.10(b)(v) (2006) (Liber.).

[101] *Id*. § 1.3 ("Conservation Corridor").

[102] *Id*. § 1.3 ("National Forest").

[103] *Id*. at Preamble ("[W]e want our forests to provide our People with sustaining and sustainable benefits.").

[104] *Id*. § 1.3 ("National Forest").

3. *Duration Restrictions*

The PUP provisions are ambiguous with respect to the duration of a permit. The basic terms of a TSC are explicitly limited to no more than three years.[105] FUPs that are granted to individual persons or groups expire after two years.[106] FSCs are not subject to any particular time restriction, but the statute is at least clear that it contemplates long-term licenses.[107] And all three of these license types are subject to renewal restrictions.[108] PUPs, on the other hand, are not subject to renewal restrictions and are limited "to the time necessary to carry out the activities described in the management plan, and in no case longer than the expected rotation age of the forest."[109] The preferred duration of a permit is thus given by circular reference to the time it would take to carry out the permitted activities, providing little meaningful guidance. It would not, for example, preclude the actions of a particular logging company that has been negotiating with communities for seventy-five-year rights to forest areas and the right to develop long-term palm oil plantations.[110]

The maximum statutory duration of a permit, given as the forest's "expected rotation age," is not particularly helpful either. For more than a century, forest economists have debated the proper way to define a forest's optimum rotation age, suggesting approaches ranging from those that maximize gross or annual yield to those that maximize net revenue or the rate of capital growth.[111]

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[105] *Id*. § 5.4(b)(iii).

[106] *Id*. § 5.5(e)(i). FUPs may also be issued by regulation for particular areas, in which case any qualified person or group may apply for a permit to conduct non-logging commercial activities in the area and no particular duration is given. *Id*. § 5.5(e)(ii).

[107] *See, e.g*., *id*. § 5.3(b)(iii) (requiring the license holder "to perform actions necessary for sound, long-term forest management"); *id*. § 5.3(b)(viii) (mandating that the length of the license "approximate the length of a forest rotation on the land based on a sustainable yield of [t]imber products"). In practice, FMCs are generally issued for a period of twenty-five years. UNSC, *supra* note 3, ¶ 111(a).

[108] NFRL §§ 18.12(b)–(c) (2006) (Liber.) (prohibiting renewal of FMCs and TSCs and prohibiting renewal of FUPs when the license grants the license holder exclusive use of a particular area).

[109] *Id*. § 5.6(e).

[110] MINHWAN AN ET AL., *supra* note 10, at 85.

[111] DAVID H. NEWMAN, FOREST SERV., U.S. DEP'T OF AGRIC., GENERAL TECHNICAL REPORT SE-48, THE OPTIMAL FOREST ROTATION: A DISCUSSION AND ANNOTATED BIBLIOGRAPHY 1 (1988), *available at* http://www.srs.fs.usda.gov/pubs/gtr/gtr_se048.pdf.

The permissible duration of PUPs will have profound implications in terms of the frequency with which forest management planning can be revisited on individual parcels.

4. *Prequalification Criteria*

The NFRL provides certain prequalification criteria that apply to all parties seeking permission to conduct commercial forest operations. These appear to be designed to prevent parties who are unable or unsuited to engage in the forest sector from doing so. For example, parties must not have been judged insolvent or convicted of a felony in the previous five years, must be registered or otherwise qualified to do business in Liberia, and may not work for or be affiliated with a listed government post that might create a conflict of interest.[112]

The FDA core regulations provide another list of prequalifications,[113] which builds on the list in the NFRL but which, inexplicably, only applies to parties wishing to log under FMCs, FUPs, and TSCs.[114] Additional criteria include that applicants must: (1) have disclosed the names of important corporate officials; (2) not employ persons who have recently violated forestry law; and (3) be in good standing with regard to their tax payments to the government.[115] The straightforward meaning of the regulation is that these additional criteria do not pertain to parties seeking to harvest timber under PUPs, but there is no obvious reason why this should be the case. It would be just as concerning to allow these parties to commercially harvest timber under a PUP, if not more so, given the more relaxed nature of PUP regulation.

5. *Landowner Permission*

Section 5.6 explicitly states that only the landowner or someone with written permission from the landowner may undertake commercial use of forest resources on private land.[116] Despite this restriction, logging companies have used other methods to effectuate landowner consent when filing paperwork

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[112] NFRL §§ 5.2(b)(ii)–(vii) (2006) (Liber).

[113] FORESTRY DEVELOPMENT AUTHORITY, *supra* note 21, Reg. No. 103-07 Schedule 1.

[114] *Id*. § 2.

[115] *Id*. Schedule 1.

[116] NFRL § 5.6(c)(i) (2006) (Liber.).

with the FDA, such as power of attorney and social agreement.[117] Leaving aside the questionable legality of PUPs that have been issued on the basis of these alternative forms of consent, there may be reasonable policy motives for expanding the means by which landowners can grant others permission to log on their land. For instance, agreement via power of attorney may be desirable when the landowner is physically incapacitated or legally unable to grant permission. It may also be wise to interpret "permission from the Land Owner in writing" to mean permission from all owners in the case of joint ownership. Clarification on this subject is critical, regardless of the ultimate interpretation.

6. *Private Land*

It is clear that PUPs are designed to facilitate commercial use of forest resources on private land. However, what land is considered to be private under Liberian law is a mystery.[118] In fact, the issue is so contentious that it has been taken up by a dedicated Land Commission with a mandate to reform Liberia's land policy, laws, and programs.[119]

The lack of a clear definition of which land is eligible for PUPs may render the bulk of PUPs issued to date unlawful. Private land in Liberia has been "understood to be land for which the owner holds a registered title."[120] "Owner" has been broadly defined to include individuals, families, communities, corporations, or other entities;[121] indeed, most PUPs have been issued for collectively held land.[122] The problem is that community land is meant to be governed by the CRL and granted in concession as CFCs for the purpose of community-based forest management. Issuing PUPs for "private" land held by communities both threatens the integrity of the CRL and sidesteps the safeguards built into that law.

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117 DE WIT, *supra* note 5, at 24.

118 LAND COMM'N, REPUBLIC OF LIBER., LAND RIGHTS POLICY 20 (2013) ("There has never been a clear definition of Private Land in Liberia.").

119 LAND COMM'N, REPUBLIC OF LIBER., BROCHURE (n.d.), *available at* http://www.landlib.org/pg_img/brochure%20redone.pdf.

120 DE WIT, *supra* note 5, at 6.

121 *Id*.

122 *Id*. at 8.

7. *Bidding*

Many of the mechanisms that ensure transparency and fairness in the forest sector are found in the Public Procurement and Concessions Act (PPCA). The PPCA imposes a robust set of rules governing bidding on concessions,[123] establishes a complaint and review process,[124] and creates the Public Procurement and Concession Commission to oversee the concession process.[125] FDA regulations reference and add to these rules in the context of FMCs, TSCs, and major FUPs,[126] but PUPs are beyond the scope of the PPCA.

There is some logic in excluding permits for logging on private land from the law governing concessions on public land—the concept of property implies the freedom to do what one wishes with one's possessions. This is especially true if PUPs were intended to be small in size, as the risk that activity on one's own land will harm another is minimal. But absent parallel protections in the PUP context, this exclusion deprives the PUP regime of transparency and fairness protections. For example, a lack of required bidding creates an opening for companies to take advantage of poorly educated landowners by offering them exploitative terms. In addition, the bidding process is the primary lever with which the government is able to prevent certain parties from participating in the forest sector. FDA regulations bar participation in bidding by individuals who are prohibited from taking part in all types of public procurement under the PPCA,[127] as well as individuals and companies that were involved in the civil war or that have defaulted on their financial obligations to the state.[128] Absent a requirement to bid for PUPs or an express prohibition on operating under a PUP, these unsavory actors have a legal means to sidestep the PPCA and FDA blacklists.

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[123] *See, e.g.*, Amendment and Restatement of the Public Procurement and Concessions Act, § 32 (2010) (Liber.).

[124] *Id.* § 10.

[125] *Id.* § 3.

[126] *See generally* FORESTRY DEV. AUTH., REPUBLIC OF LIBER., TEN CORE REGULATIONS (2007) Reg. No. 104-07.

[127] *Id.* Reg. No. 104-07 § 4 (referencing Section 44 of the Public Procurement and Concessions Act).

[128] *See id.* Reg. No. 103-07 § 23.

8. *Fees*

As a general matter, the rules regarding PUP fees are logical. The government is entitled to stumpage and forest product fees as the owner of the timber subject to a PUP. It is not entitled to land rental fees for the privately owned land, with the exception that it does receive whatever fees would remunerate it for the expense of administering the permit. A small problem arises in that FDA regulations define land rental fees to include an annual coupe inspection fee of US$50 per square-kilometer of the area being harvested.[129] This fee is only required of holders of FMCs and TSCs, despite the fact that PUPs also need to be inspected. Although inspection might normally be considered part of permit administration, for which a PUP fee may be assessed, the non-inclusion of PUPs in the list of license types to which this fee applies creates some doubt as to whether PUP fees may include an inspection fee.

9. *Transparency and Public Participation*

The NFRL requires holders of FMCs and TSCs to publish certain information in a newspaper of general circulation, including the name of the license holder, a brief description of the area covered by the license, and a list of the amounts and dates of all payments made to the government under the license.[130] No similar disclosure requirement exists for PUPs.

Public consultation is also underspecified in the PUP context. FDA regulations require consultation with affected communities prior to issuance of FMCs, TSCs, and major FUPs, and provide extensive guidance on who must be consulted, the means by which they must be notified of upcoming consultations, and the level of agreement that must be achieved.[131] No such requirements pertain to the issuance of PUPs. The NFRL does require that non-landowners who wish to log under PUPs enter into a social agreement with the landowner, but no parameters accompany this basic rule.[132] It is not even clear that the communities affected by the logging—the very parties that are meant to benefit from the

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[129] *Id.* Reg. No. 107-07 § 34(a).

[130] NFRL § 5.8(a)–(d) (2006) (Liber.).

[131] FORESTRY DEV. AUTH., REPUBLIC OF LIBER., TEN CORE REGULATIONS (2007) Reg. No. 104-07 § 22.

[132] NFRL § 5.6(d)(vi) (2006) (Liber.).

social agreement—must be consulted in its negotiation. Meanwhile, FDA regulations governing the other forest license types go into great detail concerning who must be included in negotiations, the conduct of public meetings, the FDA's role in overseeing agreements, and the contents of the agreements—even going so far as to specify minimum financial benefits.[133]

Minimizing public consultation requirements may have been a purposeful choice intended to recognize the right of a landowner to determine the fate of his or her private land without necessarily having to consult with neighbors. However, the PUP provisions of the NFRL recognize that local communities may depend on private forestland.[134] Indeed, non-landowners may derive important livelihood benefits from private forests that deserve protection, such as production of bush meat and regulation of hydrological cycles important for farming. This tension between preserving the rights of the landowner and ensuring that local communities have a stake in their livelihoods is beneath the surface of the PUP provisions and requires fleshing out.

10. *Summary*

The PUP regulation will have to clarify the following issues:

- What information must the various required documents contain?
- Exactly how large may an individual PUP be?
- Are contiguous PUPs that are owned by the same individual or corporation permissible if together they exceed the individual limit?
- Is there a limit on the total combined area that all forestry permits may cover?
- What is the maximum duration for which a PUP may be issued?
- Do the prequalification criteria that currently only apply to holders of FMCs and TSCs apply to holders of PUPs as well?
- Are there acceptable means of conveying landowner permission to harvest, other than written consent?

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[133] FORESTRY DEV. AUTH., REPUBLIC OF LIBER., TEN CORE REGULATIONS (2007) Reg. No. 105-07 § 32–36.

[134] NFRL § 5.6(d)(vi) (2006) (Liber.) (requiring that the social agreement that is required for issuance of a PUP must "define[] benefits and access rights for local forest-dependent communities").

- What constitutes "private" land?
- Will applicants for PUPs be required to participate in the PPCA's bidding process?
- Are PUP holders required to pay the annual coupe inspection fee?
- Are the transparency measures required of FMC and TSC holders also required of PUP holders?
- Do the public consultation measures required of applicants for other permit types apply to applicants for PUPs?

Each of these ambiguities in the rules governing PUPs and exclusions from the rules governing other license types raises concerns in its own right. Combined, they are even more worrisome. For example, the lack of a clear time limit for PUPs combined with the lack of size restrictions creates the possibility that large concessions of extended duration may be granted on private land. Even this is not inherently problematic because adequate guarantees of transparency, sustainable management, and benefit sharing would ensure that even enormous, long-term PUPs would further economic growth while mitigating harmful impacts. However, such guarantees are lacking at present.

Certain choices regarding how to interpret the ambiguities in the PUP legal regime are constrained by the plain language of the NFRL. For example, the duration of a permit cannot exceed the expected rotation age of the forest, however that is ultimately defined. Other choices are more open-ended, such as whether to extend FMC and TSC prequalification criteria to encompass PUPs, whether to expand the ways in which landowners may indicate consent to harvest timber on their property, and whether to subject PUP applicants to competitive bidding under the PPCA framework. Decisions on these questions suggest the need to weigh the relevant factors to determine the correct policy balance. First, the desire to provide flexibility for permit holders to decide how to manage their land and ensure that foreign sources of capital can conduct business with ease must be balanced with the need to protect local communities that depend on private forestland and to create safeguards that ensure the continued viability of forest ecosystems. The NFRL's regulatory model is premised, to a degree, on mandatory substantive standards that dictate a rigid floor above which license holders must conduct their operations. The current ambiguity regarding PUPs leaves a great deal of space,

however, for either ratcheting up the minimum standards or codifying permit holder power to determine the fate of their concessions.

Second, the FDA's institutional capacity to monitor and enforce permit compliance requires consideration. The permit system is centered on provision of information to the FDA—through annual operations plans, five-year management plans, and other documents—with which the FDA is expected to make choices that facilitate economic development while ensuring environmental sustainability and equitable treatment of forested communities. Limited FDA capacity cautions against any moves by the PUP regulation to add to the burden that this system already places on the agency to review documents and monitor concessions for compliance with the documents and with permit conditions.

The policy choices that confront the drafters of the PUP regulation may benefit from a study of how private forestland has been governed in Brazil and whether its regulatory framework has proven effective.

III. BRAZILIAN PRIVATE FOREST LAW

Brazil has large amounts of private forestland (49 million hectares in 2005 out of a total of 493 million hectares),[135] and like Liberia, Brazil regulates its private forests in a primarily centralized fashion, through the Forest Code (*Código Florestal*).[136] The original Forest Code, enacted in 1934, barred felling of trees in certain private forested areas, marking the first instance of formally codified requirements to protect private forest resources.[137] A revised code, enacted in 1965, introduced the concept of sustainable timber harvest, dividing private plots of forestland into areas that could not be cut at all and areas that could only be cut subject to restrictions.[138] Following intense international pressure to address climbing deforestation rates

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[135] JACEK P. SIRY ET AL., GLOBAL FORESTRY OWNERSHIP: IMPLICATIONS FOR FOREST PRODUCTION, MANAGEMENT, AND PROTECTION 3 (2009).

[136] Although Brazil has a federal governmental system, states have only limited power with respect to forestry, as discussed below.

[137] CLAUDIA MARGRET STICKLER, DEFENDING PUBLIC INTERESTS IN PRIVATE FORESTS: LAND-USE POLICY ALTERNATIVES FOR THE XINGU RIVER HEADWATERS REGION OF SOUTHEASTERN AMAZÔNIA 35 (2009).

[138] *Id*. at 36–37.

(peaking at 2.9 million hectares in 1995),[139] Brazil issued a provisional measure in 1996 to increase the percentage of restricted harvest areas on private property in the Amazon region and to prohibit new clearing on properties already possessing "abandoned or under-utilized" areas or areas "used inappropriately with respect to the capacity of the soil."[140] The provisional measure was edited in 2000, taking its current form, and a year later the National Congress codified all standing provisional measures as law.[141]

The Forest Code uses an approach in regulating private forestland that hybridizes command-and-control and market mechanisms. The former is premised on a division of private forested properties into three types of areas. Some rules apply regardless of the area type, such as the prohibition on burning forests and other forms of vegetation unless justified by local or regional conditions and specifically authorized by the government.[142] Other provisions are area type-specific. The first area, termed "permanent reservation areas" (*áreas de preservação permanente*), comprises slopes steeper than 45 degrees, hilltops, and areas around water bodies of between 50–500 meters depending on the width of the water body. These areas may not be cleared of vegetation and any portions that have been cleared must be restored.[143] The one exception to this absolute ban is where a showing has been made that clearing is of "public utility" or "social interest" and authorization is given.[144]

The High Court of Brazil has broadly interpreted the statutory definition of "permanent reservation areas."[145] In a 2008

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[139] This area is equivalent to 2.9 million hectares.

[140] *Id*. at 37.

[141] *Id*. at 37–38. The Forest Code remained unchanged until the legislature passed a bill in 2012, which, if enacted, would relax many of the protections that have been in place for over a decade. Jonathan Watts, *Brazil's Leader Vetoes Portions of New Amazon Rainforest Law*, GUARDIAN (May 25, 2012), http://www.theguardian.com/environment/2012/may/25/brazil-amazon-rainforest-law. President Rousseff vetoed parts of the bill, which then had to return to the legislature for reconsideration. *Id*. At the time of writing, the controversy over the bill had not been settled.

[142] Nicholas S. Bryner, *Brazil's Green Court: Environmental Law in the Superior Tribunal de Justiça (High Court of Brazil)*, 29 PACE ENVTL. L. REV. 470, 491 (2012).

[143] STICKLER, *supra* note 137, at 34.

[144] Bryner, *supra* note 142, at 489.

[145] *Id*. at 486.

decision,[146] the High Court reversed a circuit court decision that held that the clearing of vegetation surrounding a two-foot wide stream did not violate the Forest Code's permanent reservation area requirement. The circuit court had reasoned that the environmental impact of clearing vegetation around such a small stream was so minor as to be beyond the bounds of the Forest Code provision.[147] The High Court held that, on the contrary, the riparian vegetation was performing essential ecological functions that are protected by the Brazilian Constitution, thus the Forest Code must be interpreted as protecting even vegetation surrounding small streams.[148]

The second area type encompasses forested slopes of moderate inclination, between twenty-five and forty-five degrees. These are termed "hillslope forests" and may only be logged in a sustainable fashion.[149] The rest of a property is subject to the third area type. A certain percentage of this remaining land must be placed in a "legal reserve" (*reserva legal*), with the percentage depending on the biome in which the property is located. The required legal reserve in the Amazon region is 80 percent,[150] dropping to 35 percent in savanna regions and 20 percent in other rural regions.[151] Clearing of vegetation within the legal reserve is only permitted after a state or federal environmental agency has approved a management plan prepared by a forest engineer.[152] Properties in the Amazon under 100 hectares in size need not comply with the 80 percent reserve requirement.[153]

While the Forest Code establishes and provides the primary rules governing the different area types, other national laws may also impact how landowners manage their forested land. For example, the Agricultural Law of 1991 exempts landowners from

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146 *Id*. at 487.

147 *Id*.

148 *Id*. at 488.

149 STICKLER, *supra* note 137, at 34.

150 For the purposes of this law, the Amazon region encompasses a larger area than the land within the natural boundaries of the Amazon River basin, extending to the entire administrative jurisdictions of the states that fall partly within the basin. *Id*. at 34 n.2.

151 Bryner, *supra* note 142, at 507–08.

152 Lee J. Alston & Bernardo Mueller, *Legal Reserve Requirements in Brazilian Forests: Path Dependent Evolution of* De Facto *Legislation*, 8 REVISTA ECONOMIA 25, 26 (2007).

153 *Id*. at 30.

having to pay rural property tax on the parts of their land within permanent reservation areas and the legal reserve.[154]

The Forest Code requires landowners to restore native vegetation within the legal reserve up to the required percentage,[155] and the Agricultural Law of 1991 establishes a thirty-year deadline to comply.[156] However, the Code provides a market-based alternative to restoration for landowners who have cleared or would like to clear more of their legal reserve than the applicable percentage allows. Landowners may purchase the number of vegetation clearance permits corresponding to the amount of land that needs restoring from others who have not reached the clearance limit on their land. Land that serves to compensate for the area that needs restoring must be at least equivalent in ecological value and be located in the same ecosystem.[157] In addition, a lower limit on permissible deforestation per property restricts participation in the trading scheme to landowners who have not cleared more than 50 percent of their legal reserve.[158]

States have some leeway to modify the requirements of the Forest Code. For example, the Mato Grosso state plan, in draft form as of 2009, would require that aquifer recharge zones be included in the legal reserve, and would extend the area on which de-vegetation is prohibited outright to floodplains (except where clearing is necessary for subsistence agriculture).[159] In addition, the state plan proposes to modify the legal reserve requirement by splitting the state into four types of zones.[160] Zone 1 would represent agricultural areas where landowners would be permitted to depart from the Forest Code and deforest 50 percent of their land. In Zone 2, only 20 percent of properties could be deforested, but if a greater percentage of deforestation has already occurred, restoration would only need to bring the forested area up to 50 percent. Zone 3 areas would be fully subject to the Forest Code. Zone 4 would include protected areas where no deforestation

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154 STICKLER, *supra* note 137, at 40–41.

155 *Id*. at 34.

156 *Id*. at 40.

157 Kenneth M. Chomitz, *Transferable Development Rights and Forest Protection: An Exploratory Analysis*. 27 INT'L REG'L SCI. REV. 348, 351 (2004).

158 STICKLER, *supra* note 137, at 90.

159 *Id*. at 102.

160 *Id*. at 93–94.

would be permitted, and any deforested areas would have to be restored (including private land falling in this zone). This ability of states to alter Forest Code requirements is merely a nod, however, to decentralization of forest regulation. Alterations are subject to federal approval based on criteria set out in a 2002 federal decree, and several federal agencies are tasked with assisting the development of state plans, including the National Institute for Space Research, the Brazilian Enterprise for Agricultural Development, and the Brazilian Institute of Geography and Statistics.[161]

IV. ANALYSIS OF BRAZIL'S REGULATORY MODEL AND EXAMINATION OF ITS EFFECTIVENESS

A. *Theoretical Impacts*

Command-and-control regulations like the permanent reservation area and legal reserve requirements have both positive and negative aspects. On the one hand, they can be straightforward to administer. Brazil's regulatory bodies are spared from having to make individualized determinations about whether and how much of a particular forested property may be harvested, because the percentages are clearly stated in the Forest Code. Rigid regulations also provide certainty. Assuming reasonable compliance with the legal reserve percentages, Brazil can be sure that the level of forest conservation it selects—or somewhere near that level—will be achieved. In addition—and critically when considering the compatibility of such an approach with the values that Liberia's forest laws are meant to promote—rigid restrictions on how forests can and cannot be managed ensure a certain minimum of environmental sustainability.

On the other hand, predetermined percentages impose one-size-fits-all restrictions that may be inefficient. Whereas it may be true that all geographical features that constitute permanent reservation areas have high conservation value and should receive absolute protection, it is unlikely that conservation of all legal reserves is equally justified. Properties located in different areas have varying environmental values and potential for economic use; uniform regulations prevent adoption of land uses that maximize conservation where environmental qualities are most critical and

161 *Id*. at 91.

economic uses where they would be most profitable. As a result, proprietors of land for which the optimal level of deforestation exceeds that which is permitted are subjected to unnecessary cost.

Another factor weighing against command-and-control regulations is the administrative burden they impose on regulators. The Forest Code demands a great deal of monitoring capacity. Regulators must inspect riparian forests for de-vegetation and measure legal reserves to see whether the required percentage is being sustainably managed. Monitoring may be especially challenging in the context of private forested land because the regulated community comprises numerous small actors that are hard to keep track of. Technology may be able to assist; for instance, central databases containing the locations of all land subject to harvest restrictions could be compiled so that inspectors need not waste time finding the specific areas that must be monitored. However, the information needed to populate such databases is substantial and the effort needed to compile it might undermine any efficiency benefits. Satellite imagery, where available, may obviate the need to visit inspection sites in person. Indeed, some Brazilian states already use satellites to track forest cover.[162]

Mechanisms that inject flexibility into otherwise rigid command-and-control regulations can mitigate some of these negative qualities. The exclusion of smallholders with fewer than 100 hectares avoids imposing compliance costs on the landowners least likely to be able to afford adherence to land use restrictions. Similarly, variances granted from the absolute ban on de-vegetation in permanent reservation areas for reasons of public utility or social interest soften the rigidity when the benefit of another use significantly outweighs the environmental cost of clearing the land. Of course, a variance mechanism can also present a loophole around the permanent reservation area requirement.

The tradable deforestation permit scheme provides another source of flexibility. Landowners for whom it would be especially costly to achieve or maintain their full legal reserves are permitted to purchase the right to clear land beyond the legal reserve limit from other landowners for whom the cost of maintaining their reserves is lower. In economic terms, if the marginal cost of

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[162] Chomitz, *supra* note 157, at 352; Alston & Mueller, *supra* note 152, at 46.

restoration for a landowner with too little forest cover is higher than the marginal cost of conservation for a landowner with more than the required forest cover, a trade will benefit both landowners. This system allows affected landowners to reduce the cost that the regulation imposes on them while still ensuring achievement of the desired quantity of conserved land.[163]

As beneficial as this system appears, tradable permit schemes can also produce undesirable distributional impacts. For example, had Brazil's Forest Code not included a provision that traded forest areas must be of at least equivalent ecological function, it would have been possible for a landowner to obtain the rights to clear cut an area that supports endangered species in exchange for preserving an area on someone else's property that does not. Similarly, had the Forest Code not limited trades to two properties within the same ecosystem, particular ecosystems could be susceptible to severe forest clearing. Although the Code anticipates these impacts, it does not anticipate others. For instance, landowners are not prevented from trading permits in a manner that could fragment otherwise contiguous forests. Fragmentation could forestall the exchange of genetic information between populations that become separated, and dismember ecosystems that rely on connectivity with other areas to supply vital components. Certain species depend on large contiguous habitats. Others provide important ecosystem services such as pollination or seed dispersal, without which the ecosystem could become destabilized.[164] Fragmentation also increases the area of a forest exposed to harmful edge effects.[165]

The tradable permit scheme also adds to the administrative burden. Trades must be recorded in a registry, reviewed to avoid duplication and to ensure that the offsetting parcel is both in the same watershed and of greater ecological value, and periodically verified to certify that offsetting land is not subsequently cleared. The inquiry into relative ecological value may necessitate field assessments to collect soil samples, test water quality, and measure biodiversity. These assessments may be outsourced to environmental consultants, but this would add to landowners' costs of engaging in trading and would still require the regulator to

163 Chomitz, *supra* note 157, at 370.
164 *Id*. at 351.
165 *Id*.

review the consultants' work. Regulatory delay in deciding whether two parcels may be traded and lack of clarity regarding whether one's land is comparable to another piece of land represent transaction costs that may prevent otherwise efficient trades from proceeding. Theoretically, all parcels within a jurisdiction could be assigned a composite "ecological value score" ahead of time, which could be stored in a database for easy application when a trade is requested, but this would require an enormous upfront information-gathering cost.

A methodological challenge also confronts trading schemes. To enable rational comparison, ecological benefits of different types must be converted into the same units. But this is easier said than done. How should a regulator compare land with a scenic waterfall to land that provides habitat for migratory birds? Is land that produces food favored by endangered species more valuable than land that filters toxins or recharges groundwater? A similar problem has plagued the water quality trading scheme set up in the United States under the Clean Water Act to enable trades in effluent permits between point and nonpoint sources of pollution.[166]

Brazil's regulatory scheme benefits from robust liability provisions. First, landowners are held strictly liable for restoration and protection of forest areas, even if they were not responsible for the deforestation or aware of a prohibition against deforestation.[167] Strict liability promotes forest protection by obviating delays associated with conducting fact-finding to determine causation and by avoiding the possibility that a responsible third party will be missing, leaving no one liable for restoration. But it also places an unfair burden on landowners when they are held responsible for logging by third parties on their land that they did not authorize and perhaps could not control.

Second, the obligation to restore the legal reserve is tied to the land rather than to the responsible party. For some time, Brazil's High Court had interpreted the Forest Code as requiring a causation element in holding parties liable for violating the Code, meaning that if a party responsible for illegally clearing vegetation

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[166] RICHARD L. REVESZ, ENVIRONMENTAL LAW AND POLICY 595 (2d ed. 2012).

[167] Bryner, *supra* note 142, at 511.

were to sell its land, the purchaser could not be held liable.[168] A 2000 decision reversed this position, converting the legal reserve into a *propter rem* requirement. The High Court held that even if a current owner was not responsible for the failure of his or her property to meet the legal reserve requirement, he or she is still responsible for restoring the vegetation.[169] This judicial rule incentivizes prospective purchasers to be wary of purchasing land that does not meet the legal reserve requirement, internalizing the cost of deforestation to the responsible party by reducing the marketability of their land. Moreover, the rule eases the government's burden to keep an exhaustive record of land transactions and deforestation timelines. Given the enormous size of Brazil's forests and regulatory resource constraints, it might not be possible for regulators to track down former owners. The downside of this requirement is that it makes land transactions more expensive; potential purchasers must invest their own time and energy or hire a third party to determine whether the legal reserve is met in order to have confidence that the price of the land is appropriate.

Strong liability is paired with the power to assess fines for noncompliance with legal reserve requirements.[170] In principle, a monetary penalty is a useful enforcement tool because it can erase the economic benefit landowners might derive from illegally clearing trees. Increasing the amount of the penalty further adds deterrence. The problem with relying on fines for enforcement is that they may need to be set at undesirably high levels when monitoring and enforcement capacity is lacking. When the rate at which violators are punished is low, landowners may find it economically advantageous to risk being caught and prosecuted. The amount of the fine would have to be extremely high to deter future violators, but such large fines may be ineffective. The average private landholder in a developing country may not be wealthy enough to pay large fines, and if so is undeterrable beyond his or her solvency. Moreover, overly large fines risk delegitimizing the legal system, especially if fines are lower for crimes that are perceived to be more morally reprehensible than illegal logging.

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168 *Id*. at 509.
169 *Id*. at 503.
170 STICKLER, *supra* note 137, at 86.

B. *Impacts in Practice*

The above discussion highlights the potential of command-and-control regulations to provide minimum guarantees of environmental protection, as well as the possible effect on these minimum protections of introducing a tradable permit scheme. Brazil's regulatory scheme does not, however, appear to address issues of transparency, public participation, or benefit sharing, which Liberia's forest governance regime seeks to promote. Thus, if Liberia were to borrow from Brazil's approach, it would have to look elsewhere for ways to incorporate these values.

In fact, it is not even clear that Brazil's approach to regulating private forestland has succeeded at promoting environmental sustainability.[171] Compliance with the legal reserve requirement is low. A study of one region found that less than half of Amazon landholdings maintained the requisite legal reserve.[172] A 2003 study looking at the national impacts of the legal reserve requirement found that no state in the Amazon averaged above the required 80 percent forest cover, and that even among states in which properties had only to meet the 20 percent requirement, only 13 of 21 averaged at least this amount of forest cover statewide.[173]

The tradable permit scheme, severely underutilized in the Amazon, has done little to boost compliance.[174] Dr. Claudia Stickler, of Stanford Woods Institute, offers several explanations for the low utilization rate. First, insufficient information about the legal reserves on individual properties prevents trading. This is due

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[171] Recent figures indicate that the deforestation rate in Brazil during the years 2009–2010 represented a 67 percent decrease as compared with the baseline decade of 1996–2005. UNION OF CONCERNED SCIENTISTS, BRAZIL'S SUCCESS IN REDUCING DEFORESTATION, BRIEFING 8, at 1 (Feb. 2011), *available at* http://www.ucsusa.org/assets/documents/global_warming/Brazil-s-Success-in-Reducing-Deforestation.pdf. But these aggregate data do not necessarily result from successful regulation of private land. The Union of Concerned Scientists, for example, cites the primary causes of the decline of the deforestation rate as being an expansion of protected areas and state support for preventing encroachment of nonindigenous ranchers, farmers, and miners on indigenous-owned land. *Id.* Another explanation might be the global economic recession, which slowed the demand for beef, soy, and iron ore produced in the Amazon. Jonathan Watts, *Brazil's Leader Vetoes Portions of New Amazon Rainforest Law*, GUARDIAN (May 25, 2012), http://www.guardian.co.uk/environment/2012/may/25/brazil-amazon-rainforest-law.

[172] STICKLER, *supra* note 137, at 50.

[173] Alston & Mueller, *supra* note 152, at 38.

[174] STICKLER, *supra* note 137, at 90.

in part to a lack of monitoring by regulatory bodies and lax enforcement of the requirement that landowners declare their legal reserves, and in part to the disorganization of databases containing information about private land.[175] However, even in Mato Grosso, where a digital licensing system is used to keep track of private properties, only five trades have been recorded since 2000.[176] A second reason for low use of the trading mechanism is legal uncertainty. Although the law specifies that trades are allowed between properties in the same watershed, the size of the contemplated watersheds is unclear.[177] Moreover, vociferous opposition to forest protections has caused uncertainty concerning whether the legal reserve percentage will remain stable.[178] Finally, low compliance with the legal reserve requirement may mean that there is not enough "excess" forest cover to allow much trading.[179]

Poor implementation of the tradable permit scheme, and a legal reserve level that may have been set above that which would enable trades to go through, have effectively left regulation of private forestland up to the command-and-control portion of the regulatory scheme. Stickler explains that conditions are most conducive to compliance with such regulations when: "(a) the process for achieving compliance is clear and practical, (b) the probability of non-compliant landholders being identified is high, (c) the probability of apprehended landholders paying fines or facing imprisonment is high, and (d) the costs of compliance are low. In sum, compliance is highest when non-compliance is very expensive."[180]

Applying these factors to the Brazilian context makes it easier to understand the high rates of noncompliance. Regarding the first factor, there has in fact been a great deal of legal uncertainty surrounding the Forest Code. Besides the issue of whether the legal reserve percentage will remain constant, states—which are charged with implementing the Code—were not immediately given the power to bring properties into compliance after the 1996

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175 *Id*.
176 *Id*.
177 *Id*.
178 *Id*. at 61. For example, the agricultural lobby has launched frequent attacks on the Forest Code in the National Congress and reducing the legal reserve percentage has been a major objective of theirs. *Id*.
179 *Id*. at 111.
180 *Id*. at 59.

Code revisions. In addition, delayed federal determinations of whether to approve state implementation efforts may exacerbate uncertainty. For example, it took five years for the federal government to overrule Mato Grosso's reduction of the legal reserve requirement for transition forests to 50 percent.[181]

The second factor—identifying noncompliant landholders—depends to a large extent on the effectiveness of the monitoring regime. In Brazil, monitoring has faltered. For example, in 2000, 97 percent of timber extraction in the Amazon was undertaken without guidance from government-reviewed management plans.[182] Reasons for the lack of monitoring include insufficient human and financial resources, and unclear divisions of authority and lack of coordination between government bodies with overlapping natural resource responsibilities.[183]

The third factor comes down to enforcement, which has also been deficient in Brazil. To begin with, Forest Code violators have been difficult to locate, and ineffective communication among enforcement agencies has delayed prosecutions.[184] Even when prosecution is undertaken and liability assessed, few fines are ever collected. In Mato Grosso, for example, only two percent of fines issued for Forest Code violations over the course of about a decade are estimated to have been collected.[185] Amazon-wide enforcement figures are little better; in 1996, collection of fines for violation of environmental laws was approximately 13 percent of the value of the fines.[186] According to one analyst, "the most consistent encouragement to all sectors of the lumber industry . . . has been the relative freedom with which it has been allowed to exploit the public forest resources through near total absence of forest management guidelines or enforcement of existing regulations."[187] Fines may not be high enough to deter violations that are so unlikely to be punished. Part of the problem is that the local

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[181] *Id*. at 60–61.

[182] UMA LELE ET AL., WORLD BANK, BRAZIL FORESTS IN THE BALANCE: CHALLENGES OF CONSERVATION WITH DEVELOPMENT 18 (2000). Although some management plans have been approved by the Brazilian Environmental Institute, few have actually been implemented. *Id*.

[183] STICKLER, *supra* note 137, at 32.

[184] *Id*. at 33.

[185] *Id*. at 62–63.

[186] LELE ET AL. *supra* note 182, at 24.

[187] *Id*. at 23 (citing R. SCHNEIDER, WORLD BANK, BRAZIL: AN ANALYSIS OF ENVIRONMENTAL PROBLEMS IN THE AMAZON, REPORT 9104-BR (1992)).

governments charged with enforcement of forest regulations are often comprised of or aligned with logging interests. Even absent capture by industry, local governments still have an incentive not to enforce regulations in order to attract investment.[188]

Despite these challenges, enforcement appears to have intensified of late, with increased rates of seizure of illegal timber and jailing of perpetrators.[189] A World Bank report hypothesized that this may be related to a property tax reform that requires landowners to file a declaratory statement with federal authorities that, among other things, gives the area of the landowner's legal reserve that is exempt from property tax.[190] Claimed reductions in owed taxes may spur the government to verify the claims.

The fourth factor—low cost of compliance—is not met in Brazil. A study analyzing the impact of the legal reserve requirement in the state of Paraná, where the requirement is only 20 percent, found that compliant landowners lose an average of US$465 per acre per year and experience a 25 percent increase in risk to their business.[191] In a region subject to the 80 percent legal reserve requirement, landowners had by 2005 earned in the vicinity of US$4 billion from deforestation in excess of the cap; compliance would have represented an average reduction of US$4 million in landowners' achievable net present value.[192] Income potential in Mato Grosso from deforesting the legal reserve to make way for cattle ranching or soy farming is between two and twenty times greater than that from sustainable timber harvest permitted in the legal reserve.[193] Meanwhile, the benefits derived from conserving forests reflect some of the qualities of public goods:[194] the landowners who experience the costs of compliance are unable to fully capture resulting benefits and thus experience lower incentives to comply.

Other compliance costs are also extremely high. Without a feasible permit trading alternative, landowners must restore their depleted legal reserves, which would cost the average Mato Grosso

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188 *Id*.
189 UNION OF CONCERNED SCIENTISTS, *supra* note 171, at 1–2.
190 LELE ET AL., *supra* note 182, at 21–22.
191 Alston & Mueller, *supra* note 152, at 26.
192 STICKLER, *supra* note 137, at 54.
193 *Id*. at 87.
194 Alston & Mueller, *supra* note 152, at 26.

landowner over US$2 million.[195] Even the management plan itself, which must be approved before the legal reserve may be harvested, is expensive and takes a long time to develop.[196] In addition, review of management plans requires costly inspections by the enforcement agency, discouraging it from approving management plans in the first place, especially when resources are constrained.[197] Unfortunately, reduced rates of approval may have the perverse effect of driving landowners to clear their legal reserves without bothering with the management plan.

Exempting landowners from paying rural property tax on permanent reservation areas and the legal reserve provides some incentive to maintain these areas. However, given the lost opportunity cost from not engaging in more lucrative economic activity, the tax incentive would have to be quite powerful to generate much conservation. In addition, the combination of the tax break and lax monitoring leads to the risk of incentivizing landowners to both clear their land and claim tax exemptions in cases where the potential benefit exceeds the expected value of potential penalties (where expected value equals penalty value times likelihood of getting caught).

C. *Summary*

Brazil, with significant amounts of private forested land and limited capacity to monitor and enforce its forest laws, shares some basic similarities with Liberia and affords an interesting model for the drafters of the PUP regulation to consider. Certain elements of Brazil's experience may be applicable to the Liberian context, while others are less so. For example, Brazil's strong command-and-control regulations prohibiting clearance of more than specified amounts of vegetation are straightforward to administer because they obviate the need to make individualized determinations in a permit about how a forest is to be managed. They also provide certainty that the predetermined level of conservation will be achieved, provided a reasonable rate of compliance. These qualities may be useful in Liberia, where the FDA struggles with capacity challenges and where forestry law seeks to ensure environmental sustainability. However, stringent

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195 STICKLER, *supra* note 137, at 55.
196 Alston & Mueller, *supra* note 152, at 26 n.1.
197 *Id*.

regulations also introduce inefficiency by requiring conservation where it is not justified and by allowing harvesting where conservation is warranted.

In principle, trading in deforestation permits restores efficiency by enabling landowners to allocate permits amongst themselves, resulting in conservation being carried out by the lowest cost compliers. But certain practical hurdles, such as insufficient information and regulatory uncertainty, raise the transaction costs to trade and undermine the rationale for a trading scheme. The FDA, like its Brazilian counterparts, may be unable to facilitate an efficient market for trading due to its low capacity. One advantage that Liberia may enjoy over Brazil, however, is that Liberia's government is unitary, whereas Brazil's is federal. As a result, Liberian counties have no authority to modify national law as do Brazil's states. This means that Liberia could avoid some of the regulatory uncertainty due to prolonged policy disagreements between the national and sub-national governments that has been partly to blame for low compliance in Brazil.

V. STRUCTURING A NEW PUP REGIME

The analysis of the NFRL and FDA core regulations in Section II of this Article identified a number of ambiguities and outright gaps in Liberia's private forestland regulatory regime. The forthcoming PUP regulation will have to correct these to ensure that forests on private land are managed sustainably and provide continued economic and ecological benefits to landowners and forest-dependent communities. There are two basic ways to effectively structure the new PUP regime. First, the regulation could establish clear rules in each of the areas that currently suffer from vagueness or regulatory silence. Second, the regulation could adapt the concept of minimum conservation requirements from the Brazilian system. Each of these approaches is discussed in turn.

A. *Establishing Clear Rules*

It is important to remember that Liberia's forestry regime is structured around provision of information to the FDA, which the FDA then uses to issue permits. The ambiguities that infest the forestry legal regime render this model problematic. At least in name, the informational prerequisites for obtaining a PUP are fairly robust; if well prepared, an annual operations plan, five-year management plan, environmental impact assessment, and social

agreement should provide the FDA with a great deal of information about a prospective harvester's plans. But even given extensive information to assist in decision-making, the FDA is still invested with significant discretion as to whether to grant a PUP. Existing provisions aimed at ensuring that timber is harvested sustainably contain only bare-bones protections and vague directives concerning who may harvest, on which land, and under which circumstances.[198] Such broad discretion is especially worrisome given the FDA's limited capacity to review documents and to monitor approved concessions. Close public scrutiny of FDA actions might ameliorate some of the risk of mismanagement that accompanies broad discretion, but effective scrutiny is challenging in the Liberian context. The FDA would have to act in a transparent fashion, the public would have to be sufficiently educated to hold the FDA to standards of sustainable management, and working mechanisms would have to be in place for transmitting information about FDA actions to the public. The experience with PUP administration demonstrates how far Liberia is from this reality. Legally, the administration of PUPs is not bound by the disclosure requirements that apply to FMCs and TSCs[199] and is excluded from the transparent bidding process laid out in the PPCA.[200] Even if information were to be made transparently available, low literacy rates mean that few citizens would be able to make much use of it. Perhaps as a result, little public discourse took place during the first few years that PUPs started being authorized. It was not until the international watchdog Global Witness joined with local civil society groups to bring attention to problems with the PUP regime that either the local or international media even took notice.[201]

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198 *See, e.g.*, *supra* Section II(C)(4)–(6).

199 NFRL § 5.8 (2006) (Liber.).

200 *See supra* Section II(C)(7).

201 A Google search reveals that no online media outlet referenced PUPs until August 2012—the month that Global Witness, the Save My Future Foundation, and the Sustainable Development Institute released their initial report on PUPs. The first news outlet to run the story was All Africa, a regional African newspaper, on August 30. *See Liberia: Hasty Forest Sale*, ALL AFRICA (Aug. 30, 2012), http://allafrica.com/stories/201208301191.html. Beginning on September 4, Liberian outlets such as Heritage and international outlets including Al Jazeera, BBC, and NBC started to report on the PUP crisis. *See* Emmanuel Weedee, *Over 60% of Liberia's Rain Forest Offered to Logging Companies*, HERITAGE (Sept. 4, 2012), http://www.news.heritageliberia.net/index.php/inside-heritage/general-news/78-slides/532-over-60-of-liberia-s-rain-forest-offered-to-

In light of this, the first way to correct the current, flawed PUP regime is to clarify and supplement ambiguous provisions to circumscribe FDA discretion. A good place to start is with the information-forcing provisions upon which the regime rests. It is critical that criteria for acceptable documentation are clear. Guidelines are needed to instruct private landowners and companies engaging in harvesting on the requisite components of annual operations plans, five-year management plans, and business plans—similar to the way that other regulations specify the structure of environmental impact assessments.[202] In addition, indication should be given as to which documents are deemed acceptable for demonstrating technical and financial capacity to operate. It may be reasonable not to promulgate specific requirements governing social agreements, as these are private contracts in which the Liberian government has no economic interest;[203] however, the government's responsibility to protect vulnerable citizens may justify inclusion of certain minimum social guarantees. One option is to lay out the specifics of each of these document types in non-binding guidance documents, but binding regulations may be more appropriate given the frequent failure of promised communal benefits to materialize.[204]

The question of whether to subject prospective harvesters under PUPs to the PPCA bidding process or to require some other form of bidding raises a similar dilemma as the question of whether to impose requirements on the negotiation of social

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logging-companies; Travis Lupick, *Illegal Logging Endangers Liberia's Forests*, AL JAZEERA (Sept. 4, 2012), http://www.aljazeera.com/indepth/features/2012/09/20129351732763952.html; *Liberia's Failed Logging Promises*, BBC (Sept. 4, 2012), http://www.bbc.com/news/world-africa-19469570; *Illegal Logging Report Gets Liberia's Attention—Forestry Chief Suspended*, NBC (Sept. 4, 2012), http://worldnews.nbcnews.com/news/2012/09/04/13662931-illegal-logging-report-gets-liberias-attention-forestry-chief-suspended?lite.

[202] For example, the Liberian Environmental Protection Agency has promulgated guidelines for writing environmental impact statements, which specify required components and describe what each component must contain. ENVIRONMENTAL PROTECTION AGENCY, *supra* note 91, § 3.

[203] Social agreements between harvesters and potentially affected communities are different in this respect than contracts between landowners and logging companies because the ownership provision of the NFRL grants the government rights to Liberia's trees.

[204] *Liberia Rainforest: "60% Handed to Logging Companies,"* BBC (Sept. 4, 2012), http://www.bbc.com/news/world-africa-19469571 (quoting Liberia's Information Minister as saying, "[w]hat we're finding out sadly is that the community is not benefitting").

agreements. While it may be desirable to respect landowners' rights to contract with whomever they wish in their legitimate pursuit to derive value from their land, the recent linkage between armed conflict and natural resource revenues captured by political elites militates for at least a minimum of oversight. This could be achieved by applying the burdensome PPCA procedures to the PUP process, including the measures aimed at promoting transparency in natural resource contracts.[205] Alternatively, separate protections could be crafted, including a simple extension of the PPCA provision banning particular companies from the bidding process to prevent these same companies from operating under PUPs.

Certain regulatory gaps are easily repaired. The forthcoming PUP regulation could reference the prequalification criteria in the FDA core regulations that apply to FMCs, FUPs, and TSCs[206] and apply them to the PUP context. It could specify that the annual coupe inspection fee either constitutes a qualifying land rental fee or does not but is nonetheless an eligible PUP fee. And it could carry over to the PUP context the disclosure requirements that attach to FMCs and TSCs.[207] Public consultation requirements relevant to FMCs, TSCs, and major FUPs could also be easily applied to the PUP context, but the drafters will have to decide to what degree they will burden private landholders with the obligation to secure approval from others before commercially operating on their own land. A strong point in favor of requiring significant consultation is the lack of a clear definition of private land under Liberian law, which may produce conflicts over ownership or use rights that would be best aired and resolved prior to issuing a PUP. To balance respect for landowner rights with the rights of forest-dependent neighbors, the regulation might vary the level of required public consultation with the size of the forested parcel. As the benefits that local communities derive from nearby forests probably grow in proportion to the size of the forested area, it may be reasonable to force a high degree of public consultation where a large PUP is concerned while granting landowners wide freedom to make independent decisions with respect to small

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[205] *See, e.g.*, Amendment and Restatement of the Public Procurement and Concessions Act, §§ 4, 92 (2010) (Liber.).

[206] FORESTRY DEV. AUTH., REPUBLIC OF LIBER., TEN CORE REGULATIONS (2007) Reg. No. 103-07 § 2; *id*. Schedule 1.

[207] NFRL § 5.8 (2006) (Liber.).

PUPs.

Other challenges with the current PUP regime will not be so simple to resolve. Defining "private land" requires consideration of many social and economic factors and special sensitivity to Liberia's history of political inequality and the recent conflict. The decision to mandate a dedicated body to resolve this question[208] both highlights its complexity and suggests that the PUP regulation should not attempt its own definition, but should leave the definition up to the land experts. Careful consideration will also be needed to decide whether to add acceptable forms of consent to harvest logs on private land to the medium of written consent that the law already permits. Adding other acceptable forms of consent may be advisable to enable commercial use of private land in situations where the landowner is not able to give written permission. At the same time, the more forms of consent allowed, the greater the possibility for manipulation of the system to secure permission that may not represent fully informed consent.

The question of whether explicit size restrictions should be placed on PUPs (individually and as a combined percentage of Liberia's forested area) and whether existing duration restrictions should be more narrowly defined is also somewhat tricky. On the one hand, such limitations may not be important for ensuring sustainable logging, provided that other rules that speak more squarely to sustainable logging are in place and enforced. On the other hand, all other permit types are bound by such limitations,[209] suggesting that they are an important component of Liberia's forest regulatory regime. Limitations on the size and duration of permits serve as checks on forest users, on top of any substantive requirements aimed at promoting sustainable management. Given that substantive requirements are sorely lacking at present, it may be particularly important to incorporate oblique measures to aid the FDA in ensuring sustainable forestry. Indeed, size restrictions might have prevented the PUP-granting spree that hastily placed an enormous percentage of Liberia's territory under concession in the absence of adequate regulation. Duration restrictions would have meant that these concessions would have expired sooner, limiting the time in which loggers could have done damage before their permits came up for renewal. At least in the interim, before a

208 LAND COMMISSION, *supra* note 119.

209 *See supra* Section II(C)(2).

dedicated PUP regulation is promulgated and proves efficacious, it may be wise to institute such checks. Moreover, it is more difficult to monitor compliance with substantive sustainable logging requirements than to simply refrain from granting permits that exceed certain size and duration limits. The low capacity of Liberian regulators constitutes a strong case in and of itself for including easily implemented rules that can backstop more significant substantive rules.

B. *Adapting the Brazilian Model*

The second way to correct the flaws in the current PUP regime and ensure sustainable forest management is to borrow from the minimum conservation requirement approach reflected in Brazil's regulatory scheme and categorically prohibit clearance of certain forested areas on private property. This represents another way to circumscribe the FDA's discretion, which could supplement the regulatory clarifications discussed above. Clear, standardized conservation requirements (such as no-cut buffers around water bodies) may be especially appealing because compliance may be easier to monitor than compliance with permits that contain individualized permissions and obligations. Moreover, they promote sustainable forestry by affording certainty that compliance will result in attainment of desired conservation levels.

It would be a fairly simple matter to add requirements in a new PUP regulation that mandate property-by-property minimum conservation areas similar to the legal reserve requirement in Brazil's Forest Code. The basic format of the PUP regime as laid out in the NFRL and FDA regulations contemplates a regulatory scheme that, like the Forest Code, relies on command-and-control directives. Certain harvest requirements must be adhered to, duration limits obeyed, and harvester prequalifications satisfied.[210] However, such requirements represent economically inefficient ways to achieve sustainable forest management,[211] and adding to them by mimicking Brazil's strict prohibitions would exacerbate the inefficiency. Although increased inefficiency might be justifiable if it would significantly reduce the FDA's regulatory burden, minimum conservation requirements may actually have the opposite effect. The high cost of compliance with these strict

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210 *See supra* Section II(C).

211 *See* discussion of command-and-control regulation, *supra* Section IV.

standards in Brazil, combined with infrequent monitoring, low apprehension rates of violators, and lax prosecution of those violators that are caught have resulted in extremely low rates of compliance.[212] These same challenges would confront Liberia's under-capacitated FDA. Thus, while adapting Brazil's legal reserve mechanism for use in the PUP regulation could be useful, it would have to be done carefully, taking account of challenges that Brazil has encountered.[213]

The capture of local governments by logging interests that has contributed to low enforcement rates in Brazil should not pose a problem in Liberia because local governments play no enforcement role. But even the FDA would face incentives not to enforce forestry laws that are perceived as overly burdensome for fear of driving much-needed investment away from the country. Linking property taxes for forested lands to compliance with forestry law, as parts of Brazil have done,[214] may be one way to ensure that the government takes enforcement seriously.

A decision to incorporate minimum conservation requirements entails a tradeoff between flexibility and certainty in regulation. The Brazilian model, by imposing predetermined area restrictions on which trees may and may not be felled, sacrifices regulatory flexibility for a guarantee (assuming compliance with the law) of a high level of conservation. Brazilian regulators have little discretion to grant exceptions to the strict statutory deforestation limit. The High Court explained in one opinion that the legislators who passed the 1965 Forest Code intended to establish a fixed regime in response to the failed discretionary forest regime that had been put in place by the previous 1934 Forest Code.[215] Of course, limited discretion means less flexibility

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[212] *See supra* Section IV.

[213] Another issue that requires consideration before anything resembling Brazil's stringent land use controls can be applied to PUPs is whether this would be legal in the Liberian context. Brazil's Forest Code characterizes forests as "goods of common interest." Bryner, *supra* note 142, at 478. The NFRL ownership provision echoes this sentiment in a sense, although it moves beyond it by actually placing forests under the government's stewardship. To the extent that the ownership provision itself is viewed as a legitimate governmental restriction on private property rights, it presents that possibility of more rigorous governmental controls on private forestland. The question then becomes whether burdensome controls such as those used in Brazil are desirable in the Liberian context or whether other types of controls may be more appropriate.

[214] STICKLER, *supra* note 137, at 40.

[215] Bryner, *supra* note 142, at 489.

in the system and higher costs of compliance. A flexible system might allow deforestation to proceed where banning it would impose inordinate costs in individual circumstances. The outright ban in Brazil on clearing more than 20 percent of one's legal reserve in the Amazon region imposes a significant cost in terms of lost opportunity to seek rent from clearing land for other lucrative purposes. Imposing such a restriction on Liberian landowners would similarly limit the economic returns that would otherwise have been possible from clearing the land.

The primary mechanism with which Brazil has attempted to soften its rigid legal reserve requirement is the tradable permit scheme. Such a scheme could work in Liberia, but it would have to be designed carefully to preserve conservation objectives despite allowing increased flexibility. One problem that confronts most tradable permit schemes is how to fairly allocate the initial rights to degrade the environment (in our context, rights to fell trees). In the pollution context, permit allocation is often based on past pollution levels, which both creates a bias in favor of existing polluters and perversely incentivizes existing polluters to increase their pollution prior to the trading scheme coming into force in order to collect a greater share of pollution rights. These problems are not present, however, in the context of forestry. Property rights already represent a status quo bias—one that is generally accepted—and tradable permits would in fact reward past conservation efforts rather than past environmental harm.

The main challenge to adopting a tradable permit scheme in Liberia may be a dearth of landowners eligible to trade with each other. Limiting trades so that they may only take place within the same watershed or other ecologically-defined unit is desirable when there are many private landowners within that watershed. This ensures a robust market that fosters efficient trades. When, on the other hand, the number of landowners with whom to trade is too low, it may be difficult for those interested in trading to find one another and to agree on a price. If this happens, trades that otherwise might have benefited both landowners will not occur and the trading scheme will fail to minimize the cost of compliance with conservation requirements. Trading schemes at the watershed level in Brazil may create sufficiently robust markets to mitigate these transaction costs because substantial

areas of forest in Brazil—an area equivalent in size to Spain—[216] are privately owned.[217] In Liberia, however, it is unclear how much private land exists. Until the Land Commission decides on a legal definition of "private land," it will remain unclear whether enough private land exists within discreet geographic boundaries to allow for efficient trading. The alternative of expanding the geographic region in which trades can occur is not an attractive option because it would enable harmful distributional effects, such as complete destruction of especially important ecosystems.

Even if a definition of private land that enables the creation of robust, geographically constrained markets for trading were ultimately chosen, Liberia would run into a capacity challenge. Trading has been stymied in Brazil in part because Brazilian regulators have been unable to collect and make available enough information about legal reserves in different regions to enable interested parties to seek each other out.[218] Transaction costs remain too high for trades to go through. It does not seem likely that Liberian authorities, working with small budgets and poorly educated staffs, would have an easier time making information available to landowners concerning the amount of standing forest on other plots that is available for trading. Meanwhile, landowners in rural areas might have difficulty accessing such information and, in any event, may not fully understand it due to low literacy rates. In addition, a trading scheme would add to the FDA's administrative burden, as trades would have to be recorded, reviewed, and verified; this may not be advisable in light of the FDA's record.

Although there are significant problems with a trading scheme, minimum conservation requirements may still be worthwhile as they would provide a greater degree of certainty than is afforded by existing law that Liberia's forests will be protected. They would hamstring the FDA's ability in the future to grant sweeping clearance rights as it has done in the past few years. If a trading scheme is not a viable means to reduce the cost of compliance with such requirements, policymakers could simply

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[216] About 49.3 million hectares of Brazil's forestland is privately owned. SIRY ET AL., *supra* not 135 at 3. The area of Spain is about 50.5 million hectares. The World Factbook, U.S. CENT. INTELLIGENCE AGENCY, https://www.cia.gov/library/publications/the-world-factbook/geos/sp.html (last updated Jun. 20, 2014).

[217] SIRY ET AL., *supra* note 135, at 3.

[218] STICKLER, *supra* note 137, at 90.

choose to maintain a rigid stance and impose costs on landowners. Alternatively, the PUP regulation might soften the effects of rigid regulations by introducing a compensation scheme for the opportunity cost associated with complying. Payment could be made contingent on proving that forested areas have not been cut down, relieving the government of the monitoring burden to verify claims for compensation. Another approach could be to tie allocation of tax revenues to maintenance of forest cover from a given baseline. This would serve not only as a fairness mechanism by returning some of the money foregone from not cutting down forested areas to those who suffer the loss, but also as an incentive for local enforcement of harvest restrictions. States in southern Brazil have successfully experimented with an ecological tax that grants a percentage of tax revenues to municipalities on the basis of existing forest cover.[219]

Standardized conservation requirements that apply to all private properties may in some ways be easier to monitor and enforce than individualized permit requirements, but they still require regulators to ensure compliance with the chosen standard. And monitoring is probably even more of a challenge in Liberia than it is in Brazil, where insufficient monitoring is a primary reason for low compliance.[220] Liberia's GDP per capita in 2011 was only US$377, less than one-thirtieth of Brazil's;[221] thus, Liberia probably could not afford the satellites that facilitate monitoring in Brazil. Even if Liberia had access to a satellite, the FDA would probably not be the first agency to benefit from it, given the needs of sectors typically deemed more important than forestry, such as mining and agriculture.[222] Monitoring challenges do not, however, militate against adoption of minimum

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[219] LELE ET AL., *supra* note 182, at 24.

[220] *See supra* Section IV(B).

[221] *GDP Per Capita (Current US$)*, WORLD BANK, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD (last visited Jan. 21, 2013).

[222] Although the budgetary allocation from the national treasury to ministries and agencies does not necessarily indicate relative importance, it is telling. The 2013–2014 national budget allocated $LRD13,396,524 to the Ministry of Forestry. In comparison, the Ministry of Lands, Mines and Energy; Ministry of Agriculture; and Ministry of Youth & Sports were respectively allocated 40,744,461; 94,792,923; and 15,861,968. DEP'T OF THE BUDGET, MINISTRY OF FIN., NATIONAL BUDGET OF THE GOVERNMENT OF THE REPUBLIC OF LIBERIA, FISCAL YEAR 2013/14 (2013), *available at* https://docs.google.com/a/mopea.gov.lr/viewer?a=v&pid=sites&srcid=bW9wZWEuZ292LmxyfG10ZWYtYnVkZ2V0fGd4OjJlYTc5MmYxZTZiZWRiNGY.

conservation requirements, as these same challenges plague Liberia's current forestry regime.

If Liberia were to adopt minimum conservation requirements, it would have to decide on an enforcement scheme. Brazil holds strictly liable any landowner in possession of land that does not meet the legal reserve requirement[223]—an approach that guarantees restoration of degraded forests (provided adequate enforcement) and incentivizes landowners to prevent deforestation, even by third parties. Although this scheme is highly protective of forests, Liberia may be better off requiring an element of causation. There is a risk that landowners with too strong an incentive to protect their interests would perhaps resort to violent measures to avoid being held liable for third party logging on their property. Given Liberia's post-conflict context, festering animosity might combine with other factors to lower the threshold for engaging in violence.

Ultimately, the success of forest regulation in Liberia will depend on the regulator's capacity and will to enforce. The best-drafted PUP regulation will not fix the current broken system if the FDA does not have enough resources to perform adequate background checks, meaningfully review PUP applications, monitor compliance with permits, and bring enforcement actions. And even a fully resourced FDA will fail to ensure that commercial forestry is practiced sustainably if its leadership is uninterested in fairly applying the laws that bind it. This reality should not, however, stand in the way of creating the most robust regulatory scheme to govern private forested land that can be devised. Over time, economic development will enable the central government to increase the FDA's budget, and continued pressure from civil society and international advocacy organizations will hopefully encourage political leaders to uphold the rule of law. The role of the drafters of the PUP regulation is to fashion a PUP regime that will, once adequate funding and political will are present, be capable of protecting Liberia's forest base into the future.

CONCLUSION

There is a strong case for a PUP regulation that clarifies the

223 Bryner, *supra* note 142, at 511.

current vagueness regarding how PUPs are to be administered, and adopts elements of Brazil's minimum conservation requirements scheme. Extending the application of parallel provisions governing other forest license types to PUPs can remedy many of the gaps in the existing regulatory regime. Other issues will require a more careful weighing of policy options that balances the rights of private landholders and investors with the rights of forest-dependent communities. Brazil's approach of mandating uniform conservation practices across all private forested properties could supplement these clarifications, both injecting some amount of certainty that forests will be sustainably harvested and constraining the FDA's discretion to award environmentally damaging permits.

Brazil's regulatory scheme represents one model for ensuring environmental sustainability in the private forestland sector. It strikes a reasonable balance, at least in theory, between the imperative of guarding against over-exploitation of forest resources and the need to allow landowners to reap economic benefits from their land. But Brazil's experience shows that factors such as low monitoring and enforcement capacity can impede achievement of this balance. Moreover, Brazil's model provides no guidance to policymakers who might wish to construct a forestry regime that incorporates transparency, public participation, or benefit sharing, as did those who drafted Liberia's forestry regime. Countries with social factors that detract from the baseline of trust needed for a regulatory scheme to function effectively, such as abject poverty or a history of ethnic tension or armed conflict, need to look elsewhere for inspiration.

Many countries with substantial standing forests are in fact developing countries that share these challenges with Liberia. For example, the Democratic Republic of the Congo, the Republic of the Congo, and the Central African Republic have all experienced recent civil conflict and continue to have high rates of poverty. Forestry regimes with an exclusive focus on environmental protection could risk inflaming tensions and engendering mass non-compliance.

Fortunately, the laws that currently apply to other forest license types in Liberia but not to PUPs could serve as a template for constructing forest management systems that are sensitive to fragile social dynamics. Provisions requiring publication of permit information in newspapers of general circulation, including the name of the permit holder and the amounts of payments, promote

transparency. Requirements that forest-dependent communities be notified of the proposed license, and that community representatives be consulted, ensure public input into the concession process. And mandatory social agreements ensure that benefits from forest concessions are shared with locally affected peoples. If Liberia passes a PUP regulation that brings governance of private forested land in line with the progressive rules governing other license types, its forestry regime could serve as a model for other forested developing countries.

THE WASTE TREATMENT EXCLUSION AND THE DUBIOUS LEGAL FOUNDATION FOR THE EPA'S DEFINITION OF "WATERS OF THE UNITED STATES"

SCOTT SNYDER*

The precise scope of "waters of the United States" is constantly in flux, as environmentalists advance a more expansive view, while industry interests support a narrower interpretation. The waste treatment exclusion highlights this tension, as it provides a means by which a coal-fired power plant, for example, may remove a body of water from Clean Water Act (CWA) jurisdiction by impounding it and labeling it a waste treatment system. At that point, what was once a "water of the United States" is no longer regarded as such. Although the U.S. Environmental Protection Agency (EPA) vowed to revisit the issue of the waste treatment exclusion when the agency initially created it in 1980, it has failed to do so.

The waste treatment exclusion arises out of a strained interpretation of the CWA and its common law foundations. The regulation creating the exclusion was informally adopted and thus may not deserve full Chevron *deference. Even with* Chevron *deference, the regulation appears to fail at either step of the analysis; it attempts to fill a gap in the law that Congress arguably did not leave, and assuming the existence of such a gap, the exclusion fills it with an unreasonable interpretation of the statute that permits removal of waters from the CWA's jurisdictional scope. Finally, under* Brand X *and* Home Concrete*, the regulation is invalid as inconsistent with a prior judicial construction of the law regarding the scope of "waters of the United States."*

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While courts have mitigated the potential damage of the exclusion, and the EPA has stated its intention to interpret the exclusion restrictively, other legal and policy changes may independently end coal-fired electricity production in the U.S. Thus, there may be diminishing practical imperative to excise this potentially illegitimate regulation from the books. Nonetheless, if environmental groups wish to do so, these arguments should aid their efforts.

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INTRODUCTION

In 1972, Congress passed the Clean Water Act (CWA) in order to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[1] This was to be accomplished by *eliminating* the discharge of pollutants into navigable waters by 1985.[2] While laudatory for its intent, this goal proved to be vastly over-ambitious. Faced with deadlines that could not be met, Congress approved delayed compliance.[3] Although the quality of the nation's waters has improved since the passage of the CWA, substantial pollution continues unabated.[4] Coal-fired power plants are a significant source of this persistent water pollution.[5]

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[1] Federal Water Pollution Control Act, 33 U.S.C. § 1251(a) (2011).

[2] *Id.* § 1251(a)(1).

[3] *See, e.g.*, Senator Edmund S. Muskie, *The Meaning of the 1977 Clean Water Act*, EPA JOURNAL (July/Aug. 1978), *available at* http://www2.epa.gov/aboutepa/meaning-1977-clean-water-act (outlining several revisions to compliance deadlines within the Act).

[4] James Salzman, *Why Rivers No Longer Burn*, SLATE (Dec. 10, 2012, 5:20 AM), http://www.slate.com/articles/health_and_science/science/2012/12/clean_water_act_40th_anniversary_the_greatest_success_in_environmental_law.html (praising the CWA for successfully improving the quality of the nation's waters, but noting that still, "[t]he EPA estimates that about half of our rivers and streams, one-third of lakes and ponds, and two-thirds of bays and estuaries are 'impaired waters,' in many cases not clean enough for fishing and swimming") (citing WATERSHED ASSESSMENT, TRACKING & ENVIRONMENTAL RESULTS, U.S. ENVTL. PROT. AGENCY, http://ofmpub.epa.gov/waters10/attains_nation_cy.control (last updated Aug. 24, 2013)).

[5] *See Disposal: Coal Ash Waste*, SIERRA CLUB, http://content.sierraclub.org/coal/disposal-ash-waste (last visited May 6, 2014) (describing "the hazards of coal ash").

The majority of coal mined in America is used for electricity generation at about 600 power plants throughout the country.[6] The U.S. Environmental Protection Agency (EPA), through authority in most cases delegated to state programs, regulates water pollution from coal-fired power plants primarily through the National Pollution Discharge Elimination System (NPDES) permit program.[7] NPDES permits establish effluent limits for point source discharges of pollutants into "waters of the United States."[8]

When coal is burned to produce electricity, it creates ash as a waste byproduct; this ash must be disposed of.[9] The Clean Air Act (CAA) requires that most coal plants, including all post-1978 plants, "scrub" their emissions in order to reduce the release of pollutants into the air during coal combustion.[10] This scrubbing produces a "wet paste" composed of a mixture of chemicals, water, and coal ash.[11] This mixture is then pumped into an impoundment

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[6] *Energy in Brief: What is the Role of Coal in the United States?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/article/role_coal_us.cfm (last updated Aug. 16, 2013) [hereinafter *Energy in Brief*].

[7] *See, e.g.*, U.S. EPA, Permit No. AK-002294-2: Authorization to Discharge Under the National Pollutant Discharge Eliminatory System (issued to Golden Valley Electric Association Aug. 1, 2011), [hereinafter Healy Permit], *available at* http://www.epa.gov/region10/pdf/permits/npdes/ak/ak0022942-fp.pdf (authorizing the plant "to discharge *treated wastewater* . . . in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein" (emphasis added)).

[8] *See, e.g.*, *id.* at 5–6.

[9] Jessica Lienau, *Coal Ash Waste: A History of Legislative Inaction*, 14 PUB. INT. L. REP. 141, 142 (2009).

[10] *See* Joe Romm, *AEI Scholar Celebrates the Success of the Clean Air Act's Acid Rain Cap-and-Trade Program—Without Acknowledging Its Existence*, CLIMATE PROGRESS (Apr. 25, 2011, 12:48 PM), http://thinkprogress.org/climate/2011/04/25/207960/aei-scholar-celebrates-the-success-of-the-acid-rain-program-without-acknowledging-its-existence/ ("Without the Clean Air Act's pollution limits, this scrubber technology . . . would never have happened."); *see also Cleaning up Coal*, U.S. DEP'T OF ENERGY, http://www.fossil.energy.gov/education/energylessons/coal/coal_cct2.html (last visited Aug. 24, 2013) (describing the "scrubbing" process). *But see* Keith Epstein, *Decades After Clear [sic] Air Act, Most Smokestacks Still Lack Scrubbers*, CENTER FOR PUB. INTEGRITY (June 10, 2011, 3:25 PM), http://www.publicintegrity.org/2011/06/10/4872/decades-after-clear-air-act-most-smokestacks-still-lack-scrubbers-0 (last updated June 23, 2011, 10:42 PM) (noting the limits to the CAA's success in inducing the installation of scrubbing technology).

[11] U.S. DEP'T OF ENERGY, *supra* note 10.

for treatment,[12] and the resultant cleaner water is discharged at a permitted point source, referred to as an "outfall."[13] The impounded treatment ponds are generally considered "waste treatment systems" under the CWA.[14] As regulations under the CAA become more stringent, the volume of coal ash disposed of in these impoundments will increase.[15]

This Article addresses the EPA's regulation of these impoundments, and specifically, the EPA's legal grounds for exempting such "waste treatment systems" from the scope of "waters of the United States" under the CWA. Part I will briefly lay out the history of the regulatory exception for waste treatment systems—hereafter referred to as the "waste treatment exclusion"—and discuss the context in which it was promulgated, why no subsequent action was taken to address the issue, and how the EPA now views its rule. Part II will consider what degree of judicial deference the EPA's action merits based on the *Chevron* Doctrine, as well as the issue of the EPA's regulatory derogation of federal common law in light of *Brand X* and the line of cases that followed. Part III will survey the extant case law on the waste treatment exclusion. Finally, Part IV will consider recent

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[12] Some of the ash is also "recycled" and used in the manufacture of, e.g., concrete, roofing materials, and as a fill materials; the majority—56 percent—is deposited in surface impoundments and landfills. *Frequent Questions: Coal Combustion Residues (CCR)—Proposed Rule*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/wastes/nonhaz/industrial/special/fossil/ccr-rule/ccrfaq.htm (last updated Sept. 4, 2013) [hereinafter *Frequent Questions: CCR*].

[13] *See Sulfur Dioxide Scrubbers*, DUKE ENERGY, http://www.duke-energy.com/environment/air-quality/sulfur-dioxide-scrubbers.asp (last visited May 6, 2014) ("Unused byproducts [i.e. coal ash] are properly disposed of in approved landfills."); *see also* Healy Permit, *supra* note 7 (establishing effluent limits for specified "outfalls," but not for discharges *into* the treatment facilities); Memorandum from Diane Regas, Dir., Office of Wetlands, Oceans and Watersheds, et al. to Randy Smith, Dir., Office of Water, Region X (May 17, 2004) [hereinafter Regas Memorandum] (on file with author) ("EPA and the Corps also agree that any discharge of pollutants *from the impoundment to a downstream water* . . . is subject to CWA Section 402 [NPDES permitting]." (emphasis added)).

[14] *See* 40 C.F.R. § 122.2 (2013) ("Waste treatment systems, including treatment ponds").

[15] *See, e.g.*, Spencer Hunt, *Utilities Amassing Landfills: Tougher Air Standards Send Tons of Plants' Sludge, Coal Ash into Ground*, COLUMBUS DISPATCH, Apr. 15, 2008, 1:17 AM, http://www.dispatch.com/content/stories/local/2008/04/14/Powerfills.ARTART_04-14-08_B1_FF9TI0U.html ("As federal rules require more scrubbers . . . utilities will dump more [coal ash] in the ground.").

developments in energy policy that place increasing burdens on coal-fired generation and will explore how reversing the waste treatment exclusion may provide an alternative means of addressing greenhouse gas emissions from coal-fired power plants.

I. THE WASTE TREATMENT EXCLUSION

Before the waste treatment exclusion, the EPA had defined "waters of the United States" to include "[a]ll impoundments of waters otherwise defined as navigable waters under this [definition]."[16] The definition specified that "waste treatment systems (other than cooling ponds meeting the criteria of this paragraph) are not waters of the United States."[17] Then, on May 19, 1980, the EPA (temporarily) clarified its view of waste treatment systems:

> Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR § 423.11(m) which also meet the criteria of this definition) are not waters of the United States. *This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as a disposal area in wetlands) nor resulted from the impoundment of waters of the United States*.[18]

Thus, while the prior definition created an exception to regulation as "waters of the United States" for waste treatment systems, the EPA's May 19 action carved out an exception to this exception, such that a plant operator could not coopt original "waters of the United States" for use as waste treatment systems and thereby avoid regulation. This conformed to Congressional intent as evidenced by Senate Committee reports on the CWA. For example, in 1971, a report from the Senate Public Works Committee emphatically stated: "The use of any river, lake, stream or ocean as a waste treatment system is unacceptable."[19] The EPA's early understanding of the Act reflected this sentiment from the Senate report, as shown in the EPA's background discussion of a 1978 proposed rule:

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[16] 40 C.F.R. § 122.3(t)(4) (1979).

[17] *Id*. § 122.3(t)(6).

[18] EPA Administered Permit Programs, 45 Fed. Reg. 33,418, 33,424 (May 19, 1980) (emphasis added).

[19] S. REP. NO. 92-414, at 7 (1971), *reprinted in* 1972 U.S.C.C.A.N. 3668, 3674.

> The definition of 'navigable waters' has been revised to more accurately reflect which waters are subject to the requirements of the Clean Water Act. *Consistent with legislative history*. . .the term covers all waters which may be regulated by the Federal Government within constitutional limits, including . . . impoundments.[20]

However, on July 21, 1980, only two months after the EPA had revised the definition of "waters of the United States" to be consistent with this congressional intent, the agency backtracked, suspending the italicized portion of the May 19 definition above.[21] This created the waste treatment exclusion. At the time the EPA promulgated this exception, the agency stated its intention to "promptly . . . develop a revised definition,"[22] but it never did so.

It also bears mentioning that the phrase this Article addresses, "waters of the United States," possesses slightly different definitions in different regulatory contexts.[23] Most significantly, the EPA and Army Corps of Engineers have recently prepared a proposed rule that seeks to standardize the definition across CWA regulations, as well as to incorporate the most recent Supreme Court precedent and the latest scientific understanding of the water table.[24] The definition of "waters of the United States" in the proposed rule retains the waste treatment exclusion.[25]

A. *The Role of Coal Ash Ponds in Electricity Generation*

As of 2012, 81 percent of coal produced in the U.S. was devoted to generating electricity at 572 power plants across the

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[20] National Pollutant Discharge Elimination System, 43 Fed. Reg. 37,078, 37,079 (proposed Aug. 21, 1978) (to be codified at 40 C.F.R. pt. 6) (emphasis added).

[21] Consolidated Permit Regulations, 45 Fed. Reg. 48,620 (July 21, 1980) (to be codified at 40 C.F.R. pt. 122).

[22] *Id*. (alteration added).

[23] *Compare* 40 C.F.R. § 122.2 (2013) (including the definition of "waters of the United States" discussed here), *with* 33 C.F.R. § 328.3(a)(8) (2013) (including within a definition of the same term a provision related to prior cropland).

[24] Definition of "Waters of the United States" Under the Clean Water Act, 79 Fed. Reg. 22,188 (proposed Apr. 21, 2014) (to be codified at 40 C.F.R. pts. 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401).

[25] Definition of "Waters of the United States" Under the Clean Water Act, 79 Fed. Reg. at 22,189 ("The agencies propose no change to the exclusion for waste treatment systems . . . .").

nation.[26] This combustion creates ash, some of which is deposited in treatment ponds on site.[27] As of June 2012, the EPA had documented at least 1161 coal ash ponds in the U.S.,[28] and there are undoubtedly more.[29] As a result of the waste treatment exclusion, discharges into these ponds are unregulated,[30] although the construction and maintenance of the ponds is nonetheless subject to some oversight.[31]

While Section 402 of the CWA regulates discharges of pollutants *from* a waste treatment system into other "waters of the United States," Section 404 regulates the creation of the impoundments themselves.[32] Authority to enforce Section 404 permits is split between the EPA, charged with enforcing water quality impacts of such impoundments, and the Army Corps of Engineers, charged with enforcing permit conditions related to construction of the impoundments.[33] Extensive regulations govern the creation of treatment systems and discharges from such systems in a variety of contexts.[34] In addition, "[w]aste treatment

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[26] *Coal vs. Wind*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/clean_energy/coalvswind/c01.html (last visited May 14, 2014); *Energy in Brief*, *supra* note 6.

[27] *Disposal: Coal Ash Waste*, *supra* note 5; *see also Coal Combustion Residuals Impoundment Assessment Reports*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/wastes/nonhaz/industrial/special/fossil/surveys2/ (last updated Mar. 24, 2014) (discussing the EPA's assessment of coal ash impoundments).

[28] Lisa Evans & Lisa Hallowell, *New EPA Data Show Coal Ash Problem Much Worse*, EARTHJUSTICE (June 27, 2012), http://earthjustice.org/news/press/2012/new-epa-data-show-coal-ash-problem-much-worse.

[29] *See id.* (noting that utilities continue to conceal the existence of some ponds through confidential business information claims).

[30] *See* Memorandum from LaJuana S. Wilcher, Assistant Adm'r, U.S. Envtl. Prot. Agency to Charles E. Findley, Dir., Water Division, Region X (Oct. 2, 1992) [hereinafter Wilcher Memorandum], *available at* http://www.epa.gov/npdes/pubs/cwa_regulation_mine.pdf.

[31] *See infra* notes 32–35.

[32] *See* Wilcher Memorandum, *supra* note 30, at 1 ("All the parties agree that the mining companies need a *Section 404 permit for the discharge of fill material to create the basins themselves*, and that a Section 402 permit is needed for any discharges flowing out of the basins following treatment." (emphasis added)); *see also* 33 U.S.C. § 1344 (2011) (covering permits for dredged or fill material).

[33] Wilcher Memorandum, *supra* note 30, at 2.

[34] *See generally* 40 C.F.R. § 420 (2013) (establishing effluent standards, pretreatment standards, and provisions related to waste treatment facilities for individual categories).

systems . . . generally are subject to regulation under [the Resource Conservation and Recovery Act]."[35]

Despite the basic practical need to *have* waste treatment systems, the current regulatory oversight of these impoundments is woefully deficient. Data released by the EPA in June 2012 indicate that "at least 535 ponds . . . operate without a liner to prevent hazardous chemicals from reaching drinking water sources."[36] Without impermeable liners, harmful chemicals, including arsenic, lead, and mercury, among others, can leach into groundwater supplies and contaminate drinking water.[37] Both the EPA and the Army Corps of Engineers are aware of these risks.[38] However, while the EPA has recognized the dangers of coal ash and proposed rules to regulate its disposal, the substance remains unregulated as an "exempt waste."[39] In addition to these

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[35] Memorandum from Marcia Williams, Dir., Office of Solid Waste to James H. Scarbrough, Chief, Residuals Mgmt. Branch, Region IV, at 5 (Apr. 2, 1986) [hereinafter Williams Memorandum], *available at* http://yosemite.epa.gov/osw/rcra.nsf/ea6e50dc6214725285256bf00063269d/40C2A6D9BCCFCE8F8525670F006C0105/$file/12604.pdf; *see also* 40 C.F.R. 261.4(a)(2) c. (2013) (excluding from RCRA coverage discharges that are subject to CWA Section 402 regulation, but specifying that this "does *not* exclude industrial wastewaters while they are being collected, stored or treated before discharge, nor does it exclude sludges that are generated by industrial wastewater treatment" (emphasis added)).

[36] Evans & Hallowell, *supra* note 28; *see also Frequent Questions: CCR*, *supra* note 12 (noting that a substantial percentage of states lack requirements for liners on CCR landfills).

[37] *Disposal: Coal Ash Waste*, *supra* note 5; *see also Frequent Questions: CCR*, *supra* note 12 ("These residuals contain contaminants like mercury, cadmium and arsenic associated with cancer and various other serious health effects.").

[38] OFFICE OF RES. CONSERVATION AND RECOVERY, U.S. ENVTL. PROT. AGENCY, HUMAN AND ECOLOGICAL RISK ASSESSMENT OF COAL COMBUSTION WASTES 4–10 (2010), *available at* http://earthjustice.org/sites/default/files/library/reports/epa-coal-combustion-waste-risk-assessment.pdf ("[T]he presence of liners, especially composite liners, reduce leaching and risks from CCW [coal combustion waste] landfills and surface impoundments."); *see also* Dina Cappiello, Toxic Coal Ash Piling up in Ponds in 32 States, USA TODAY (Jan. 9, 2009, 8:57 PM), http://usatoday30.usatoday.com/news/nation/environment/2009-01-09-coal-ash_N.htm ("In 2000, when the EPA first floated the idea of a national standard, the agency knew of 11 cases of water pollution linked to ash ponds or landfills."); Wilcher Memorandum, *supra* note 30, at 2 ("[T]he Corps would require that a liner be placed in the disposal/treatment facility, if EPA recommends such liner to protect water quality.").

[39] *Coal Combustion Residuals—Proposed Rule*, 75 Fed. Reg. 35,128 (June 21, 2010) (to be codified at 40 C.F.R pts. 257, 261, 264, 265, 268, 271, 302), *available at* http://www.epa.gov/epawaste/nonhaz/industrial/special/fossil/ccr-

groundwater pollution concerns, the structural integrity of many of these impoundments is highly suspect. In 2008, this danger came into the spotlight at the Tennessee Valley Authority (TVA) Kingston Fossil plant, where the walls of a coal ash impoundment failed and 5.4 million cubic yards of sludge burst through an earthen dam and buried the surrounding land, including many homes.[40] Despite this disaster, the Kingston plant remains online, serving nine million customers with coal-generated electricity.[41] Even after coal plants have ceased operations, these surface impoundments pose ongoing risks.[42]

B. *The EPA Capitulated to Industry Interests to Amend Its Definition*

As noted above, the EPA's May 19 definition was consistent with legislative intent not to allow the use of "waters of the United States" in treating wastewater.[43] However, coal-fired generation and the storage of coal combustion residuals in surface water impoundments was common industry practice years before Congress enacted the CWA.[44] Thus, when the EPA introduced its

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rule/index.htm (last updated Dec. 4, 2013).

[40] Rebecca Purdom & Emily Remmel, *TVA Found Liable for Massive Coal Ash Spill But Proof of Damages Remains an Obstacle*, VT. LAW SCH., http://watchlist.vermontlaw.edu/tva-found-liable-for-massive-coal-ash-spill-but-proof-of-damages-remains-an-obstacle/ (last visited Aug. 25, 2013); *accord Tennessee Valley Coal Ash Spill Buries 400 Acres, Damages Homes*, ENV'T NEWS SERV. (Dec. 23, 2008), http://www.ens-newswire.com/ens/dec2008/2008-12-23-091.asp; *see also* Sue Sturgis, *Coal's Ticking Timebomb: Could Disaster Strike a Coal Ash Dump Near You?*, INST. FOR S. STUDIES (Jan. 4, 2009, 11:24 PM), http://www.southernstudies.org/2009/01/coals-ticking-timebomb-could-disaster-strike-a-coal-ash-dump-near-you.html (identifying the 100 largest surface impoundments of coal ash in the U.S.).

[41] Purdom & Remmel, *supra* note 40.

[42] *See, e.g.*, Tracy Moss, *Environmental Concerns Remain over Coal-Ash Ponds*, NEWS-GAZETTE (Aug. 19, 2013, 7:00 AM), http://www.news-gazette.com/news/local/2013-08-19/environmental-concerns-remain-over-coal-ash-ponds.html (discussing ongoing concerns regarding ponds at a coal-fired plant in Illinois that has been offline for over two years).

[43] S. REP. NO. 95-370, at 4 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4326, 4330 ("There is no defense for the practice of dumping all of the waste that this country generates into its rivers, lakes, and streams. The 1972 act stipulated that the Nation's fresh and marine waters would not be an element of the waste treatment process. That continues to be national policy."); S. REP. NO. 92-414, at 7, *reprinted in* 1977 U.S.C.C.A.N. 4326, 4330.

[44] *See Coal Impoundments with Hazard Rating*, ENERGY JUSTICE NETWORK, http://www.energyjustice.net/map/data.php (follow "Coal Impoundments with

revised definition that exempted only treatment systems *not* created in "waters of the United States," operators understandably expressed concern that old impoundments would face new regulation.[45] Industry pressure led to the EPA's prompt suspension of a portion of the definition, thereby exempting waste treatment systems from its scope.[46] On at least a conceptual level, this validated the industry practice of commandeering natural bodies of water for use as treatment ponds.

The EPA's response to industry concerns—creating a blanket exception for waste treatment systems—was not its only option. The agency could have retained its May 19 definition, but chosen not to apply it retroactively;[47] it could have included tiered requirements for remedial action based on the age and size of the impoundment, thereby ameliorating some of the burden industry would bear from cleanup costs; it could have required full compliance with the definition but provided other financial incentives to lessen the blow.[48] Despite a number of options and the agency's promise to revisit the rule, the EPA has left the definition alone for the past thirty-four years.[49]

Hazard Rating" hyperlink) (last visited May 14, 2014). The Google Earth file available here identifies over 600 coal ash impoundments and lists factual characteristics, including age. Many of the facilities were commissioned prior to 1970.

[45] *See* Consolidated Permit Regulations, 45 Fed. Reg. 48,620 (July 21, 1980) (to be codified at 40 C.F.R. pt. 122) (noting objections to the May 19 version of the definition submitted by "[c]ertain industry petitioners," because the previous language "would require them to obtain permits for discharges into existing waste treatment systems, such as power plant ash ponds").

[46] *See* In the Matter of: Borden, Inc./Colonial Sugars, 1 E.A.D. 895, 911 n.32 (EAB 1984) ("[C]ertain industry members wrote EPA objecting to the new regulation's policy of making the exemption inapplicable to *all* natural waste treatment systems including, e.g., power plant ash ponds which had been in existence for many years. In response to this flurry of criticism by industry . . . EPA decided to suspend its effectiveness pending reexamination through further proceedings.").

[47] Indeed, this appears to be the EPA's intent even with the exclusion in place. *See* Williams Memorandum, *supra* note 35, at 9.

[48] Such financial incentives (e.g., partial subsidization of the requisite compliance measures) would likely require Congressional action, which would explain why the EPA did not go this route.

[49] *See* 40 C.F.R. § 122.2 (2013) (retaining the waste treatment exclusion exactly as it was written on July 21, 1980); Consolidated Permit Regulations, 45 Fed. Reg. at 48,620 ("EPA intends promptly to develop a revised definition and to publish it as a proposed rule for public comment.").

Thirty years of inaction aside, the EPA must have questioned, on some level, the legality of the definition as it currently exists, or the agency would have simply deleted the offending sentence, rather than suspending and promising to revise it. This may have been due to an awareness of prior legislative history on the matter; alternatively, it may have been based on a more fundamental, high level analysis, by which it seems simply odd for an Act purportedly aimed at protecting the nation's waters to allow private entities to take practical ownership of some of those waters to be used as dumping grounds. In any event, the EPA has *not* revisited the waste treatment exclusion, and it seems to view the definition of "waters of the United States" as though the suspended sentence has in fact been deleted,[50] although it tends to disfavor new construction of impoundments of "waters of the United States."[51]

As previously mentioned, the EPA has proposed rules to regulate coal ash.[52] However, these seem to have stalled.[53] More fundamentally, notwithstanding potential regulation of coal ash, the question remains whether the waste treatment exclusion, which affects specifically the impoundments, is or ever was legally permissible.

II. REGULATORY DEROGATION OF FEDERAL COMMON LAW

The EPA's waste treatment exclusion conflicts with longstanding Supreme Court jurisprudence regarding the definition of "waters of the United States." Decades before Congress passed the modern Clean Water Act, the Court explicitly stated that under common law, once a body of water was considered to be within

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[50] *See* Regas Memorandum, *supra* note 13, at 3 (referring to the "waste treatment exclusion . . . for the discharge of [pollutants] to impounded waters" (alteration added)); Wilcher Memorandum, *supra* note 30, at 2 (expressing the "view that the particular [impoundment], if permitted by the Corps under Section 404 for purposes of creating a waste treatment system, would no longer be waters of the U.S." (alteration added)).

[51] *See* Williams Memorandum, *supra* note 35, at 9.

[52] *Coal Combustion Residuals—Proposed Rule*, *supra* note 39.

[53] Tracy Moss, *supra* note 42 (noting that the EPA's proposed rules have "generated controversy in Washington"); Kristen Lombardi, *As EPA Delays New Coal Ash Rules, Residents Turn to the Courts for Relief*, CTR. FOR PUB. INTEGRITY (Feb. 22, 2013, 6:00 AM), http://www.publicintegrity.org/2013/02/22/12223/epa-delays-new-coal-ash-rules-residents-turn-courts-relief.

the scope of "waters of the United States," it would *always* be within the scope of "waters of the United States."[54] Under a straightforward reading of the waste treatment exclusion, the EPA's definition of "waters of the United States" directly contradicts the definitional scope prescribed by federal common law, because the definition allows what was once a "water of the United States" to be converted into a waste treatment system, thereby losing its protected status.[55]

A. *Was the EPA's Action Procedurally Sufficient to Warrant Judicial Deference?*

As an initial matter, it is necessary to determine whether the EPA's July 21, 1980, action—suspending a portion of the May 19 final rule—deserves judicial deference, and if so, how much.[56] There is little doubt that the original May 19 rule, promulgated via notice-and-comment rulemaking, would be subject to an ordinary *Chevron* analysis.[57] However, the July 21 suspension, a rapid response to criticism of the final rule, was not itself a product of the same analytical rigor or public scrutiny, for there was no additional formal notice and comment period. There was *meant* to be further rulemaking, but to revise the definition more fully post-suspension, not to effect the suspension in the first place.[58]

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[54] *E.g.*, Utah v. United States, 403 U.S. 9, 10 (1971) (applying the "equal footing" principle, and stating that "Utah's claim to the original bed of the Great Salt Lake—whether now submerged or exposed—ultimately rests on whether the lake *was* navigable at the time of Utah's admission" (emphasis added)); United States v. Appalachian Elec. Power Co., 311 U.S. 377, 408 (1940) ("When once found to be navigable, a waterway remains so."). For discussion of why it should not matter that these prior cases generally use the term "navigable waters," whereas the CWA uses the term "waters of the United States," see *infra* notes 94-95 and accompanying text.

[55] Wilcher Memorandum, *supra* note 30, at 2.

[56] *See, e.g.*, United States v. Mead Corp., 533 U.S. 218, 221 (noting that under *Skidmore*, a relatively informal agency action "is eligible to claim respect according to its persuasiveness").

[57] *See id.* at 219 ("A very good indicator of delegation meriting *Chevron* treatment is express congressional authorizations to engage in the rulemaking or adjudication process that produces the regulations or rulings for which deference is claimed. Thus, the overwhelming number of cases applying *Chevron* deference have reviewed the fruits of notice-and-comment rulemaking or formal adjudication.").

[58] *See* In the Matter of: Borden, Inc./Colonial Sugars, 1 E.A.D. 895, 911 n.32 (EAB 1984) ("EPA decided to suspend [the suspended sentence's]

In *Motor Vehicle Manufacturers Association of U.S., Inc. v. State Farm Mutual Automobile Insurance Co.* (*State Farm*), the Supreme Court explained that an agency's decision to rescind its rule is subject to the same standard of judicial scrutiny—arbitrary and capricious review—as an agency's decision to promulgate such a rule.[59] The waste treatment exclusion resulted from the EPA's suspension of *part* of a rule, rather than rescission of the full rule; however, the suspension seems to have become permanent and thus could be viewed functionally as a rescission. Moreover, similar to the case of the waste treatment exclusion, the Court's analysis in *State Farm* concerned "an agency changing its course by rescinding a rule."[60] Applying the Court's reasoning to the waste treatment exclusion, the EPA "is obligated to supply a reasoned analysis for the change."[61] The agency did this to some extent at the time of the suspension.[62] The EPA has also continued to supply guidance on the rule in the form of memoranda.[63] Yet, as previously noted, the EPA also stated its intention to "promptly" issue a new definition, which it never did.[64] The EPA's failure to return to the rule and take further action as promised may be a separate "action" that a court could find arbitrary and capricious under the Administrative Procedure Act (APA).[65]

While the above application of *State Farm* relies on the way in which the EPA's action regarding the waste treatment exclusion is similar to a rescission, the EPA did *not* formally rescind its rule; this may suggest even further that the action was arbitrary and capricious. *State Farm* concerned automobile standards set by the

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effectiveness *pending reexamination through further rulemaking proceedings (i.e., public notice and comment)*." (alteration added)).

[59] Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 41 (1983); *see* Chevron, U.S.A., Inc. v. NRDC, 467 U.S. 837 (1984) (discussed further in this Part, *infra*).

[60] 463 U.S. at 42.

[61] *Id.*

[62] Consolidated Permit Regulations, 45 Fed. Reg. 48,620 (July 21, 1980) (to be codified at 40 C.F.R. pt. 122) (noting that the regulation may have been "overly broad" because of its application to "power plant ash ponds, which had been in existence for many years").

[63] Regas Memorandum, *supra* note 13; Wilcher Memorandum, *supra* note 30; Williams Memorandum, *supra* note 35.

[64] Consolidated Permit Regulations, 45 Fed. Reg. 48,620.

[65] *See* 5 U.S.C. § 706(1) (2011) (providing a reviewing court the authority to "compel agency action unlawfully withheld or unreasonably delayed").

National Highway Traffic Safety Administration (NHTSA).[66] The Court found that the NHTSA had failed to supply a sufficient "reasoned analysis" for its decision to rescind.[67] Notwithstanding the insufficiency of the agency's analysis, it at least came in the form of a final rule.[68] The EPA's *functional* rescission that spawned the waste treatment exclusion, however, did not.[69] On the one hand, perhaps because Congress has indicated a clear intent for the EPA to administer the CWA and prescribe the specific definition of "waters of the United States,"[70] the EPA's less formal revision of this definition should be acceptable.[71] On the other hand, the formal procedures generally required by the APA serve undeniably vital purposes,[72] and without them perhaps the EPA's action should receive only *Skidmore* deference, or alternatively should be entirely invalid under the APA.[73]

Despite the uncertain status of the EPA's July 21 action, this Article will proceed as though an agency's suspension of a recently promulgated final rule *does* warrant *Chevron* analysis.[74] This Article makes this assumption in part to restrict the scope of the analysis. In addition, the EPA's procedural shortcomings are no longer relevant from a litigation standpoint, for the simple reason that the statute of limitations has run for any civil action

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[66] *State Farm*, 463 U.S. 29.

[67] *Id*. at 57.

[68] Federal Motor Vehicle Safety Standards; Occupant Crash Protection, 46 Fed. Reg. 53,419 (Oct. 29, 1981).

[69] *See* Consolidated Permit Regulations, 45 Fed. Reg. 48,620.

[70] *See infra* notes 85–87 and accompanying text.

[71] *Cf.* Graham G. Martin & David A. Super, *Judicial Deference to Administrative Agencies and Its Limits*, 40 CLEARINGHOUSE REV. J. POVERTY L. & POL'Y 596, 599 (2007) (noting that finding indications of Congressional delegation "where the agency did not proceed through rule making or formal adjudication is *exceptional*," but not impossible (emphasis added)).

[72] *See id*. at 600 (discussing how requiring more formal procedures "compel[s] agencies to engage in debates over statutory construction on largely equal terms with their challengers").

[73] *See, e.g.*, United States v. Mead Corp., 533 U.S. 218, 231 (2001) (according deference to an agency interpretation, but less than *Chevron* deference, because the interpretation was "far removed not only from notice-and-comment process, but from any other circumstances reasonably suggesting that Congress ever thought [of the procedure] as deserving [*Chevron*] deference") (alteration added).

[74] Chevron, U.S.A., Inc. v. NRDC, Inc., 467 U.S. 837, 837 (1984) (finding an EPA interpretation of a Clean Air Act provision reasonable).

against the EPA under the APA.[75] Finally, in terms of degree, *Chevron* deference is the most deferential of the various types of judicial deference that a court may accord an administrative action.[76] Thus, if the EPA's definition does not survive *Chevron* treatment, it will necessarily fail under any less deferential standard.

B. *Application of the Chevron Doctrine*

In *Chevron*, the U.S. Supreme Court announced the method that courts should use when determining whether an agency decision deserves substantial judicial deference.[77] In relevant part, the Court stated that "[w]hen a court reviews an agency's construction of the statute which it administers," it asks first "whether Congress has directly spoken to the precise question at issue."[78] If the answer is yes, then the court "must give effect to the unambiguously expressed intent of Congress" regardless of the agency's desired interpretation.[79] Conversely, if the answer is no, then the court considers "whether the agency's answer is based on a permissible construction of the statute."[80] If the court determines that the agency's construction is reasonable, then it must give effect to such construction even if it would prefer a contrary one.[81] This analytical lens, and the deferential decision that may result from such analysis, has come to be known as "*Chevron* deference."[82]

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[75] 28 U.S.C. § 2401(a) (2012) (barring actions after six years from when the right of action accrues).

[76] *See Mead Corp.*, 533 U.S. at 236–37 (discussing the Court's decision "to recognize more than one variety of judicial deference" and implying by comparison to *Skidmore* deference that *Chevron* deference is the most deferential).

[77] *Chevron*, 467 U.S. 837.

[78] *Id.* at 842.

[79] *Id.* at 843.

[80] *Id.* at 843.

[81] *Id.* at 844 ("[A] court may not substitute its own construction of a statutory provision for a reasonable interpretation made by the administrator of an agency.").

[82] *E.g.*, United States v. Mead Corp., 533 U.S. 218, 218 (2001) (holding that a tariff classification ruling by the U.S. Customs Service was not entitled to *Chevron* deference); NRDC v. EPA, 804 F.2d 710, 732 (1986) (using the phrase "*Chevron* deference" for what appears to be the first time by a court).

1. *Chevron Step 1: Is the CWA Ambiguous with Respect to the Definition of "Waters of the United States"?*

The Clean Water Act defines "navigable waters" as "waters of the United States, including the territorial seas,"[83] but it does not further define "waters of the United States." The only use of the term "waters of the United States" within the Section 402 permitting program relates to stormwater discharges and provides no guidance as to its interpretation in other contexts.[84] Rather, in delineating the various prohibitions against pollution, the Act generally refers to discharges of pollutants into "navigable waters."[85] The only additional guidance that the Act provides is a broad delegation of authority to the Administrator of the EPA "to prescribe such regulations as are necessary to carry out his functions under this chapter."[86]

Thus, the statutory language is both straightforward and unhelpful, clearly defining "navigable waters" but not the operative phrase here, "waters of the United States."[87] This is not the end of the matter, however, as courts may consider materials beyond the specific text to determine the proper meaning of a statutory provision.[88] The *Chevron* Court itself considered not only the language of the statute, but also legislative history regarding the particular statutory provision in question and policy arguments.[89] More significantly, the validity of the waste treatment exclusion does not necessarily depend on the ambiguity of the definition of "waters of the United States" *as a whole*. Rather, at issue is the more discrete question of whether the definition permits the EPA to remove waters from "waters of the United States" by regulation. Extratextual materials strongly suggest that the answer is no.

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[83] 33 U.S.C. § 1362(7) (2011).

[84] *See id*. § 1342(p)(2)(E).

[85] *E.g*., *id*. § 1251(a)(6) (referring to the need "to eliminate the discharge of pollutants into the navigable waters").

[86] *Id*. § 1361(a).

[87] *Id*. § 1362(7).

[88] *See, e.g*., Zuni Pub. Sch. Dist. No. 89 v. Dep't of Educ., 550 U.S. 81, 93 (2007) (considering the "history and purpose" of the statutory provision in evaluating the reasonableness of agency interpretation); Chevron, U.S.A., Inc. v. NRDC, 467 U.S. 837, 862-66 (1984) (considering legislative history and policy in addition to the statutory text).

[89] *Chevron*, 467 U.S. at 859–66.

As noted previously, the limited legislative history on the topic suggests that Congress did *not* intend for "waters of the United States" to be used as part of the waste treatment process. A 1971 Senate Report stated that "[t]he use of any river, lake, stream or ocean as a waste treatment system is unacceptable."[90] A 1977 Senate Report explained that the CWA "stipulated that the Nation's fresh and marine waters would not be an element of the waste treatment process. That continues to be national policy."[91] Without more, this would seem explicitly to prohibit the waste treatment exclusion. Further statements to this effect exist throughout the Congressional record, for example, "[t]he 1972 law's cleanup plan was founded on the principle that polluters should not use the public's waters as their private waste treatment systems."[92] Such isolated pronouncements by individual members of Congress, witnesses at Congressional hearings, and reports of Congressional committees are by no means dispositive.[93] However, in the aggregate and in the absence of contrary views on this particular issue, they weigh strongly against the legitimacy of the waste treatment exclusion. Put another way, however Congress meant for the EPA to define "waters of the United States," it appears evident that they did *not* mean for the agency to have authority to permit the use of the nation's public water resources for waste treatment.

Jurisprudence on the scope of "waters of the United States" prior to the EPA's action further suggests that waters may *not* be removed from the definition's purview. On many occasions over decades of case law, courts at every level have held that "waters of

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[90] S. REP. NO. 92-414, at 7 (1971), *reprinted in* 1972 U.S.C.C.A.N. 3668, 3674.

[91] S. REP. NO. 95-370, at 4 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4326, 4330.

[92] *To Amend the Federal Water Pollution Control Act to Provide for Additional Authorizations, and for Other Purposes: Hearing on H.R. 3199 Before the H. Comm. on Pub. Works and Transp.*, 95th Cong. 295 (1977) (statement of David R. Zwick, Executive Director, Clean Water Action Project, and Larry Silverman, Legislative Director, Clean Water Action Project).

[93] *See, e.g.*, Robert J. Araujo, S.J., *The Use of Legislative History in Statutory Interpretation: A Look at* Regents v. Bakke, 16 SETON HALL LEGIS. J. 57, 136 (1992) ("The simplest and one of the more common limitations on the use of legislative history is that it does not guarantee clarification of the statutory text under interpretation.").

the United States" retain their protected status in perpetuity.[94] Many of these cases considered the status of "navigable waters" rather than "waters of the United States," but the CWA uses "waters of the United States" to define "navigable waters." It is difficult to see how, despite a rule that navigable waters retain their status forever, "waters of the United States"—by definition navigable waters as well—may lose *their* status.

These common law developments regarding the meaning of "navigable waters" should inform our assessment of what Congress intended when they included the term in the CWA, based on the interpretive canon of imputing the common-law meaning of a term which Congress uses.[95] This canon suggests that when Congress incorporated the terms "navigable waters" and "waters of the United States" and neglected to provide definitions contrary to the terms' "widely accepted definitions" at common law, Congress incorporated these "widely accepted definitions" by reference.[96] However malleable the definition may be in a general sense, it would be imprudent for a court to assume that Congress intended to diverge from precedent by delegating to the EPA the specific authority to remove waters from the definitional scope when there is no suggestion of this in the statute or elsewhere.

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[94] *E.g.*, United States v. Appalachian Elec. Power Co., 311 U.S. 377, 408 (1940) ("When once found to be navigable, a waterway remains so."); Pollard v. Hagan, 44 U.S. (3 How.) 212, 229 (1845) (discussing "the compact entered into between [Alabama and the United States] when Alabama was admitted into the union, 'that all navigable waters within the said state shall for ever remain public highways, free to the citizens of said state, and of the United States. . .'"); United States v. Moses, 496 F.3d 984, 989 (9th Cir. 2007) ("[W]e do not see how a mere man-made diversion, however long ago undertaken, could change [a creek] from a water of the United States into something else."); Benjamin v. Douglas Ridge Rifle Club, 673 F. Supp. 2d 1210, 1218 (D. Or. 2009) ("[A] man-made structure cannot eliminate the CWA's jurisdiction over a water of the United States."); United States v. Granite State Packing Co., 343 F. Supp. 57, 60 (D.N.H. 1972) ("[I]n the eyes of the law, a river navigable in the past remains so in perpetuity as far as the authority of Congress is concerned . . . .").

[95] *See* Carter v. United States, 530 U.S. 255, 264 (2000) ("[W]here Congress borrows terms of art in which are accumulated the legal tradition and meaning of centuries of practice, it presumably knows and adopts the cluster of ideas that were attached to each borrowed word in the body of learning from which it was taken and the meaning its use will convey to the judicial mind unless otherwise instructed. In such case, absence of contrary direction may be taken as satisfaction with widely accepted definitions, not as a departure from them." (alteration in original) (emphasis omitted) (quoting Morissette v. United States, 342 U.S. 246, 263 (1952) (internal quotation marks omitted)).

[96] *See id.*

Collectively, the evidence suggests Congress' relatively unambiguous intent for "waters of the United States" to *remain* "waters of the United States." Thus, notwithstanding the potential validity of the rest of the EPA's definition, the waste treatment exclusion, in isolation, appears to be invalid under *Chevron* Step 1. For the sake of argument, however, this paper will concede sufficient ambiguity to proceed to Step 2, to demonstrate why the EPA's action, even if addressing ambiguity and filling a gap, is nonetheless invalid for being an unreasonable interpretation of the statute.

2. *Chevron Step 2: Assuming Ambiguity, Is the Waste Treatment Exclusion a Reasonable Construction of the CWA?*

In evaluating the reasonableness of the EPA's definition of "waters of the United States," "considerable weight" should be accorded the agency's interpretation, as it represents "an executive department's construction of a statutory scheme it is entrusted to administer."[97] This deference, though, is not without limits, and "a reviewing court need not accept an interpretation which is unreasonable."[98]

Even if the analysis above regarding statutory structure and legislative intent is insufficient to show an adequate lack of ambiguity, it is likely sufficient to address the question of the rule's reasonableness. Even if there remains some amount of ambiguity in that multiple definitions could be appropriate, the EPA's waste treatment exclusion directly conflicts with what appears most likely to have been Congress's view on the discrete issue of removing waters from "waters of the United States." And even if there were some ambiguity as to *that* point, and Congress might have left room for a contrary view, other factors expose the arbitrariness—and thus unreasonableness—of the EPA's disposition.

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[97] Chevron, U.S.A., Inc. v. NRDC, 467 U.S. 837, 844 (1984).

[98] Nat'l R.R. Passenger Corp. v. Bos. & Me. Corp., 503 U.S. 407, 418 (1992); *cf.* United States v. Mead Corp., 533 U.S. 218, 237 n.18 (2001) ("It is, of course, true that the limit of *Chevron* deference is not marked by a hard-edged rule. But *Chevron* itself is a good example showing when *Chevron* deference is warranted, while this is a good case showing when it is not. Judges in other, perhaps harder, cases will make reasoned choices between the two examples, the way courts have always done.").

In *Chevron*, the Court included a section on policy, primarily to reject the parties' attempts to employ policy arguments, as "policy arguments are more properly addressed to legislators or administrators, not to judges."[99] In this case, the EPA could argue that the legislators left a gap for the EPA to fill with respect to the scope of "waters of the United States," necessarily through "the formulation of policy,"[100] and the waste treatment exclusion is a valid policy decision as a consequence of this congressional delegation. However, given how starkly this policy contradicts what appears to have been Congress's policy on the particular issue in question, a court would likely reject this contention, especially given courts' general distaste for policy-based arguments as inappropriate for the judicial forum.[101]

Moreover, subsequent developments on the issue of the scope of "waters of the United States" highlight the waste treatment exclusion as an outlier in water law policy and further suggest the *un*reasonableness of the EPA's interpretation, even assuming Congress left the matter unresolved. Notably, aside from the waste treatment exclusion itself, significant changes to the scope of "waters of the United States" over the last several decades have generally been toward a *more expansive* interpretation. Long before the passage of the CWA, the Supreme Court had interpreted the phrase "navigable waters of the United States" in the seminal case of *The Daniel Ball*.[102] Based on this case, American courts interpreted "navigable waters of the United States" to include only those waters that are navigable in fact,[103] and the Army Corps "adopted this traditional judicial definition for the Act's term 'navigable waters.'"[104] With the CWA, however, Congress expressed a new vision for the nation's waters and called for a new

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[99] *Chevron*, 467 U.S. at 864.

[100] *Id.* at 843 (quoting Morton v. Ruiz, 415 U.S. 199, 231 (1974)) (internal quotation marks omitted).

[101] *See id.* at 864.

[102] The Daniel Ball, 77 U.S. (10 Wall.) 557, 563 (1870) ("Those rivers must be regarded as public navigable rivers in law which are navigable in fact.").

[103] *Id.*; *see also* Utah v. United States, 403 U.S. 9, 10 (1971); United States v. Appalachian Elec. Power Co., 311 U.S. 377, 406 (1940).

[104] Rapanos v. United States, 547 U.S. 715, 723 (2006) (plurality opinion) (citing Permits for Activities in Navigable Waters or Ocean Waters, 39 Fed. Reg. 12,115, 12,119 (Apr. 3, 1974) (to be codified at 33 C.F.R. pt. 209)).

jurisdictional scope for the regulation of water pollution.[105] Given this development, the Army Corps's definition was deemed too narrow.[106] The Army Corps thus broadened its interpretation to include wetlands abutting navigable-in-fact waters, and in 1985 the Supreme Court upheld this view.[107] Sixteen years later, the Court rejected the Army Corps's attempt to expand the definition substantially further to include "isolated ponds, some only seasonal . . . because they serve as habitat for migratory birds."[108] Finally, in *Rapanos*, a plurality led by Justice Scalia attempted to clarify that "waters of the United States" "includes only those relatively permanent, standing or continuously flowing bodies of water 'forming geographic features' that are described in ordinary parlance as 'streams[,] . . . oceans, rivers, [and] lakes.'"[109] The plurality held that the term does *not* include "[w]etlands with only an intermittent, physically remote hydrologic connection to 'waters of the United States.'"[110]

Because *Rapanos* involved a 4-4-1 split, the current scope of "waters of the United States" for agency jurisdictional purposes remains somewhat unclear.[111] The EPA and Army Corps have

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[105] *See id*. at 767 (Kennedy, J., concurring in the judgment) ("[I]n enacting the Clean Water Act Congress intended to regulate at least some waters that are not navigable in the traditional sense.").

[106] NRDC v. Callaway, 392 F. Supp. 685, 686 (D.D.C. 1975) ("Congress by defining the term 'navigable waters' in Section 502(7) of the Federal Water Pollution Control Act Amendments of 1972 . . . to mean 'the waters of the United States . . . ,' asserted federal jurisdiction over the nation's waters to the maximum extent permissible under the Commerce Clause of the Constitution.").

[107] United States v. Riverside Bayview Homes, Inc., 474 U.S. 121, 134 (1985); *see also* Definition of "Waters of the United States" Under the Clean Water Act, 79 Fed. Reg. 22,188, 22,256 (proposed Apr. 21, 2014) (to be codified at 40 C.F.R. pts. 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401) ("[T]he legislative history clearly demonstrates that Congress was expanding jurisdiction—not narrowing it—with the 1972 amendments.").

[108] Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps of Eng'rs (*SWANCC*), 531 U.S. 159, 171–72 (2001).

[109] 547 U.S. at 739 (alterations in original) (quoting Webster's New International Dictionary 2882 (2d ed. 1954)).

[110] *Id*. at 742.

[111] Jeff Kray, *Five Years After* Rapanos*—EPA Prepares New Clean Water Act Jurisdictional Guidance*, MARTEN LAW (Feb. 3, 2011), http://www.martenlaw.com/newsletter/20110203-epa-prepares-new-cwa-guidance ("EPA, Congress, and dozens of lower courts have tried—without a great deal of success—to clarify the meaning of the Supreme Court's 4-4-1 plurality decision. As we approach the five year anniversary of *Rapanos*, parties seeking CWA permits and regulators reviewing those permit applications are still

issued two guidance documents on the matter, first in 2008[112] and then in April 2011.[113] At a high level, this guidance is consistent with the gradual trend of expanding the scope of the agencies' jurisdiction, though in a more restrained manner after the Supreme Court's recent decisions:

> The agencies expect, based on relevant science and recent field experience, that under the understandings stated in this draft guidance, the extent of waters over which the agencies assert jurisdiction under the CWA *will increase* compared to the extent of waters over which jurisdiction has been asserted under existing guidance, though certainly not to the full extent that it was typically asserted prior to the Supreme Court decisions in *SWANCC* and *Rapanos*.[114]

More precisely, the guidance explains how the EPA and the Army Corps will adopt Justice Kennedy's "significant nexus" test to determine the extent of their jurisdiction, "since a majority of the justices would support [such exercise of] jurisdiction."[115] Justice Kennedy explained that according to this test,

> [W]etlands possess the requisite nexus, and thus come within the statutory phrase "navigable waters," if the wetlands, either alone or in combination with similarly situated lands in the

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left to ponder which wetlands, ponds, streams, and other water bodies are federally regulated."); *see also* Richard E. Glaze, Jr., Rapanos *Guidance III: "Waters" Revisited*, 42 ENVTL. L. REP. 10,118 (2012) (discussing the EPA's and Army Corps's attempt to clarify the Supreme Court's split in *Rapanos*); Kevin P. Pechulis, *Scope of "Waters of the United States" Unclear After Rapanos v. United States*, 38 NO. 2 ABA TRENDS 4 (2006) ("Subsequent case law demonstrates that uncertainty remains regarding the scope of 'waters of the United States' after *Rapanos*, especially in circumstances involving intermittent streams and wetlands adjacent to such streams.").

[112] U.S. ENVTL. PROT. AGENCY & U.S. ARMY CORPS OF ENG'RS, CLEAN WATER ACT JURISDICTION FOLLOWING THE U.S. SUPREME COURT'S DECISION IN RAPANOS V. UNITED STATES & CARABELL V. UNITED STATES (2008), [hereinafter *RAPANOS* 2008 GUIDANCE], *available at* http://water.epa.gov/lawsregs/guidance/wetlands/upload/2008_12_3_wetlands_CWA_Jurisdiction_Following_Rapanos120208.pdf.

[113] U.S. ENVTL. PROT. AGENCY & U.S. ARMY CORPS OF ENG'RS, DRAFT GUIDANCE ON IDENTIFYING WATERS PROTECTED BY THE CLEAN WATER ACT (2011), [hereinafter *RAPANOS* 2011 GUIDANCE], *available at* http://water.epa.gov/lawsregs/guidance/wetlands/upload/wous_guidance_4-2011.pdf.

[114] *RAPANOS* 2011 GUIDANCE, *supra* note 113, at 3 (emphasis added); *see also* Glaze, Jr., *supra* note 111, at 10,120 ("[T]he agencies acknowledge that their proposed policy is intended to expand jurisdiction over waters of the United States . . . .").

[115] *RAPANOS* 2011 GUIDANCE, *supra* note 113, at 2.

> 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."[116]

In support of this holistic perspective toward the nation's waterways, the EPA recently submitted a draft scientific report on the connectivity of waterways to the Science Advisory Board for public peer review.[117] This report is to serve as the basis for the EPA's and Army Corps's joint rulemaking to clarify the definition of "waters of the United States."[118] The rulemaking also incorporates Justice Kennedy's "significant nexus" formulation.[119]

Although the series of cases described above generally deals with the Army Corps's definition of "waters of the United States,"[120] rather than the EPA's definition,[121] the conclusions drawn from an analysis of these cases are equally applicable to the EPA's definition. While the two agencies administer somewhat different aspects of the CWA, this is not grounds to conclude that the scope of a definition so central to the Act as "waters of the United States" should likewise differ between them.[122] Indeed, the

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[116] Rapanos v. United States, 547 U.S. 715, 780 (2006) (Kennedy, J., concurring) (emphasis added).

[117] OFFICE OF RESEARCH & DEV., U.S. ENVTL. PROT. AGENCY, CONNECTIVITY OF STREAMS AND WETLANDS TO DOWNSTREAM WATERS: A REVIEW AND SYNTHESIS OF THE SCIENTIFIC EVIDENCE (2013), *available at* http://yosemite.epa.gov/sab/sabproduct.nsf/fedrgstr_activites/7724357376745F48852579E60043E88C/$File/WOUS_ERD2_Sep2013.pdf.

[118] *See* Proposed Rule Revising the Definition of "Waters of the United States," *supra* note 24.

[119] *Id*.

[120] *See* Definition of "Waters of the United States" Under the Clean Water Act, 79 Fed. Reg. 22,188 (proposed Apr. 21, 2014) (to be codified at 40 C.F.R. pt. 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401).

[121] 40 C.F.R. § 122.2 (2013) (defining "waters of the United States" as it applies to EPA regulations).

[122] For multiple reasons, the EPA is not necessarily bound by the Army Corps's interpretation. First, the Attorney General determined in 1979 that "the structure and intent of the [CWA] support an interpretation . . . that gives the Administrator [of the EPA] the final administrative responsibility for construing the term 'navigable waters.'" Memorandum on Administrative Authority to Construe § 404 of the Federal Water Pollution Control Act from Benjamin R. Civiletti, Attorney Gen., to The Sec'y of the Army (1979) [hereinafter Civiletti Memorandum]. Moreover, the same agency may interpret the same statutory provision in different ways for different programs, Envtl. Def. v. Duke Energy

Court in *Rapanos* discusses "federal jurisdiction" over waters—not the Army Corps's jurisdiction in particular.[123] Rather, the insight to take away from the trend evidenced by these cases is that the EPA and the Army Corps have consistently been attempting, with inconsistent results in court, to expand the scope of "waters of the United States." As quoted above, the EPA has recently stated that with their upcoming new guidance, both agencies expect to expand "the extent of waters over which the agencies assert jurisdiction under the CWA . . . ."[124] Their draft proposed rule follows through on this expectation.[125] The waste treatment exclusion remains the sole outlier contradicting this trend.

The *Rapanos* line of cases and the associated guidance do not directly address the EPA's authority to enforce the waste treatment exclusion, as *Rapanos* relates to the outer limit of federal authority over U.S. waters,[126] rather than the agency's ability to carve out an exception that *reduces* its authority within this limit. On the other hand, the waste treatment exclusion stands in sharp contrast to a forty-year trend since the passage of the CWA, and a 140-year trend since *The Daniel Ball*, of expanding the scope of "waters of the United States" to allow agencies broader powers to regulate

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Corp., 549 U.S. 561, 576 (2007), so it should follow that different agencies may do so as well. However, this does not appear to be a problem going forward in light of the fact that the agencies have drafted a *joint* proposed rulemaking addressing the scope of "waters of the United States." *See* Proposed Rule Revising the Definition of "Waters of the United States," *supra* note 24.

[123] Rapanos v. United States, 547 U.S. 715, 731 (2006); *see also* Civiletti Memorandum, *supra* note 122 (noting that Congress understood "that 'navigable waters' can have only one interpretation under the Act . . . ."). *See generally* Glaze, Jr., *supra* note 111 (analyzing the most recent agency guidance on the matter and not distinguishing between the meaning of "waters of the United States" in different regulations).

[124] *RAPANOS* 2011 GUIDANCE, *supra* note 113, at 3. Even if the Army Corps preferred a different jurisdictional rule, the EPA's decision would control. Civiletti Memorandum, *supra* note 122, at 202 (concluding that "the structure and intent of the [CWA] support an interpretation . . . that gives the Administrator [of the EPA] the final administrative responsibility for construing the term 'navigable waters'"). *See* Definition of "Waters of the United States" Under the Clean Water Act, 79 Fed. Reg. at 22,188.

[125] *See* Definition of "Waters of the United States" Under the Clean Water Act, 79 Fed. Reg. at 22,189 (stating that under the proposed rule, waters may be found jurisdictional "waters of the United States" if they satisfy the "significant nexus" test developed in *Rapanos*).

[126] *See Rapanos*, 547 U.S. at 724 (referring to the Corps's effort to "extend the definition of 'the waters of the United States' to the *outer limits* of Congress's commerce power") (emphasis added)).

water pollution.[127] Indeed, after the passage of the CWA, the expansion proceeded with a court's reprimand of an Army Corps definition deemed to be overly narrow,[128] even though the definition "assert[ed] regulatory authority over many heretofore unregulated waterways."[129] Thus, if the issue were litigated on these terms, an argument could be made that the waste treatment exclusion is an unreasonable interpretation of the CWA given the statutory scheme for "waters of the United States" that has been developing—consistently, but for the waste treatment exclusion—since the statute's creation.

C. *Application of* Brand X *and Its Progeny*

Twenty years after *Chevron*, the Court was faced with a somewhat different question: when interpreting a statute, may an agency contradict a prior judicial construction of that statute? In *National Cable & Telecommunications Association v. Brand X Internet Services* (*Brand X*),[130] the U.S. Supreme Court answered in the affirmative. The Court stated: "[a] court's prior judicial construction of a statute trumps an agency construction otherwise entitled to *Chevron* deference *only if* the prior court decision holds that its construction follows from the unambiguous terms of the statute and thus leaves no room for agency discretion."[131] In the case of the definition of "waters of the United States" under the CWA, the plain terms of the statute clearly leave room for agency discretion.[132] However, even assuming that the above *Chevron* analysis is incorrect and this discretion may thus include removal of waters from "waters of the United States," the *Brand X* doctrine seems to cut in the opposite direction, suggesting that the EPA's discretion on this matter is much more limited.

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[127] *See supra* notes 102–125 and accompanying text.

[128] NRDC v. Callaway, 392 F. Supp. 685, 686 (D.D.C. 1975) (declaring that the Corps "acted unlawfully and in derogation of their responsibilities under [the CWA] by the adoption" of a definition limited to "traditional tests of navigability.").

[129] *See* Definition of "Waters of the United States" Under the Clean Water Act, 79 Fed. Reg. at 22,189 (stating that under the proposed rule, waters may be found jurisdictional "waters of the United States" if they satisfy the "significant nexus" test developed in *Rapanos*).

[130] Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs., 545 U.S. 967 (2005).

[131] *Id*. at 982 (emphasis added).

[132] *See* discussion *supra* Part II.A.1.

1. *The Rule of Deference from* Brand X *and* Home Concrete

In *United States v. Home Concrete & Supply* (*Home Concrete*),[133] the rule enunciated in *Brand X* became somewhat muddled by a split amongst the justices. The Court was considering the definition of "omission" within the Internal Revenue Code.[134] The issue arose because a prior case had addressed the definition of the term in a 1939 version of the statute,[135] and the IRS now sought to interpret the term differently from that prior court's interpretation, based in part on a 1954 revision to the statute.[136] A 5-4 majority held that *Colony*—the prior case—had foreclosed the issue, stating somewhat vaguely that "there is no longer any different construction that is consistent with *Colony* and available for adoption by the agency."[137] This was odd, because the *Colony* Court had stated that "[i]t *cannot* be said that the language is *unambiguous*."[138] Given this explicit statement of the statute's potential ambiguity and the *Brand X* rule that a prior judicial construction trumps *only* when it holds the statute to be unambiguous, the Court would seem to be required to accept the IRS's construction, which the Court does *not* find to be "unreasonable."[139]

Instead, the Court seemed to announce a revised rule of deference that hinges not on ambiguity in statutory terms, but rather—more abstractly—on an indication that Congress left an ambiguous gap for the agency to fill.[140] A plurality of the *Home Concrete* Court found that *Colony* had held there to be no such

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133 United States v. Home Concrete & Supply, LLC, 132 S. Ct. 1836 (2012).

134 *Id*. at 1839–40.

135 *See* Colony, Inc. v. Comm'r, 357 U.S. 28 (1958).

136 *Home Concrete*, 132 S. Ct. at 1841 ("The provision before us is a 1954 reenactment of the 1939 provision that *Colony* interpreted.").

137 *Id*. at 1843.

138 *Id*. at 1847 (Scalia, J., concurring) (quoting *Colony*, 357 U.S. at 33) (internal quotation marks omitted) (emphasis added).

139 *See id*. at 1843 (noting that the Government argues its regulation is "reasonable," and failing to reject this point); *see also id*. ("[A] court may not substitute its own construction of a statutory provision for a reasonable interpretation made by the administrator of an agency." (quoting *Chevron*, 467 U.S. at 844) (internal quotation marks omitted)).

140 *See id*. at 1844 (finding that, despite *Colony*'s admission of ambiguity in the text, "there is every reason to believe that the [*Colony*] Court thought that Congress had 'directly spoken to the question at hand,' and thus left '[no] gap for the agency to fill'" (second alteration in the original) (quoting *Chevron*, 467 U.S. at 842-43)).

gap, and that decided the issue.[141] Justice Scalia, joining in the judgment but not this rule, argued that the issue to be decided in this case was not gap-filling or statutory ambiguity, but simply whether the prior court had "resolved the construction of the statutory language at issue."[142] Justice Scalia asserted that once a court has resolved the construction, ambiguous statutory terms or not, that is the law.[143] Finally, a four-Justice dissent in *Home Concrete* argued that *Colony* was largely inapposite, because that case was considering a 1939 version of the Internal Revenue Code, whereas the case at bar involved a 1954 revision in which Congress had indicated a new intent.[144]

2. *Application of This Rule of Deference to the Waste Treatment Exclusion*

The *Brand X* line of cases is not directly applicable to the waste treatment exclusion analysis, because prior judicial constructions of the term "waters of the United States" were addressing the question of navigability under federal common law, rather than interpreting a statutory term; indeed, litigation over this issue began decades before Congress enacted the CWA.[145] Nonetheless, *Home Concrete* may suggest that the waste treatment exclusion is an impermissible construction of the CWA's definition of "navigable waters."

The Supreme Court arguably eliminated any gap Congress may have left for the EPA to fill with respect to the isolated question of whether "waters of the United States" *remain* "waters of the United States" in perpetuity. Of course, as discussed above, the issue of the broader definition of "waters of the United States" was left unclear by the CWA and remains unclear after multiple cases before the Supreme Court.[146] But for purposes of

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[141] *Id*. ("[T]here being no gap to fill, the Government's gap-filling regulation cannot change *Colony's* interpretation of the statute.").

[142] *Id*. at 1848 (Scalia, J., concurring).

[143] *Id*. at 1846; *see also Brand X*, 545 U.S. 967, 1019 (2005) (Scalia, J., dissenting) ("When a court interprets a statute without *Chevron* deference to agency views, its interpretation (whether or not asserted to rest upon unambiguous text) is the law.").

[144] *Home Concrete*, 132 S. Ct. at 1850.

[145] *See, e.g*., Utah v. United States, 403 U.S. 9, 10 (1971); United States v. Appalachian Elec. Power Co., 311 U.S. 377, 408 (1940); Daniel Ball, 77 U.S. (10 Wall.) 557, 557 (1870).

[146] *See* discussion *supra* Part II.A.3.

determining the validity of the waste treatment exclusion, the precise scope of this definition is inapposite. At issue in the waste treatment exclusion is the more discrete issue of whether the EPA may remove waters from "waters of the United States" by regulation. As discussed in Part II.A.2, *supra*, the case law is clear that this is impermissible.

Although this precedent is not a prior judicial construction of a statute, it is a prior judicial construction of the precise terms that a subsequently enacted statute incorporates. These cases say nothing explicitly about the ambiguity of terms within the CWA, but they should resoundingly close any gap as to the question of whether "waters of the United States" may be changed to "something else." Thus, the logic of *Home Concrete*'s majority, as well as that of Justice Scalia, should apply.[147] In 1980, when the EPA sought to revise its interpretation of the admittedly ambiguous term "waters of the United States," it possessed significant discretion in crafting a suitable definition. However, prior judicial constructions should have precluded the agency from removing waters from the definitional scope.

III. JUDICIAL ANALYSIS OF THE WASTE TREATMENT EXCLUSION

The previous Part considered the legal legitimacy of the waste treatment exclusion. The fact is, however, the regulation has stood for over thirty years, and courts have already ruled on challenges to impoundments of "waters of the United States." These courts have used a variety of methods in order to nullify the potential environmental harm of reading the waste treatment exclusion literally and broadly.

A. *The Significance of Settlement Pond "Design"*

The waste treatment exclusion, by its terms, applies only to waste treatment systems "designed to meet the requirements of the CWA." Multiple courts have focused on this "design" requirement in considering the Section 122.2 definition.

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[147] The EPA would also be unable to find support from the *Home Concrete* dissent, as their opinion rested on the view that Congress had changed its position with respect to the statutory provision at issue, thereby validating the agency's interpretation. *See Home Concrete*, 132 S. Ct. at 1849 (Kennedy, J., dissenting) ("Congress added new provisions leading to the permissible conclusion that it would have a different meaning going forward.").

One illustrative case involved a pond used for treatment at a city's waste treatment facility.[148] In *Healdsburg 1*, the district court explained that the impoundment in question, although used for waste treatment through a natural filtration process, "was not 'designed' to meet the requirements of the Clean Water Act or 'designed' to be part of the waste-treatment system. The pond preexisted the plant. It preexisted the Clean Water Act."[149] The Ninth Circuit then expounded in *Healdsburg 2* upon the waste treatment exclusion more generally, noting the significance of whether an impoundment has been permitted as a waste treatment system in the facility's NPDES permit.[150]

A subsequent case applied these findings to a detention pond holding—and "treating"—stormwater discharges.[151] The court explained that "[t]he EPA's mandate and logic would dictate that something does not lose its status as a water of the United States by impoundment;"[152] rather, it loses its status if impounded *and "designed"* to be a waste treatment system meeting the requirements of the CWA, and implicit in this "design" condition is a Best Management Practice (BMP) Plan.[153] Notably, the court also repeated with approval the view from *Healdsburg 1* that the fact that a body of water "pre-existed the CWA and pre-existed the . . . plant" is evidence that it was not "designed" as a waste treatment facility that would comply with CWA requirements.[154] This suggests that all such impoundments of "waters of the United States" constructed pre-CWA and not updated to reflect CWA requirements are suspect as waste treatment systems qualifying for exclusion under Section 122.2.

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[148] N. Cal. River Watch v. City of Healdsburg (*Healdsburg 1*), No. C01-04686WHA, 2004 WL 201502 (N.D. Cal. 2004), *aff'd*, 457 F.3d 1023 (9th Cir. 2006), *opinion withdrawn and superseded on denial of reh'g by* 496 F.3d 993 (9th Cir. 2007) (*Healdsburg 2*).

[149] *Healdsburg 1*, at *11; *see also* David S. Baron, *Water Quality Standards for Rivers and Lakes: Emerging Issues*, 27 ARIZ. ST. L.J. 559, 566 n.58 (1995) ("EPA has shown some ambivalence on whether wetlands constructed for 'natural' wastewater treatment qualify as waters of the United States.").

[150] *Healdsburg 2*, 496 F.3d at 1001–02.

[151] Cal. Sportfishing Prot. Alliance v. Cal. Ammonia Co., NO. CIV. S-05-0952 WBS JMF, 2007 WL 273847 (E.D. Cal. 2007).

[152] *Id*. at *8.

[153] *Id*. ("[T]o be a waste treatment system as reflected by the terms of the . . . NPDES permit and consequentially for the waste treatment exemption to apply here, the . . . detention pond must be a BMP reflecting BAT/BCT.").

[154] *Id*. at *6.

Finally, the Fourth Circuit Court of Appeals, relying in part on the Wilcher Memorandum,[155] upheld the Army Corps's use of the waste treatment exclusion in administering Section 404 permits.[156] The court distinguished its prior holding in *West Virginia Coal Ass'n v. Reilly* by limiting *Reilly*'s application to Section 402 permits.[157] While *OVEC* could be read as less restrictive than the cases discussed in the preceding two paragraphs, the sediment ponds in question, according to their permits, had satisfied best available technology economically achievable and best conventional pollutant control technology (BAT/BCT) standards.[158] Thus, the opinion could also be read as consistent with the others, in that these particular ponds *were* "designed to meet the requirements of the CWA."

These cases to some degree restrain plant operators' ability to take possession of "waters of the United States" indiscriminately and pollute them under the guise of waste treatment, but they do so without disturbing the waste treatment exclusion as a definitional carve-out. They therefore mitigate the effects of the illegality of the waste treatment exclusion while failing to address this illegality itself.

B. West Virginia Coal Association v. Reilly

In *Reilly*, a district court in West Virginia—subsequently affirmed by the Fourth Circuit Court of Appeals—interpreted the waste treatment exclusion with the aid of the EPA's own arguments on the matter in litigation. The EPA argued to the court:

> [T]he exclusion for treatment ponds was never meant to apply to treatment ponds constructed in United States waters. According to EPA, the [suspended] sentence was not definitional, rather it was merely explanatory in nature. Accordingly, EPA contends, the suspension of the last sentence has no effect upon the clear definitional mandate that

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155 Wilcher Memorandum, *supra* note 30.

156 Ohio Valley Envtl. Coal. v. Aracoma Coal Co. (*OVEC*), 556 F.3d 177, 209 (4th Cir. 2009).

157 *Id*. at 214–15; *see* W. Va. Coal Assoc. v. Reilly, 728 F. Supp. 1276 (S.D. W. Va. 1989) (discussed *infra* at Part IV.E.).

158 *OVEC*, 556 F.3d at 216 ("Sediment ponds represent the 'best technology currently available' for the treatment of sedimentary runoff from surface mining valley fills.").

> impoundments of waters of the United States remain "waters of the United States."[159]

This is consistent with a 1986 EPA memorandum on the subject:

> One could argue that the [July 21] suspension . . . is an affirmative statement by EPA that any "waste treatment system" which is "designed to meet the requirements of the CWA" is excluded from the definition of "waters of the U.S.," notwithstanding its creation in or by impounding such waters. Such interpretation, however, is inconsistent with EPA's intent.[160]

The EPA proceeded to explain that its intent by the July 21 suspension was to evaluate each case of an impoundment "on its own facts."[161] The purpose of the July 21 suspension, as discussed above, was "not to require NPDES permits for treatment systems which have been in existence for many years."[162] The *Reilly* court upheld the EPA's 1986 view that its regulation did not alter the definitional status of "waters of the United States."[163]

C. The Second Circuit Anomaly

In 1999, the Second Circuit Court of Appeals addressed the definition of "waters of the United States" in 40 C.F.R. § 122.2 and read the regulation as though the suspended sentence—the suspension of which created the waste treatment exclusion—were not actually suspended.[164] After quoting the definition in full, including the suspended sentence, the *TGR* court concluded that the waterway in question was "not natural, not man-made," and therefore it "clearly cannot be considered a waste treatment

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159 *Reilly*, 728 F. Supp. at 1290.

160 Williams Memorandum, *supra* note 35, at 8.

161 *Id*. at 9.

162 *Id*.

163 *Reilly*, 728 F. Supp. at 1290.

164 United States v. TGR Corp., 171 F.3d 762, 765 (2d Cir. 1999) ("[A]lthough 'waste treatment systems' are not 'waters of the United States' under the Act, *see* 40 C.F.R. 122.2, the regulations provide that '[t]his exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States,' *id*." (second alteration in original)).

system."[165] The court completely ignored the EPA's July 21, 1980, action suspending part of the definition.[166]

Although this case has gone undisputed in the Second Circuit, it appears to be a simple misreading of the regulation. The EPA's suspension was unambiguous, and there should be no doubt now that the waste treatment exclusion exists; multiple interagency memoranda discuss its application,[167] and other courts that address the issue treat the suspension as being in effect.[168] Thus, while *TGR* represents a unique view with respect to the definition of "waters of the United States," it should likely be considered an aberration, and this paper does not rely on the decision in its analysis.

D. *The Effect of the EPA's Rule Can Be Mitigated, but Does This Justify Its Existence?*

The cases discussed in this Part demonstrate that regardless of the broad range of actions that might be justifiable by an expansive reading of the waste treatment exclusion, courts are nonetheless prepared to limit the ability of industry to commandeer "waters of the United States" for use as waste treatment systems. Courts have been aided in this effort by the EPA's own position on the issue.

However, the EPA's apparent willingness to adapt its regulation on a case-by-case basis does not change the plain terms of the definition, which indisputably allow "waters of the United States" to lose their protected status by conversion into a waste treatment system. The EPA has stated its intention to

> appl[y] a standard which treats newly created impoundments of waters of the U.S. as "waters of the U.S.," not as "waste treatment systems designed to meet the requirements of the CWA," whereas impoundments of "waters of the U.S." that have existed for many years and had been issued NPDES permits for discharges from such impoundments are "wastewater treatment systems designed to meet the requirements of the CWA" and therefore are not "waters of the U.S."[169]

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165 *Id.*

166 *See id.*

167 Regas Memorandum, *supra* note 13; Wilcher Memorandum, *supra* note 30; Williams Memorandum, *supra* note 35.

168 *See* discussion *supra* Part IV.A.

169 Williams Memorandum, *supra* note 35, at 7.

Notwithstanding whether this is a reasonable policy choice, it violates the plain terms of the EPA's own rule. While agencies are generally afforded significant discretion in construing regulations of their own creation[170]—and in limited circumstances, they may in fact be allowed to violate their own (at least procedural) rules outright[171]—this latitude is not without limits.[172] In this instance, a strong case can be made that the EPA's case-by-case interpretation of its definition of "waters of the United States" and the waste treatment exclusion is "plainly erroneous" and "inconsistent with the regulation."[173] Thus, as legitimate as the EPA's policy concerns may be, the agency may be bound by its own regulation's plain language. This is of course not to suggest that the plain language is good, or even legally defensible, but simply that the EPA has no choice but to follow it now that it is purportedly the law.

IV. POLICY IMPLICATIONS OF THE WASTE TREATMENT SYSTEM EXCEPTION FOR THE COAL INDUSTRY AND CLIMATE CHANGE

If the waste treatment exclusion is illegal and plant operators should be legally required to clean up their impoundments—for instance, by creating new, lined impoundments on sites that are *not* preexisting "waters of the United States"—coal-generated electricity will face substantial new costs. The potential consequences of these added costs depend in part on the changing economics of natural gas and the energy industry as a whole, as well as the political currents affecting electricity generation and CAA regulation of coal.

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170 *E.g.*, Decker v. Nw. Envtl. Def. Ctr., 133 S. Ct. 1326, 1337 (2013) ("When an agency interprets its own regulation, the Court, as a general rule, defers to it 'unless that interpretation is plainly erroneous or inconsistent with the regulation.'" (quoting Chase Bank USA, N.A. v. McCoy, 131 S. Ct. 871, 880 (2011))).

171 United States v. Caceres, 440 U.S. 741, 754 n.18 (1979) ("[A]s a matter of administrative law . . . agencies are not required, at the risk of invalidation of their action, to follow all of their rules . . . .").

172 *E.g.*, Wilkinson v. Legal Servs. Corp., 27 F. Supp. 2d 32, 63 n.58 (D.D.C. 1998) ("[T]he statement that agencies are not bound by the law of their own creation is at variance with the founding rule-of-law principle." (citing Raoul Berger, *Do Regulations Really Bind Regulators?*, 62 NW. U. L. REV. 137, 179 (1967))).

173 *Decker*, 133 S. Ct. at 1337 (quoting *McCoy*, 131 S. Ct. at 880).

A. *Could the Coal Industry Survive an Attack on Coal Ash Ponds?*

Coal-fired electricity generation has been an integral part of the U.S. energy portfolio since the mid twentieth century,[174] and as of 2012 it accounted for 37 percent of the country's electricity generation.[175] However, for several years now, electricity generation has trended away from coal as a fuel source,[176] and some have argued that the dirtiest fossil fuel is on its way out of the U.S. energy mix.[177] This trend is due in part to stricter environmental regulations, but perhaps even more to the shale gas boom, which has drastically shifted the economics of the energy industry in favor of natural gas.[178] Current projections indicate that coal's decline is likely to continue.[179]

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[174] U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY REVIEW 2011 7 (2012), *available at* http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf (showing net electricity generation from all sectors from 1949–2011); *History of Energy Consumption in the United States, 1775–2009*, U.S. ENERGY INFO. ADMIN. (Feb. 9, 2011), http://www.eia.gov/todayinenergy/detail.cfm?id=10 ("Since the mid 20th century, usage of coal has . . . increased (mainly as a primary energy source for electric power generation) . . . .").

[175] *What Is the Role of Coal in the United States*?, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/article/role_coal_us.cfm (last updated Aug. 16, 2013).

[176] *Id*. ("[Coal's] annual share of total net [electricity] generation declined from 50% in 2007 to 37% in 2012 . . . .").

[177] Eric Lipton, *Even in Coal Country, the Fight for an Industry*, N.Y. TIMES (May 29, 2012), http://www.nytimes.com/2012/05/30/business/energy-environment/even-in-kentucky-coal-industry-is-under-siege.html?pagewanted=all&_r=1& (describing the coal industry's struggles due to "new regulations from Washington, environmentalists fortified by money from [Mayor Bloomberg], and natural gas companies intent on capturing much of the nation's energy market").

[178] *Id*.; Mike Pasqualetti, *The Eclipse of Coal: An Energy Source on Its Way Out*, AZCENTRAL (June 28, 2013, 3:42 PM), http://www.azcentral.com/opinions/articles/20130607coal-navajo-generating-station-viewpoints.html (describing natural gas as "the biggest threat to coal" and noting that "natural gas [has] been less costly than coal over the past few years . . .").

[179] *E.g*., U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2013 EARLY RELEASE OVERVIEW 11 (2012), *available at* http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2013).pdf (predicting that coal will account for 35 percent of total generation in 2040); *see supra* note 176; *cf*. Charles C. Mann, *What if We Never Run Out of Oil?*, THE ATLANTIC (Apr. 24, 2013, 9:58 PM), http://www.theatlantic.com/magazine/archive/2013/05/what-if-we-never-run-out-of-oil/309294/?single_page=true (suggesting that the shale gas boom may only be a precursor to an even greater surge of natural gas production from methane hydrates).

If the EPA revoked the waste treatment exclusion, coal-fired generation would become substantially costlier, particularly if this revocation applied to both pre- and post-CWA impoundments of "waters of the United States." Plants would still need treatment systems for the millions of tons of coal ash they produce every year,[180] but these systems would have to be newly constructed and entirely man-made, rather than building on existing bodies of water. Estimates of the potential costs of cleaning up existing ponds range from $1-100 million per pond.[181] In some cases, a single operator would need to clean up multiple ponds at one facility.[182] To recover these costs, coal-based electricity generators would presumably need to raise prices. Given the newfound competitiveness of natural gas-fired generation relative to coal, the coal industry would not fare well if forced into this position.[183] Moreover, it is possible that the economic viability of natural gas has yet to reach its peak;[184] if methane hydrates prove to be economically recoverable at commercial scale, prospects for coal-fired generation will become ever bleaker. Revoking the EPA's July 21 suspension may not be the final nail in the coffin of coal-fired electricity generation, but it would undoubtedly be a substantial economic burden.

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[180] *Cf. Disposal: Coal Ash Waste*, *supra* note 5 ("Every year, the nation's coal plants produce 140 million tons of coal ash pollution, the toxic by-product that is left over after the coal is burned. All that ash has to go somewhere, so it's dumped in the backyards of power plants.").

[181] *See* E. Lynn Grayson, *Coal Ash Ponds and Coal-Related Financing News*, JENNER & BLOCK LLP CORP. ENVTL. LAW BLOG (July 18, 2013), http://environblog.jenner.com/corporate_environmental_l/2013/07/coal-ash-ponds-and-coal-funding-news.html (noting that a report by the Rainforest Action Network estimates the cost of closing ash ponds will range "from $1M to potentially over $100M per pond").

[182] *Compare* Evans & Hallowell, *supra* note 28 (noting that EPA data indicates the existence of "at least 1161" coal ash ponds), *with Coal vs. Wind*, *supra* note 26 (noting that there were 572 operational coal plants as of 2012).

[183] *See* Grayson, *supra* note 181 ("[F]orthcoming EPA coal ash disposal regulations may force power plant operators to incur substantial compliance costs and potentially shutter several coal-fired power plants.").

[184] Mann, *supra* note 179 (describing the "immense quantities" of methane hydrate—"by some estimates, it is twice as abundant as all other fossil fuels combined"—and noting Japan's recent success with its *Chikyu* vessel, which "retrieved about 4 million cubic feet of natural gas from methane hydrate, at double the expected rate").

B. *In Light of the "War on Coal," Does the Waste Treatment Exclusion Still Matter?*

This Subpart will assume that a future without coal-fired electricity generation—or with such generation limited to plants that use carbon capture & storage (CCS) technology and deposit coal combustion waste in lined ash impoundments that are *not* built on existing "waters of the United States"—is preferable. The question, then, is what is the most effective and efficient way to reach this future as quickly as possible? Regulation of GHG emissions is one, but by no means the only, method.

The Obama administration recently announced its desire for the EPA to draft new CAA regulations to limit greenhouse gas (GHG) emissions from existing power plants.[185] By some accounts, this announcement heralds the beginning of the end of coal-fired electricity generation in the United States.[186] In addition, the EPA's recently proposed rules for new plants already all-but-ban new construction of coal plants.[187] In the face of this "war on coal" that may eliminate coal-fired generation without reliance on the CWA, it may be reasonable to question whether the waste treatment exclusion is still relevant. Below are two reasons for its continued relevance.

1. *The Current "War on Coal" Is Being Waged by Air, but It Could Be Waged by Sea as Well*

Eliminating coal-fired generation to mitigate climate change impacts is one environmental goal of revising the waste treatment

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[185] Memorandum on Power Sector Carbon Pollution Standards, 78 Fed. Reg. 39,535 (July 1, 2013).

[186] *See, e.g.*, *Obama Orders New Rules on Coal-Fired Plants, Sets Condition for Keystone Pipeline*, FOX NEWS (June 25, 2013), http://www.foxnews.com/politics/2013/06/25/obama-to-unveil-new-climate-regulations-as-adviser-pushes-war-on-coal/ (quoting Rep. Shelley Moore Capito, a Republican from West Virginia, who claimed the new regulations "could deliver an unrecoverable blow to coal-rich states . . ." (internal quotation marks omitted)).

[187] Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units, 77 Fed. Reg. 22,392 (proposed Apr. 13, 2012) (to be codified at 40 C.F.R. pt. 60) (setting CO_2 emissions limits of 1,000 pounds per MWh of electricity produced); Erica Martinson, *EPA Hits Greenhouse Gas Emissions from Power Plants*, POLITICO (Mar. 26, 2012, 11:23 PM), http://www.politico.com/news/stories/0312/74508.html#ixzz1qKCuneuw ("[T]he rule means that coal-fired power plants as they exist now will not be built in the future.").

exclusion, but another, wholly distinct goal is tied more directly to the actual purpose of the CWA: improving the nation's water quality. As effective as the CAA may be in addressing climate change and the coal-fired power industry—at least relative to the CWA—it is *not* suited to addressing water pollution. Stricter CAA regulation of GHG emissions may in fact have the perverse effect of *increasing* water pollution; as more pollutants are "scrubbed" from emissions, plant operators will necessarily have more pollutants in their possession to dispose of somewhere other than in the air. For this reason, it is important to evaluate the waste treatment exclusion in terms of its distinct effects on coal-fired generation, but also its interaction with the CAA as one provision among many in a broad regulatory regime designed to control environmental degradation in all of its forms.

2. *The Waste Treatment Exclusion Affects Industries Beyond Coal*

Moreover, while this Article has discussed the waste treatment exclusion in the context of coal ash ponds, it is important to keep in mind that the regulation is not this narrow in its impact. Coal plants may be uniquely impacted by the fate of the exclusion, but other industries impound "waters of the United States" to create waste treatment systems and will be affected to varying degrees.[188] Again, this speaks to the fact that removing the exclusion would help to mitigate climate change impacts by imposing costs on coal-fired electricity generation, but it would also include wider water quality improvements as well.

CONCLUSION

No action is without consequences, and in the case of coal-fired electricity generation, one of those consequences is surface impoundments of water full of coal ash. For the last thirty-three years, these impoundments have found legal existential justification in the EPA's suspension of one sentence in the

[188] *See, e.g.*, Ohio Valley Envtl. Coal. v. Aracoma Coal Co., 556 F.3d 177 (4th Cir. 2009) (addressing the waste treatment exclusion in the context of coal *mining* operations); N. Cal. River Watch v. City of Healdsburg, 2004 WL 201502 (N.D. Cal. 2004) (addressing the exclusion in the context of a municipal waste treatment system); In the Matter of: Borden, Inc./Colonial Sugars, 1 E.A.D. 89532 (EAB 1984) (addressing the exclusion in the context of a sugar cane processing facility).

regulatory definition of "waters of the United States." This Article has attempted to demonstrate why the waste treatment exclusion, created by the EPA's action, is potentially illegitimate based on the procedures followed, the *Chevron* Doctrine, and the logic of the Supreme Court's opinions in *Brand X* and *Home Concrete*.

Assuming the law's illegality and the potential to challenge it, whether such challenges *should* be brought are separate questions. After all, the EPA's original decision to establish it was not without practical justifications.[189] Given both the climate change imperative and the current political environment,[190] one may question the prudence of spending the finite political capital of the environmentalist agenda on an obscure EPA regulation from 1980 dealing with a relatively small area of water pollution—especially if, as some have argued, the coal industry is already on its way out,[191] and eliminating the waste treatment exclusion would thus exert negligible additional pressure.

That being said, the waste treatment exclusion appears to be a longstanding legal oversight on an issue of fundamental significance to the Clean Water Act—the EPA's authority to set the scope of an Act it has been charged with administering. Should environmental groups or state actors wish to remedy this oversight, the legal arguments advanced in this Article may contribute to their efforts.

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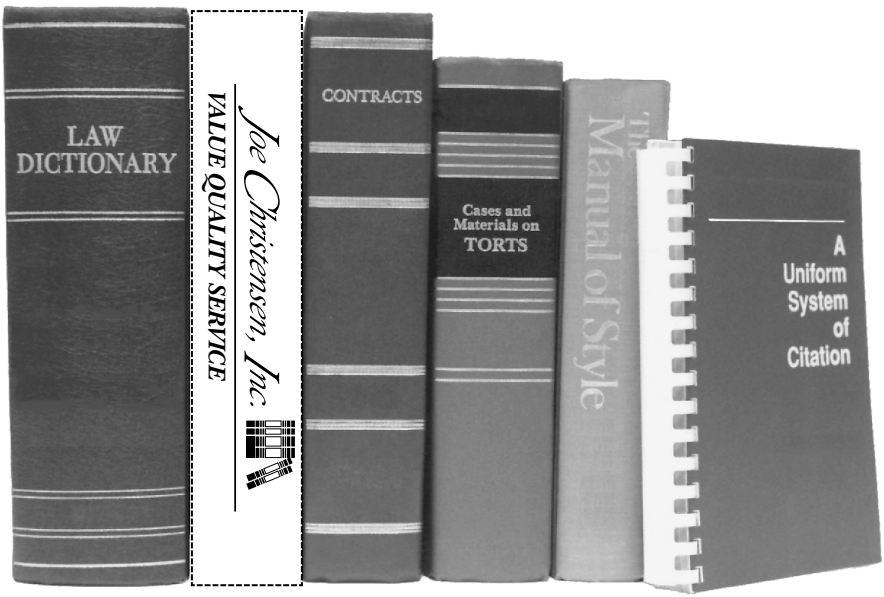
[189] *See* Consolidated Permit Regulations, 45 Fed. Reg. 48,260 (July 18, 1980).

[190] *See, e.g.*, John Cronin, *President Obama and Climate Change 2013*, EARTHDESK (June 26, 2013), http://earthdesk.blogs.pace.edu/2013/06/26/president-obama-and-climate-change-2013/ ("The effectiveness of [President Obama's] limited reserve of political capital in the face of House and industry objections will likely be determined by political realities that have little to do with the rising levels of carbon dioxide in the atmosphere.").

[191] *See, e.g.*, Lipton, *supra* note 177; *see also* Michael Bastasch, *Report: EPA Rules to Shut Down More Than 280 Coal-Fired Units*, DAILY CALLER (May 3, 2013, 11:15AM), http://dailycaller.com/2013/05/03/report-epa-rules-to-shut-down-more-than-280-coal-fired-units/ (discussing the potential impact of regulations the EPA has already proposed).



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