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The White Horse Press

Full citation:

Paavola, Jouni. "Interstate Water Pollution Problems and Elusive Federal Water Pollution Policy in the United States, 1900–1948." *Environment and History* 12, no. 4 (November 2006): 435–65.  
<http://www.environmentandsociety.org/node/3281>.

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# Interstate Water Pollution Problems and Elusive Federal Water Pollution Policy in the United States, 1900–1948

JOUNI PAAVOLA

*Sustainability Research Institute (SRI)  
School of Earth and Environment  
University of Leeds  
Leeds LS2 9JT, UK  
Email: j.paavola@see.leeds.ac.uk*

## ABSTRACT

This article examines water pollution and its control in the United States from the turn of the twentieth century until after the Second World War, a period during which water pollution became an interstate problem. State water pollution control policies existed at the time. However, states were unwilling to control the pollution of state waters because of the threat of industrial flight, and the pollution of interstate waters because it would have mainly benefited downstream states. The states first sought to resolve their conflicts over the pollution of interstate waters by litigating in the Supreme Court of the United States, but it was not well-suited for managing the quality of interstate waters. Many organisations also lobbied for federal water pollution control legislation but the federal government only endorsed the use of interstate compacts to manage water quality in interstate waters. However, they were largely ineffective and did not address the threat of industrial flight which was an obstacle for water pollution control in state waters. Federal funding of water pollution control measures during the New Deal had more lasting impacts and became an element of federal water pollution legislation when it was finally enacted after the Second World War.

## KEYWORDS

Water pollution, interstate compacts, New Deal, United States

## 1. INTRODUCTION

It is a common view that changing values and new kinds of environmental activism in the 1960s and the 1970s helped to bring about public policies which mitigated water and air pollution problems caused by industrialisation and urbanisation. There is a grain of truth in this view but it omits that the history of pollution problems is long, and that complex reasons often lay behind the ineffectiveness of past policy responses. Past policies sometimes resolved pressing problems – but not necessarily the ones that the posterity considers important. For example, public policies mainstreamed filtration and chlorination of drinking water in the early twentieth century to protect public health, but failed to improve in-stream water quality.<sup>1</sup>

This article examines legal responses to water pollution in the United States from the turn of the twentieth century until after the Second World War. Several environmental historians have focused on water pollution and its control in particular watersheds or states during the period, and there is a relatively good understanding of the technological and economic drivers of water pollution during the period. Environmental historians have also explored aspects of federal involvement in water pollution control during the period. However, institutional solutions for water pollution control have not yet been explored in greater detail. The goal of this article is to identify institutional solutions that were used for water pollution control during the period, and to shed some light on the reasons for their emergence as well as on their effectiveness and outcomes. At the same time, the article seeks to synthesise earlier contributions and to place them in their broader context.<sup>2</sup>

Douglass North has defined institutions as the ‘rules of the game’ in human interaction. Institutions can be informal or formal, and can simultaneously govern human interaction. Institutions are established to pursue either widely shared social goals or the goals of a well-placed interest group; they change when power relations between groups are altered or when their goals change. They may also change when the costs of ways of achieving goals increase or decrease. The focus in this article is on institutions that have governed the quality of waters. These institutions are typically formal, meaning that they have been explicitly formulated and coded in legal precedent, statute books, and other documents. But the rules in theory are seldom the same as the rules in practice: some formal rules may be ineffective and interactions between formal and informal rules may result in unintended outcomes. The goal of the article is to understand the change of institutions that have governed water quality in the United States as well as their impacts in this light.<sup>3</sup>

Court case reports indicate that mines, tanneries, saw mills and textile mills were the primary water polluters in the United States until the last quarter of

the nineteenth century, when sewage disposal from growing cities became the greatest source of water pollution. At the same time, the emergence and growth of mining, petroleum refining, and metal and chemical industries increased chemical and toxic discharges to watercourses. The scale and intensity of water pollution increased so that it became an interstate problem by the turn of the twentieth century.<sup>4</sup>

The article argues that existing legal institutions were mostly ineffective in controlling water pollution at the turn of the twentieth century. States such as Maryland, Massachusetts, New Jersey and Pennsylvania had established statutory water pollution control programmes to protect public health. However, these policies frequently applied to sewage pollution only and had also other exemptions. Furthermore, states ceased to enforce these policies after the effectiveness of filtration and chlorination of drinking water in protecting public health was demonstrated. In many states, local ordinances were the only statutory water pollution control measures and they were powerless when the source of pollution was outside of their jurisdiction. The only other legal remedy for water pollution was a court action under common law. However, litigation seldom delivered clean water because its function was to restore economic value of property. Political economy of litigation also resulted in gradual evolution of rules of water use which relieved many industrial polluters from liability.<sup>5</sup>

It was unsurprising that other institutional alternatives were considered. States litigated some conflicts over the pollution of interstate waters in the Supreme Court in the early twentieth century, but it was not well-suited for managing the quality of interstate waters. The federal government also enacted the Rivers and Harbors Act of 1899 and the Oil Pollution Act of 1924 to protect interstate commerce, but these interventions did little to protect other interests in clean water. Conservation and other organisations lobbied for more comprehensive federal water pollution control legislation in the 1930s. But federal government only endorsed the use of interstate compacts as a response to the pollution of interstate waters. Interstate compacts proved largely ineffective and they did not address the obstacles for controlling the pollution of state waters at all. Federal funding of water pollution control measures as part of the New Deal efforts to alleviate the Great Depression had more lasting impacts and federal government retained the funding role when the federal water pollution control legislation was finally adopted after the Second World War.<sup>6</sup>

In what follows, the second section discusses how water pollution became an interstate problem by the turn of the twentieth century. The third section analyses legal institutions that existed for governing water quality at the time. The fourth section examines the search for a solution for interstate water pollution problems; and the fifth section analyses interstate compacts as the adopted response.

## 2. WATER POLLUTION AS AN INTERSTATE PROBLEM

Court case reports indicate that early industrial establishments created local water pollution problems in the United States by the first half of the nineteenth century. Tanneries, saw mills, and textile mills were located at watercourses because they needed water for power generation or production. Watercourses were also used to dispose of wastes such as organic matter, sawdust and bark. Both the scale of industrial pollution and its nature changed towards the end of the nineteenth century: large coal and ore mines, steel factories, oil refineries and chemical plants discharged increasing amounts of chemicals and toxins.<sup>7</sup>

Early industrial water pollution interfered with private water use and the use of other private property, for which the injured party could seek compensation or injunction under riparian law or nuisance law. The plaintiff was often a mill owner who made valuable use of water and who had the incentives and resources to litigate. The effects of industrial water pollution on public health, recreation, and fisheries were first ignored but they received more attention after the First World War. For example, the American Water Works Association (AWWA) appointed a Committee on Industrial Wastes in Relation to Water Supply, which reported in 1923 that industrial discharges had damaged 250 public water supplies.<sup>8</sup>

Pollution of water by human wastes also began at the same time. Cesspools and privy vaults contaminated water and caused epidemics of water-borne diseases, which contributed to decreasing urban life expectancy in the first half of the nineteenth century. However, at this time diseases were still often attributed to moral failure, a view which did not justify legal responses to water pollution. The cholera pandemics formed an exception: court cases litigated in 1832–4, 1848–9, 1866 and 1873 suggest that all health treats were considered seriously during the cholera years.<sup>9</sup>

The mid-nineteenth-century epidemiological studies and sanitary surveys established an association between filth and pollution on one hand, and diseases and mortality on the other, thereby providing a rationale for constructing networked systems for delivering clean water and for disposing of human wastes. Initially, these systems expanded the scale of the problems they were expected to resolve, contaminating public water supplies and causing deadly typhoid epidemics in many cities in the late nineteenth century.<sup>10</sup>

Case reports suggest that sewage replaced industrial discharges as the primary cause of water pollution at the end the nineteenth century. Sewage pollution was primarily a public health problem but it also damaged private property, recreation and fisheries. Public nuisance suits, which were often used by private rather than public plaintiffs, were the first legal measure available for controlling sewage pollution. Many communities adopted local ordinances after the mid-nineteenth century to protect public health from human wastes. Private litigation for property damages caused by municipal polluters also intensified after cities

built sewerage systems. Sewage pollution caused frequent conflicts in densely populated watersheds, such as that of the Passaic River in New Jersey, at the end of the nineteenth century.<sup>11</sup>

Local communities faced the same problematic incentives with regard to water pollution control as states would later: those taking action incurred costs while benefits accrued to others. This is why states started to legislate on water pollution at the end of the nineteenth century.<sup>12</sup> Paul Hansen, engineer of the Illinois State Water Survey, assessed the situation in the *American City* magazine in 1914 as follows:

the cleanness of streams cannot be conserved unless under a central governmental supervision. If left to individual communities, very little could be expected in the way of results. Communities are not likely to be altruistic enough to spend large sums of money for sewage purification works to protect neighbors on the stream below, unless such altruism is induced by damage suits which render sewage purification the cheapest way out of difficulty. But lawsuits are costly if long drawn out and the results are often unsatisfactory.<sup>13</sup>

Water pollution problems already involved several states at the turn of the twentieth century. One of the early interstate conflicts took place between Illinois and Missouri over Chicago's sewage discharges. Chicago had taken its water from Lake Michigan since building its first water works and it also discharged its wastes to Lake Michigan via Chicago River. The city experienced severe typhoid epidemics, which killed more than 100 people per 100,000 population in 1864–6, 1872, 1881 and 1890–92. In 1887, the city decided to divert sewage discharges from its water supply by building the Sanitary and Ship Canal (see Figures 1–3). The Canal diverted the Chicago River to Illinois River, which flows to the Mississippi just north of St. Louis in Missouri. The construction of the Canal was started in 1890 and completed in 1900. St. Louis objected to receiving the untreated sewage of Chicago's million inhabitants. Together with the state of Missouri, it pleaded the Supreme Court to enjoin Chicago's sewage discharges but the Supreme Court refused.<sup>14</sup>

New York and New Jersey also had a dispute in the early twentieth century. New Jersey wanted to reduce sewage pollution in the Passaic River by building a trunk sewer from the Passaic River basin communities to the Upper New York Bay. New York was opposed to the plan. New Jersey, in turn, challenged New York's dumping of wastes to the Atlantic Ocean because the wastes were washed to New Jersey's beaches which were important to its tourist industry.<sup>15</sup> Earlier, oil refineries situated in the Northern New Jersey and in the Newtown Creek of Long Island had badly polluted the interstate waters between New Jersey and New York. Industrial development and urban growth in Pennsylvania, Virginia, West Virginia, Ohio, Indiana, Illinois and Kentucky polluted the Ohio River and the same happened in the Great Lakes.<sup>16</sup>

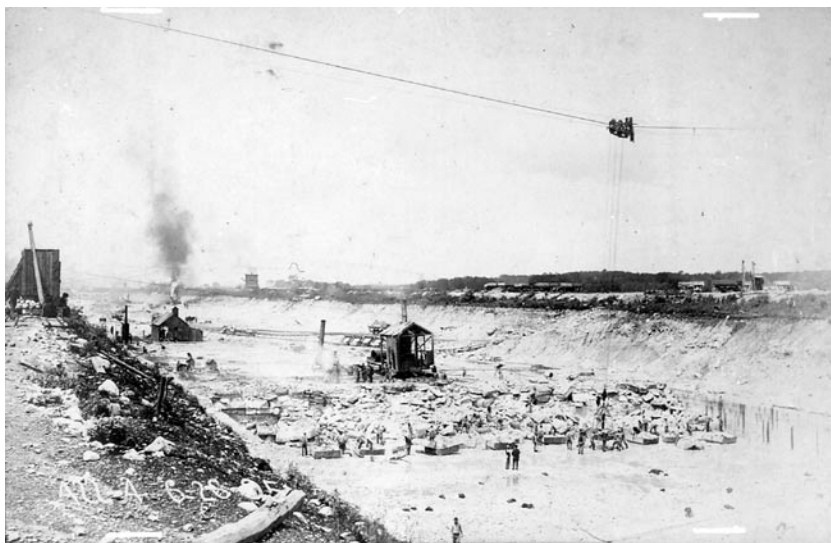


FIGURE 1. Excavation of the Chicago Sanitary and Ship Canal in 1895. Photograph courtesy of the Lewis University Canal and Regional History Special Collection.



FIGURE 2. Nearly finished Chicago Sanitary and Ship Canal in 1898. Photograph the courtesy of the Lewis University Canal and Regional History Special Collection.

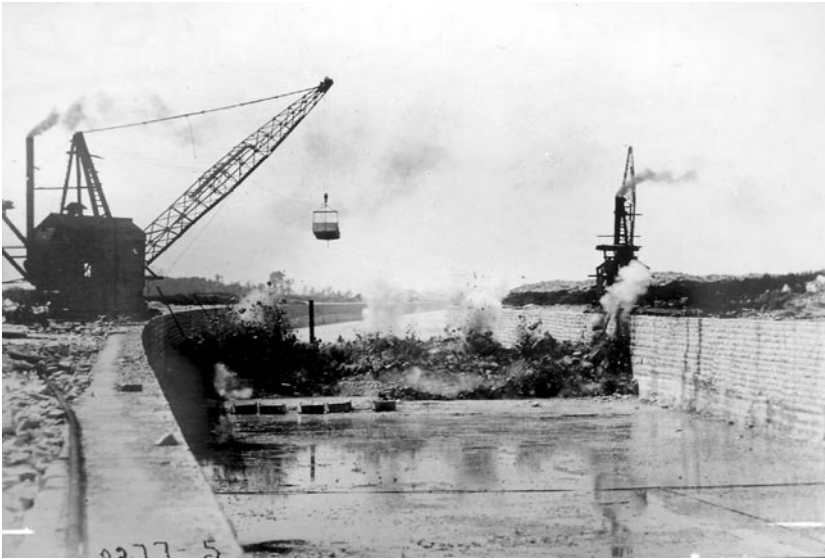


FIGURE 3. Removal of a coffer dam in the Chicago Sanitary and Ship Canal in 1900. Photograph courtesy of the Lewis University Canal and Regional History Special Collection.

Thus water pollution had become an interstate problem by the turn of the twentieth century. At this time, sewage discharges were contributing more to water pollution than industrial waste disposal. However, industrial waste disposal became the most important cause of water pollution by the end of the Second World War as the result of industrial growth and gradually improving sewage treatment. Water pollution had two aspects as an interstate problem, the first of which was the pollution of *interstate waters*. Upstream states had no incentives to control the pollution of interstate waters because they would have carried all of the costs and all benefits would have accrued to downstream states.<sup>17</sup>

The second aspect of water pollution was the interdependence of states with regard to the control of pollution in *state waters*. State policies influenced a state's attractiveness for industrial location – strict policies could repel industries and result in industrial flight. Textile and pulp and paper industries relocated from the northern states to the southern ones within a few decades in the early twentieth century: industrial mobility was real and its threat was used to object water pollution control policies.<sup>18</sup> For example, in 1936, Kenneth A. Reid, the Executive Director of the Izaak Walton League of America, observed in his address to the League's fourteenth annual convention:



We have had a Pure Streams Bill in the Pennsylvania Legislature every year as long as I can remember. It is always defeated by the Pennsylvania Manufacturers' Association, with this argument: that to pass such a bill would penalise Pennsylvania industries and put them at competitive disadvantage with the industries of New York, New Jersey, West Virginia and other adjoining states.<sup>19</sup>

### 3. INADEQUACY OF EXISTING LEGAL INSTITUTIONS

Primary responsibility for water pollution control rested with the states in the early twentieth century. Some states had enacted water pollution control legislation as a response to severe typhoid epidemics in the late nineteenth century. In 1916, Charles V. Chapin, one of the leaders of the public health movement, assessed that Massachusetts, Pennsylvania, Maryland, New Jersey, Minnesota, Ohio and New York were at the forefront in water pollution control. The reviews of state legislation prepared by Edwin B. Goodell in 1905 and Stanley D. Montgomery and Earle B. Phelps in 1918 indicate that these states indeed pioneered in water pollution policy. Their water pollution control statutes gave state departments of public health a relatively broad authority, ranging from the monitoring of water quality and the enforcement of rules regarding the discharge of pollutants to the approval of plans for water supply and sewer systems. But even in these pioneering states, water quality management focused on public health goals, while in-stream water quality received less attention.<sup>20</sup>

Additional insights into these water pollution control programmes are provided by the reviews that were conducted by the National Resources Committee (NRC) in the 1930s. The NRC was a New Deal agency established in 1935 for federal planning, including planning of conservation and use of national resources. NRC was the successor of the Federal Emergency Administration Board (National Planning Board) which was established in 1933 and transformed into the National Resources Board in 1934. In 1939, NRC was amalgamated into the National Resources Planning Board, which was abolished later in 1943. These New Deal planning organisations were responsible to President Franklin D. Roosevelt and included departmental representatives and appointed advisory members such as Frederic A. Delano (President Roosevelt's uncle) and Wesley C. Mitchell, the prominent institutional economist.<sup>21</sup>

NRC harnessed experts from public administration, universities and business to generate surveys and studies to support its planning. The Special Advisory Committee on Water Pollution ('the Committee') was formed for preparing reviews of state water pollution control programmes in 1935, 1937 and 1939. In 1939, the Special Advisory Committee was chaired by Abel Wolman, Chief Engineer of the Maryland State Department of Health. Other members included W. B. Bell, Chief of the Division of Wildlife Research in the US Biological Survey; Thorndike Saville, Dean of the College of Engineering at New York

University; William A. Snow, Chief of the Technological Branch of the Bureau of Mines; Elmer Higgins, Chief of the Division of Scientific Inquiry of the Bureau of Fisheries; and R. E. Tabbett, Senior Sanitary Engineer of the US Public Health Service. The Special Advisory Committee heard and obtained contributions from federal and state authorities, representatives of industrial organisations and trade associations, and members of conservation organisations, such as the Izaak Walton League of America and the Audubon Society.<sup>22</sup>

The three reviews indicate that the development of state water pollution control policies was slow after the mainstreaming of chlorination of drinking water between 1911 and 1915. Therefore, many of their observations and assessments are also pertinent to the situation that prevailed in the first decade of the twentieth century. The Committee judged that only eight states had 'optimum control' over water pollution in 1935. For the Committee, optimum control meant that the responsibility and authority for controlling water pollution was delegated to one state agency, which was empowered to determine what constituted prohibited water pollution and to compel its abatement. It also meant that the agency could compel the construction of municipal sewage treatment plants despite limitations imposed by state legislation on municipal bonding or borrowing. In 1939, 15 states were deemed to have 'optimal control'. These states included California, Connecticut, Florida, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, North Dakota, Oregon, Rhode Island, South Dakota and Wisconsin. Comparisons between the states, federal support for sewerage and waste water treatment investments, and civic activism all played a part in fostering the development of legislation in this relatively short period of time.<sup>23</sup>

The reviews of the NRC identified several weaknesses in state water pollution control programmes. First, they contained numerous exemptions – most often they exempted industrial streams that were among the most polluted waters. Certain industries were also sometimes exempted – usually those that were important for the states' economies. Finally, certain cities or municipalities could be exempted. With some irony, one of the reviews noted that when all exemptions were accounted for, one state's water pollution control provisions were found to apply only to its coastal waters.<sup>24</sup> Secondly, statutes contained ambiguous wording, such as the prohibition of pollution 'in quantities injurious to public health', which weakened the position of state agencies in court if a polluter challenged an administrative order.<sup>25</sup> Thirdly, all statutes did not include provisions for relaxing limitations on the bonding and taxing powers of local governments. These limitations had been established to protect local tax payers by preventing local governments from becoming indebted, but they were also used as a pretext for not complying with abatement orders. Sometimes they simply made compliance impossible.<sup>26</sup>

The reviews observed that many state programmes did not explicitly delegate mandatory powers to state agencies. Therefore, they could not issue binding

and enforceable compliance orders to polluters. State agencies also often lacked authority to establish what constituted prohibited water pollution. The reviews argued that the absence of a clear standard of unacceptable pollution was an obstacle for enforcement, and weakened the position of state agencies in the courts.<sup>27</sup> The reviews also drew attention to the great number of water pollution control statutes. In some states, such as Wisconsin, responsibility for water pollution control was shared between several state agencies.<sup>28</sup>

Finally, in fourteen states only common law and penal and nuisance statutes governed water quality in 1935. The experience with industrial water pollution had demonstrated that common law could not be used to control water pollution effectively. Part of the problem was that common law remedies only protected the economic value of property. Damages could be awarded to the plaintiff after the injury to restore the value of his or her property to what it had been before. Injunction affirmed the plaintiff's property right and it could be awarded both to remedy and prevent injury. But an injunctive right was tradable like any other property: a plaintiff could demand a price to tolerate pollution. This was what many plaintiffs did although there were also some who refused to trade.<sup>29</sup>

Thus common law remedies both put a price tag on pollution and created an incentive for reducing pollution. However, industrial polluters frequently made the most valuable use of water and could afford to pay to pollute. And this was not all: the dynamics of rule creation gradually relieved industrial polluters from liability. Under riparian law, 'rules of water use' emerged as the result of litigation because the courts either affirmed the existing rules or formulated new ones when they resolved disputes over water pollution. The resources of plaintiffs and defendants determined their ability to litigate; and their willingness to litigate was determined by the probability and prospective gains of winning litigation. When polluting water uses were the most valuable ones, litigation gradually weakened the protection of customary water rights. Early in the nineteenth century, the doctrine of natural flow had entitled riparians to undiminished quantity and quality of water. The rule of reasonable use adopted in the late 1820s enabled proprietors to cause some change in the quantity or quality of water available for others without liability for damages. In the mid-nineteenth century, the rule of reasonable use was transformed into a balancing test, which confirmed the more valuable water use as the reasonable one and enabled the riparian making a more valuable water use to extinguish the less valuable rights without compensation. This gradual change in rules of water use was a part of what Morton Horwitz (1977) has called 'the capital subsidy' for the nascent industry in the nineteenth-century United States.<sup>30</sup>

Litigation over sewage pollution had a somewhat less dismal record. Owners of riparian properties brought dozens of private nuisance suits against municipal polluters in the last quarter of the nineteenth and in the first few decades of the twentieth centuries. At first the courts were reluctant to find municipal polluters liable for the damages they had caused. However, plaintiffs increasingly pre-

vailed in the courts towards the end of the nineteenth century, putting pressure on municipal polluters to adopt sewage treatment. Yet while private nuisance litigation over sewage pollution created financial pressures to adopt sewage treatment, it did so only to protect property values and omitted other reasons. There also existed a parallel line of litigation over death and disease, caused by the delivery of contaminated water, which created pressures for filtering and chlorinating drinking water.<sup>31</sup>

Despite the weakness of the early state water pollution control policies and the common law, states managed to solve the problem that most concerned them: the threat of contaminated water supplies to public health. Filtration and chlorination of drinking water protected public health at a low cost, and state health departments ensured that public and private water companies adopted these technologies. They could do so because in many states legislation required the review and acceptance of plans and designs for water works and sewer systems by state authorities. Litigation for illness and loss of life caused by the delivery of contaminated water added financial pressures to adopt these technologies. Chlorination of drinking water was mainstreamed between 1911 and 1915, which together with water filtration decreased typhoid mortality to about one per cent of what it had been earlier. But filtration and chlorination also reduced the urgency of treating sewage discharges. George C. Whipple described the problem succinctly:<sup>32</sup>

the greater the natural purity of the water the less work is demanded of a purification plant... It is possible, however, to overemphasise the relative results that can be accomplished by prevention of pollution... It is of course desirable that our streams and lakes be kept pure, and this is especially true when such waters are to be afterwards used as sources of water supply. Nevertheless a small amount of pollution can be more readily and efficiently removed by modern devices for purifying water, and at much less cost, than by the methods of purifying sewage. That it is cheaper to purify water than it is to purify sewage should be apparent to anyone who thoughtfully considers the nature of these two liquids.<sup>33</sup>

The possibility of safeguarding public health with inexpensive technologies, such as filtration and chlorination, reduced the urgency of enforcing the existing water pollution control policies. Whipple noted in the early 1920s that 'there is now a greater indifference to stream pollution, a greater laxity in enforcing laws, than was the case before the World War'. The indifference was reflected in lower number of actions brought to the courts to enforce water pollution control statutes after the First World War. In addition, the NRC noted in its 1939 review that many states had ample authority to control water pollution and to enforce existing legislation but that this authority was not used. That is, while the early statutory state water pollution control programmes reached their primary goal of safeguarding public health, they were counter-productive for in-stream water quality.<sup>34</sup>

Thus, states could not manage the quality of their own waters effectively on the basis of the policies that existed at the beginning of the twentieth century. States were also unable to manage the quality of interstate waters. On one hand, many sources of water pollution were outside their own jurisdiction and they had no power over these sources. On the other hand, they had no incentives to control pollution originating from within their own jurisdiction because it would have mainly benefited the downstream states. States recognised this. For example, in Ohio the Bense Act of 1908 'exempted every village and municipality along the Ohio River from installing sewage-treatment works until similar facilities were provided by all municipalities upstream of it'. As a result, only one per cent of households in the Ohio River basin were served by sewage treatment in 1948, while the average national figure was over 30 per cent in 1938. Moreover, other large interstate rivers had lower than average sewage treatment levels.<sup>35</sup>

#### 4. THE SEARCH FOR AN INTERSTATE SOLUTION

States first sought to resolve their conflicts over the pollution of interstate waters in the U.S. Supreme Court, which had primary jurisdiction in disputes between them. In *Missouri v. Illinois* (1901, 1906), the Supreme Court denied injunction because Missouri could not show that Chicago's sewage discharges would endanger public health in St Louis. A few years later, the federal government sued Chicago because it had diverted water from the Lake Michigan in excess of its permit for flushing its sewage to Mississippi, drawing down the water level in the Great Lakes. Several states joined this litigation. The Supreme Court set a limit to Chicago's diversion of water, which required it to build what would be the largest sewage treatment plant in the world at the time (see Figure 4).<sup>36</sup>

Several other prominent cases related to water pollution were dealt with by the Supreme Court after *Missouri v. Illinois*. In *New York v. New Jersey* (1921), the Supreme Court allowed New Jersey to proceed with the construction of the Passaic trunk sewer on the condition of treating the sewage and ensuring the absence of visible suspended particles in New York Harbour, as well as the absence of odour and discoloration of water, and damage to property and fish life. In *New Jersey v. City of New York* (1930), the Supreme Court enjoined New York from disposing of its wastes to the sea, requiring it to build waste incinerators.<sup>37</sup>

The Supreme Court facilitated water pollution control in these disputes by defining how the benefits and burdens were to be allocated between the states involved. However, it was not well-suited to managing water quality in interstate waters on a day-to-day basis. Its decisions in interstate disputes did not have the precedent value of its ordinary decisions: after all, it was just the trial court in interstate disputes. Litigation in the Supreme Court also took time. For example, New York challenged New Jersey's plan of building the Passaic trunk sewer



Figure 4. Settling Tanks at the Southwestern Disposal Plant in Chicago which was built as a result of the US Supreme Court's decisions. Photograph the courtesy of the US National Archives and Records Administration (NARA).

in 1908, and the Supreme Court made its final decision on the case in 1921. It was no wonder that other institutional solutions for dealing with interstate water pollution problems emerged.

One way to deal with interstate water pollution was federal intervention. The federal government indeed intervened at the turn of the century to stop dumping of wastes into watercourses on the basis of its constitutional authority to protect interstate commerce. The problem of dumping had emerged because contractors responsible for urban solid waste collection often tipped their wastes into the nearest watercourses. Congress prohibited dumping of wastes in New York Harbor in 1886 but dumping soon impeded navigation elsewhere. The Rivers and Harbors Act of 1899 prohibited the throwing of wastes and refuse (apart from sewage which was exempted) into all navigable waters without the permission of the Army Corps of Engineers. Several other bills, calling for the study of water pollution or its control, were presented in Congress in the late nineteenth and early twentieth centuries. These initiatives were echoed in the establishment, later in 1911, of the Public Health Service (PHS) to study water pollution and its public health impacts.<sup>38</sup>

These early federal statutes were enacted on the basis of the federal government's authority to protect interstate commerce, and navigation as one of its underpinnings, and they did not extend protection to any other interests in water quality. State policies and common law provided some degree of protection to public health and private property, respectively, but other interests in water quality, such as those related to recreation, received little attention. Yet anglers had lamented water pollution since the 1870s in publications such as *Field and Stream*, and recreational water users became more vocal in the early twentieth century.<sup>39</sup> Herbert Hoover, who at the time was Secretary of Commerce, echoed these concerns in his short contribution to *Outdoor America* in 1927:

oil ... not only forms a film on the water which stifles the fish but it finally coagulates into a sticky mass which ... washes up on the beaches or sinks to the bottom to poison the oysters. Those of you who take your children to ... beaches nowadays must also take with you a supply of benzine in order that you may wash your children after they have had a bath.<sup>40</sup>

Many organisations started to campaign for more effective water pollution control and greater federal involvement in it in the early twentieth century. These organisations included the Izaak Walton League of America (IWLA), the Audubon Society, the Interstate Committee on Prevention of Pollution of Coastal Waters and Beaches, the Waterways League of America, the National Coast Anti-Pollution League, and the Oyster Growers' and Dealers' Association of North America.<sup>41</sup> Several of these organisations were united by oil pollution, which had generated local problems since the 1870s in New Jersey and New York. Increasing use of internal combustion engines quickly spread oil pollution problems after the turn of the century. The most important source of oil pollution was ships, which flushed their tanks in or near harbours. Oil was a fire hazard in harbours, killed fish and fowl, and was washed onto beaches. It was no wonder that the insurance industry and organisations with interests in tourism, recreation, fisheries and bird life, such as the Waterways League of America, the National Coast Anti-Pollution League and the Audubon Society, actively participated in the hearings for the Oil Pollution Act. Some of these organisations promoted strong legislation for controlling all sources of oil pollution, but the Oil Pollution Act of 1924 in the end only prohibited the discharge of oil from vessels within three miles of the coast.<sup>42</sup>

Later in the 1920s and the 1930s, the IWLA became the most important organisation campaigning for water pollution control. It was established by fifty-four anglers at the Chicago Athletic Club in January 1922 to promote the protection of fisheries and wildlife. Will H. Dilg, a public relations person for a St Louis brewery, became the first national president of the IWLA. His professional skills and personal charisma contributed to IWLA's fast growth – it boasted 200,000 members in 2,900 chapters in its National Convention in 1927. Innovative organisational structure, a glossy magazine, and the involvement

of women and prominent writers, illustrators, physicians, sanitary engineers, and fish and wildlife managers also helped to boost IWLA's membership and activism.<sup>43</sup>

The IWLA first focused on fish and wildlife protection. For example, it played a key role in the establishment of the Upper Mississippi Fish and Wildlife Refuge in 1924. The IWLA's focus broadened after Will Dilg was ousted from the national presidency in 1926 because of his 'lax financial habits' and deteriorating health – Dilg suffered from throat cancer and died the following year. The national presidency was held by Charles W. Folds in 1926–7, J. M. Dickinson in 1927–8, and Henry Baldwin Ward in 1928–30.<sup>44</sup>

It was primarily Henry Baldwin Ward (1865–1945) who directed the IWLA's efforts to combat water pollution. Ward had trained in zoology in Göttingen in Germany in 1888–90 and completed his Ph.D. in zoology in Harvard in 1892. He held academic posts in Michigan and Nebraska before moving to the University of Illinois at Urbana-Champaign in 1909 to head the department of Zoology. Ward founded the *American Journal of Parasitology* in 1914, co-authored *Fresh-Water Biology* with George C. Whipple in 1918, and collaborated with other water pollution researchers such as Stephen A. Forbes.<sup>45</sup>

Ward suggested to President Coolidge in 1926 that the IWLA could prepare a nation-wide survey of water quality – an effort that was carried out during 1927 and reported in IWLA's magazine, *Outdoor America*. The survey found that sewage pollution was responsible for three-quarters of water pollution in the country as a whole, but that industrial effluents and sewage were equally important polluters in big industrial centres. The Northeast, the Midwest and California were found to be the most polluted areas. The survey also indicated that only 31 per cent of urban Americans were served by any kind of sewage treatment in 1926.<sup>46</sup>

At the federal level, the IWLA coordinated pressure on Senators and Representatives from different states and mobilised attendance in public hearings. The IWLA's state divisions and local chapters used the same tactics at state and local levels. For example, the Minnesota chapters campaigned for the treatment of the sewage discharges of Minneapolis and St Paul in the 1920s and the 1930s because the dams and locks in the Mississippi held back their sewage and created a massive nuisance. The Minnesota State Board of Health established the Minneapolis-St. Paul Sanitary District in 1933 for building the Pig's Eye Sewage Treatment Plant. The IWLA also campaigned against the use of boundary waters in Minnesota for power generation and industrial purposes in the hearings of the International Joint Commission in the 1920s and in the 1930s.<sup>47</sup>

The IWLA promoted federal water pollution control policy because its leaders believed that states would not control water pollution on their own. For example, in his address to the 14th annual convention of the IWLA in 1936, Kenneth Reid complained that the Pennsylvania Manufacturers' Association always defeated clean water bills in the state legislature by arguing that they would disadvan-



tage the state's industry in relation to those of New York, New Jersey and West Virginia. Interest groups had entrenched positions in state politics because the costs of more stringent policies would have been felt locally. Federal policies would have burdened all (or at least a number of similarly situated) states equally without altering relative competitiveness of affected states.<sup>48</sup>

In 1933, Senator Augustine Lonergan of Connecticut submitted a report on water pollution to President Franklin D. Roosevelt, who referred it to the Secretary of War, George R. Dern. In December 1934, Dern and Lonergan organised a conference on water pollution involving federal agencies, state governments and civic organisations such as the IWLA.<sup>49</sup> The conference could not agree on recommendations. The majority report proposed that compacts should be used to control the pollution of interstate waters and that the National Resources Committee should investigate water pollution and coordinate activities related to it. Members representing the IWLA prepared a minority report proposing a federal agency with an authority to establish sanitary districts and boards with powers to require abatement of pollution and to build and lease plants to industries and municipalities.<sup>50</sup>

A number of water pollution control bills were presented in Congress after the Lonergan conference. Senator Lonergan presented a bill to amend the Rivers and Harbors Act of 1899 to prohibit all discharges to navigable waters and the Oil Pollution Act of 1924 to prohibit the discharge of oil from land-based installations. He also presented a bill to establish a permanent National Resources Committee and to give it an oversight over water pollution control. Senator Alben W. Barkley of Kentucky, who had been involved in preparations for an interstate compact for the management of water quality in the Ohio River, proposed four bills related to water pollution control in the 74th Congress. These included S-4627, which provided for the establishment of the Division of Stream Pollution Control in the Public Health Service, to study water pollution and to prepare and promote plans for its control. The Barkley bill passed the Senate in the 74th Congress in 1935 but Senator Lonergan moved to reconsider the bill because he considered it weak. Identical to the Barkley bill, the Vinson bill passed the House of Representatives a few weeks later. Had it not been for Senator Lonergan's motion to reconsider the Barkley bill, the United States could have had federal water pollution control legislation in the 1930s. In the 75th Congress in 1937, water pollution control bills, identical to Barkley and Vinson bills, passed both the Senate and the House. However, President Franklin D. Roosevelt vetoed the bill because it contained a federal loan programme that he felt could not be afforded.<sup>51</sup> The Second World War then directed attention elsewhere.

However, the IWLA did not come out from its campaign with empty hands although its main goal of obtaining federal water pollution control legislation was not achieved. The IWLA succeeded in raising water pollution to the national political agenda. As recommended by the majority report of the Lonergan conference, the National Resources Committee prepared the three reviews of



Figure 5. During the New Deal era, many WPA projects such as this in Manhattan improved sewerage and sewage treatment. Photograph courtesy of the U.S. National Archives and Records Administration (NARA).

water pollution and its control in the late 1930s. These reviews recognised the existence of interstate water pollution problems and endorsed the use of interstate compacts as a response to them. The IWLA was also involved in the establishment of some of the compacts although it did not endorse them as the primary policy response.<sup>52</sup>

Perhaps even more importantly, the IWLA promoted water pollution control measures – such as the sealing of old coal mines and the construction of intercepting sewers and municipal waste water treatment plants (see Figures 4–5) – as part of the efforts to mitigate the Great Depression. While federal funding partly replaced state and local funding in this area, it was used for new purposes and helped to increase the proportion of Americans served by sewage treatment of any kind from about 17 per cent in 1932 to over 30 per cent in 1938. Federal funding of water supply and sanitation infrastructure during the New Deal also set a precedent for the establishment of a federal grant-in-aid programme as a part of the federal water pollution control legislation when it was established in 1948 and consolidated in 1956.<sup>53</sup>

## 5. INTERSTATE COMPACTS AS A COMPROMISE

Negotiations for interstate compacts were started before their use was endorsed by Senator Lonergan's conference and the NRC's three reviews. Interstate cooperation was started even earlier on the basis of informal agreements between state agencies. Ohio, Pennsylvania, West Virginia and Kentucky departments of public health studied phenol pollution in the Ohio River in collaboration with the federal Public Health Service in the 1920s. Phenols formed chlorinated phenyl compounds when they reacted with the chlorine used to treat drinking water. This adversely affected the taste of drinking water and exposed those consumers who opted for better-tasting, non-chlorinated water to water-borne diseases. The concerted effort of these public health departments eliminated phenol pollution from the Ohio River. Similarly, public health departments in Michigan and Ohio agreed on uniform policies to control the pollution of their boundary waters by food and paper industries and Pennsylvania and New Jersey collaborated in controlling pollution of the Delaware River.<sup>54</sup>

Interstate cooperation was formalised in compacts, which had been used earlier to resolve border disputes between the states. Interest in their use for other purposes grew after the First World War, when industrialisation and urban growth created problems that were too large for any one state to resolve, but which were not perceived to justify federal involvement. Justices Felix Frankfurter and James M. Landis also paved the way for their use by clarifying their constitutionality and legal basis in an influential article in the mid-1920s. A compact between New York and New Jersey in 1921 created the first permanent interstate agency, the Port Authority of New York. Soon afterwards, another

## INTERSTATE WATER POLLUTION

interstate compact created a permanent commission for sharing the waters of the Colorado River among seven Western states.<sup>55</sup>

The first interstate agency for controlling water pollution – the Interstate Sanitation Commission – was established by a compact between New York, New Jersey and Connecticut in 1935. Interstate Commission for the Delaware River Basin (INCodel) was also established in the 1930s by reciprocal legislation in New York, New Jersey, Pennsylvania and Delaware. However, it was transformed into a formal interstate compact only later in 1961. The Interstate Commission on the Potomac River Basin saw daylight in 1940 and the New England Interstate Water Pollution Control Compact and the Ohio River Valley Water Sanitation Compact came into force in 1947 and 1948.<sup>56</sup>

A closer look at the Ohio River Valley Water Sanitation Compact sheds light on all interstate compacts adopted for water pollution control. The compact was formed between the Ohio River basin states of New York, Pennsylvania, West Virginia, Virginia, Ohio, Indiana, Illinois and Kentucky (see Figure 1). Negotiations for the compact took place in the 1930s and the Congress approved it in 1940. However, the compact came into force only later in 1948 because of the war.<sup>57</sup> The compact established the Ohio River Valley Water Sanitation District

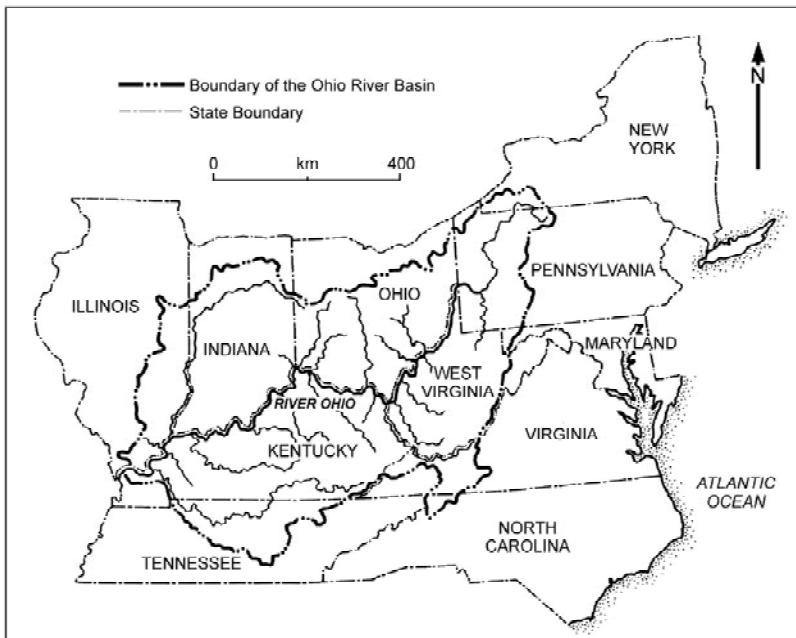


FIGURE 6. Map of Ohio River basin.

as the jurisdiction for interstate cooperation, and the Ohio River Valley Water Sanitation Commission (ORSANCO) as the interstate agency for managing water quality in the district. The seven states and the federal government each had three commissioners in the Commission. One or more commissioners from the majority of the states made the Commission quorate. The compact set general targets for the control of sewage and industrial discharges and authorised the Commission to determine the standard of purification after the process of 'investigation, due notice and hearing'. However, the majority of states could issue an enforcement order only upon the consent of the state in which the polluter resided.<sup>58</sup>

ORSANCO promoted the issue of municipal bonds for financing the construction of sewage treatment plants and organised industry-wide committees for establishing guidelines for good industrial practices and for finding solutions to abate industrial water pollution. Guidelines of good industrial practice were established for the handling of oil in terminals, for example. Industry committees fostered cooperation between the interstate commission, state authorities and industrial polluters. An informal system was also instituted for informing about accidental spills that could cause damage to downstream water works or industrial water users.<sup>59</sup>

All interstate compacts shared an emphasis on voluntary action but they had different powers and functions. INCODEL and the Potomac Commission were research and advisory bodies that did not have rule making or enforcement authority. The New England Interstate Compact had only a slightly broader mandate. The Interstate Sanitation Commission and ORSANCO had limited enforcement powers requiring unanimous decisions among the compact parties. Thus half of the compacts based the governance of water quality in interstate waters exclusively on voluntary, coordinated state action. Even interstate agencies such as ORSANCO that had broader powers avoided testing the limits of cooperation: it initiated court proceedings to enforce its orders only six times between 1948 and 1965.<sup>60</sup>

Nevertheless, interstate agencies fostered sewage treatment in their jurisdictions. The proportion of households in the Ohio River basin served by municipal sewage treatment increased from one per cent to 97 per cent between 1948 and 1963. Similarly, the number of households in the Potomac basin served by secondary treatment increased from nine per cent in 1940 to 87 per cent in 1965. In the jurisdiction of the New England Interstate Water Pollution Control Commission the proportion of households served by municipal sewage treatment plants increased from 39 per cent in 1947 to 87 per cent in 1965. However, these improvements in service levels were not sufficient to transform the quality of interstate waters because the required treatment levels were still relatively low. Moreover, apart from ORSANCO, the interstate agencies had relatively little influence on industrial water pollution.<sup>61</sup>

## INTERSTATE WATER POLLUTION

The IWLA's assessment of interstate compacts was poignant:

In theory compacts sound fine; in practice they just don't materialise, but as a legal means of putting off the day of reckoning in pollution control, the interstate compact probably has no equal...

Fourteen years of negotiation for an interstate compact that agrees to enforce no control over pollution from either municipalities or industries in any State unless two of the three compact commissioners from the offending State are willing to have this order entered against its pollution. If the state is willing, it can clean up its own pollution without an interstate compact; if it is unwilling, such a compact will contribute nothing to the cause of clean streams.<sup>62</sup>

No new interstate compacts were negotiated after 1948 exclusively for water pollution control, which perhaps best indicates that interstate compacts had not satisfied expectations. This happened despite the fact that the federal Water Pollution Control Act of 1948 endorsed and authorised the use of interstate compacts as a solution for regional water pollution problems. But the federal water pollution control legislation also created expectations of continued and deepening federal involvement in water pollution control. Many states such as Pennsylvania also reformed their water pollution control programmes in the 1930s and the 1940s because industrial water pollution had become more severe. Civic organisations, such as state divisions and local chapters of the Izaak Walton League of America, also actively lobbied for better water pollution control policies in the state legislatures.<sup>63</sup>

## 6. CONCLUSION

This article has examined legal responses to water pollution in the United States in the first half of the twentieth century. At the beginning of the twentieth century, water pollution problems increasingly had interstate effects and they also made states interdependent with regard to their policies towards the pollution of state waters. Active states carried the costs of controlling water pollution while its benefits mainly accrued to downstream states. Furthermore, no state wanted to be a vanguard of water pollution control and to expose itself to industrial flight. Existing legal institutions could not be used to resolve these water pollution problems and so several new legal responses were experimented with before the Second World War.

States first sought to litigate their conflicts over the pollution of interstate waters in the Supreme Court of the United States. While litigation resolved particular interstate conflicts over water pollution, it established the entitlements of involved states rather than providing a framework for continual management of water quality in interstate waters. Another legal solution that emerged in the 1920s was the interstate compact, which established a special jurisdiction to

manage the quality of interstate waters. Interstate agencies successfully promoted sewage treatment in their jurisdiction but they were less effective in controlling industrial pollution because their rule-making and enforcement powers were limited. Moreover, interstate compacts did not address the interdependence of states with regard to controlling the pollution of intra-state waters.

Federal water pollution control legislation would, in principle, have been able to manage the quality of interstate waters *and* to eliminate the threat of industrial flight by setting minimum standards for legal responses to pollution of state waters. While many organisations, such as the Izaak Walton League of America, campaigned for federal water pollution control legislation in the first half of the twentieth century, they had only limited success: no general federal water pollution control legislation was established before 1948. But they succeeded in raising water pollution and its control to the national political agenda. Another lasting achievement was the involvement of federal government in the funding of water pollution control activities during the Great Depression. It went some way to abating sewage pollution and set the precedent for federal water pollution control programmes in the future.

Attempts to control water pollution in the first half of the twentieth century in the United States illustrate more general issues in environmental policy that are still relevant today. The scale at which problems are addressed is important: it is dubious to leave lower-level political entities – whether they are nation-states, in the case of global environmental problems such as biodiversity or global climate change, or households, in the case of consumption-related problems – to deal with problems creating unequal and disadvantageous distribution of costs and benefits. Yet these solutions are frequently promoted in the name of sovereignty, personal responsibility and other ideologies. Secondly, the existence of institutional solutions does not automatically translate to sought-after environmental outcomes. Sometimes ineffective institutional solutions are knowingly adopted for the sake of ‘psychic balm’ and at other times lack of political will, lack of implementation capacity, or other reasons render adopted institutional solutions ineffective. Yet progress in environmental protection is unlikely without adoption of institutional arrangements for the purpose.

#### ACKNOWLEDGEMENTS

This work is a part of the research programme on environmental decision-making (PEDM) of the Centre for Social and Economic Research on the Global Environment (CSERGE) at the University of East Anglia. I gratefully acknowledge the support of the UK Economic and Social Research Council (ESRC). I thank Joel A. Tarr, Tapio Katko, Paula Saukko and the two anonymous referees for their helpful comments and suggestions on earlier versions of this manuscript. Any shortcomings remain my sole responsibility.

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<sup>2</sup> See Richard N. L. Andrews, *Managing the Environment, Managing Ourselves: A History of American Environmental Policy* (New Haven and London: Yale University Press, 1999); Hugh S. Gorman, *Redefining Efficiency: Pollution Concerns, Regulatory Mechanisms, and Technological Change in the US Petroleum Industry* (Akron, OH: University of Akron Press, 2001); Terence Kehoe, *Cleaning Up the Great Lakes: From Cooperation to Confrontation* (DeKalb: Northern University Press, 1997); Philip V. Scarpino, *Great River: An Environmental History of the Upper Mississippi, 1890–1950* (Columbia: University of Missouri Press, 1985); Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, OH: The University of Akron Press, 1996); Craig E. Colten, ‘Illinois River Pollution Control, 1900–1970’, in *The American Environment: Interpretations of Past Geographies*, eds. Lary M. Dilsaver and Craig E. Colten (Lanham, MD: Rowman and Littlefield, 1992), 193–214; Richard W. Judd, ‘The Coming of the Clean Water Acts in Maine,’ *Environmental History Review* 14 (1990): 51–73; Harold L. Platt, ‘Chicago, the Great Lakes, and the Origins of Federal Urban Policy’, *Journal of the Gilded Age and Progressive Era* 1 (2002): 122–53; James Joseph Flannery, ‘Water Pollution Control: Development of State and National Policy’ (Ph.D. diss., University of Wisconsin, 1956), 51–72.

<sup>3</sup> On institutions and their analysis, see e.g. Douglass C. North, *Institutions, Institutional Change, and Economic Performance* (Cambridge: Cambridge University Press, 1990); Douglass C. North, *Understanding the Process of Economic Change* (Princeton, NJ: Princeton University Press, 2005); Elinor Ostrom, *Understanding Institutional Diversity* (Princeton: Princeton University Press, 2005). See also Arild Vatn, *Institutions and the Environment* (Cheltenham: Edward Elgar, 2005); Jouni Paavola, ‘Water Quality as Property: Industrial Water Pollution and Common Law in the Nineteenth Century United States’, *Environment and History* 8 (2002): 295–318. Jouni Paavola and W. Neil Adger, ‘Institutional Ecological Economics’, *Ecological Economics* 53 (2005): 353–68.

<sup>4</sup> See John T. Cumbler, ‘Whatever Happened to Industrial Waste: Reform, Compromise, and Science in Nineteenth Century Southern New England’, *Journal of Social History* (Fall 1995): 149–71; Stuart Galishoff, ‘Triumph and Failure: The American Response to the Urban Water Supply Problem, 1860–1923’, in *Pollution and Reform in American Cities, 1870–1930*, ed. Martin V. Melosi (Austin, TX: University of Texas Press, 1980) 35–57; Jouni Paavola, ‘Water Quality as Property: Industrial Water Pollution and Common Law in the Nineteenth Century United States’, *Environment and History* 8 (2002): 295–318; Jouni Paavola, ‘Law – Water and Air Pollution’, In *The Encyclopedia of World Environmental History*, Vol. II., eds. Shepard Krech III, J. R. McNeill and Carolyn Merchant, (London and New York: Routledge, 2004), 778–86; Joel A. Tarr, ‘Sewerage and the Develop-



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<sup>5</sup>On legal institutions for the protection of public health, see John Duffy, *A History of Public Health in New York City, 1866–1966* (New York: Russell Sage Foundation, 1974); William J. Novak, *The People’s Welfare: Law and Regulation in Nineteenth-Century America* (Chapel Hill: University of North Carolina Press, 1996); Charles Rosen, *A History of Public Health*, exp. ed. (Baltimore: Johns Hopkins University Press, 1993); Charles E. Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago: University of Chicago Press, 1962); Barbara Gutmann Rosenkrantz, *Public Health And The State: Changing Views in Massachusetts, 1842–1936* (Cambridge: Harvard University Press, 1972); On litigation over industrial water pollution, see Jouni Paavola, ‘Water Quality as Property’.

<sup>6</sup> See Andrews, *Managing the Environment, Managing Ourselves*, 201–5; Gorman, *Redefining Efficiency*; Kehoe, *Cleaning Up the Great Lakes*; Scarpino, *Great River*.

<sup>7</sup> See e.g. *Lewis v. Stein*, 16 Ala. 214, 50 Am. Rep. 177 (1849); *Wheatley v. Chrisman*, 24 Pa. St. 298, 64 Am. Dec. 657 (1855, 658); *Snow v. Parsons*, 28 Vt. 459, 67 Am. Dec. 723 (1856); *Hayes v. Waldron*, 44 N.H. 580, 84 Am. Dec. 105 (1863); *McCallum v. Germantown Water Co.*, 54 Pa. 40, 93 Am. Dec. 656 (1867); *New Boston Coal and Mining Co. v. Pottsville Water Co.*, 54 Penn. 164 (1867); *Jacobs v. Allard*, 42 Vt. 303, 1 Am. Rep. 331 (1869); *Richmond Manufacturing v. Atlantic DeLaine*, 10 R.I. 106, 14 Am. Rep. 658 (1871) *Hazeltine v. Case*, 46 Wis. 391, 1 N.W. 66 (1879); *Canfield v. Andrews*, 54 Vt. 1, 41 Am. Rep. 828 (1882); *Red River Roller Mills v. Wright*, 30 Minn. 249, 44 Am. Rep. 194 (1883); *Lockwood Co. v. Lawrence*, 77 Me. 297, 52 Am. Rep. 763 (1885); *Woodruff v. North Bloomfield Gravel Mining Co.*, 16 F. 25 (1883, 30); *Pennsylvania Coal Co. v. Sanderson and Wife*, 113 Pa. 126, 6 A. 453 (1886, 459); *Robb v. Carnegie Bros. & Co. Limited*, 145 Pa. St. 338, 22 A. 649 (1891); *Columbus & H. Coal & Iron Co. Tucker*, 48 Ohio St. 41, 26 N.E. 630 (1891, 632); *Beach v. Sterling Iron & Zinc Co.*, 54 N.J. Eq. 65, 33 A. 286 (1895); *Strobel et. al. v. Kerr Salt Co.*, 164 N.Y. 303, 58 N.E. 142 (1900, 145). See also Theodore Steinberg, *Nature Incorporated: Industrialization and the Waters of New England* (Cambridge: Cambridge University Press, 1991), 205–39; Cumber, ‘Whatever Happened to Industrial Waste’; Andrew Hurley, ‘Creating Ecological Wastelands: Oil Pollution in New York City, 1870–1900’, *Journal of Urban History* 20 (1994): 340–64; Martin V. Melosi, ‘Hazardous Waste and Environmental Liability: An Historical Perspective’, *Houston Law Review* 25 (1988): 741–79; Paavola, ‘Water Quality as Property’; Joel A. Tarr, ‘Searching for a Sink.’

<sup>8</sup> See Peter N. Davis, ‘Theories of Water Pollution Litigation’, *Wisconsin Law Review* (1971): 738–816; Melosi, ‘Hazardous Waste and Environmental Liability’; Paavola, ‘Law – Water and Air Pollution’, pp. 778–86; Paavola, ‘Water Quality as Property’. On industrial effluents and health, see American Water Works Association, ‘Report of Industrial Wastes in Relation to Water Supply’, *Journal of American Water Works Association* 10 (1923): 415–30; American Water Works Association, ‘Progress Report on

## INTERSTATE WATER POLLUTION

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<sup>9</sup> On litigation in cholera years, see *Mills v. Hall*, 9 Wendell 315 (N.Y.), 24 Am. Dec. 160 (1832, 162); *State v. Buckman*, 8 N.H. 203 (1836); *Lewis v. Stein*, 16 Ala. 214, 50 Am. Rep. 177 (1849, 180); *Metropolitan Board of Health v. Heister*, 37 N.Y. 661 (1868, 667); *City of Salem v. Eastern RR. Co.*, 98 Mass. 431 (1868, 443); *McCallum v. Germantown Water Co.*, 54 Pa. 40, 93 Am. Dec. 656 (1867, 664–5); *New Boston Coal and Mining Co. v. Pottsville Water Co.*, 54 Penn. 164 (1867); *Fertilizing Co. v. Hyde Park*, 97 U.S. 659 (1878). On urbanisation and mortality, see Robert William Fogel, *The Escape from Hunger and Premature Death, 1700–2100* (Cambridge: Cambridge University Press, 2004). On theories of disease, see Rosen, *A History of Public Health*; Rosenberg, *The Cholera Years*.

<sup>10</sup> On urban growth and sewage pollution in general, see Galishoff, 'Triumph and Failure'; Joel A. Tarr, James McCurley, III, Francis C. McMichael, and Terry F. Yosie. 'Water and Wastes: A Retrospective Assessment of Wastewater Technology in the U.S., 1800–1932', *Technology and Culture* 25 (1984): 226–63. On the mid-19th century epidemiological studies and sanitary surveys, see Rosen, *A History of Public Health*.

<sup>11</sup> On sewage litigation, see *Chapman v. City of Rochester*, 110 N.Y. 273, 18 N.E. 88 (1888); *Topeka Water Supply Co. v. City of Potwin Place*, 43 Kan. 404, 23 P. 578 (1889); *Newark Aqueduct Board v. City of Passaic*, 45 N.J. Eq. 393, 18 A. 106 (1889); *Middlesex Co. v. City of Lowell*, 149 Mass. 509, 21 N.E. 872 (1889, 873); *City of Jacksonville v. Doan*, 145 Ill. 23, 33 N.E. 878 (1893, 880); *Good v. City of Altoona*, 162 Pa. 493, 29 A 741 (1894); *Village of Dwight v. Hayes*, 150 Ill. 273 37 N.E. 218 (1894); *Blizzard v. Borough of Danville*, 175 Pa. 479, 34 A. 846 (1896); *Morgan v. City of Danbury*, 67 Conn. 484, 35 A. 499 (1896); *Nolan v. City of New Britain*, 69 Conn. 668, 38 A. 703 (1897); *Owens v. City of Lancaster*, 182 Pa. 257, 37 A. 858 (1897); *City of Richmond v. Test*, 18 Ind. App. 482, 48 N.E. 610 (1897); *Peterson v. City of Santa Rosa*, 119 Cal. 387, 51 P. 557 (1897); *City of Valparaiso v. Hagen*, 153 Ind. 337, 74 Am. St. Rep. 305, 54 N.E. 1062 (1899, 1064); *Attorney General v. City of Paterson*, 58 N.J. Eq. 1, 42 A. 749 (1899); *Rhodes v. City of Durham*, 81 S.E. 938 (1914). Cities in the Passaic River Valley frequented the courts in the 19th century. See, for example, *Newark Aqueduct Board v. City of Passaic*, 45 N.J. Eq. 393, 18 A. 106 (1889); *State v. Bergen County*, 18 A. 465 (1889); *Attorney General v. City of Paterson*, 58 N.J. Eq. 1, 42 A. 749 (1899); *Attorney General v. City of Paterson*, 60 N.J. Eq. 305, 45 A. 995 (1900); *City of Paterson v. City of Summit*, 56 A. 125 (1903). On water pollution in Passaic valley and New Jersey, see Stuart Galishoff, *Newark: The Nation's Unhealthiest City, 1832–1895* (New Brunswick: Rutgers University Press, 1975); Stuart Galishoff, *Safeguarding the Public Health: Newark, 1895–1918* (Westport: Greenwood Press, 1988). See also Stuart Galishoff, 'Triumph and Failure: The American Response to the Urban Water Supply Problem, 1860–1923', in *Pollution and Reform in American Cities, 1870–1930*, ed. Martin V. Melosi (Austin: University of Texas Press, 1980), 35–57.

<sup>12</sup> On local and state public health promotion, see Duffy, *A History of Public Health in New York City*; Novak, *The People's Welfare*; Rosenkrantz, *Public Health and the State*. Paavola, 'Law – Water and Air Pollution'. See also Joel A. Tarr, Terry Yosie, and James McCurley, 'Disputes over Water Quality Policy: Professional Cultures in Conflict,

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<sup>13</sup> See Paul Hansen, ‘The Control of Stream Pollution’, *The American City* 10 (1914): 69.

<sup>14</sup> On Chicago’s typhoid epidemics, see George C. Whipple, *Typhoid Fever: Its Causation, Transmission and Prevention* (New York, 1908), 391–2. On conflicts over Chicago’s sewage disposal solutions and associated diversion of water from the Lake Michigan, see *Missouri v. Illinois*, 180 U.S. 208 (1901), 200 U.S. 496 (1906); *Wisconsin v. Illinois*, 278 U.S. 367 (1928); *Wisconsin v. Illinois*, 281 U.S. 179 (1929); *Wisconsin v. Illinois*, 289 U.S. 395 (1933). See also Louis P. Cain, *Sanitation Strategy for a Lakefront Metropolis: The Case of Chicago* (DeKalb, IL: Northern Illinois University Press, 1978); Colten, ‘Illinois River Pollution Control’; Platt, ‘Chicago, the Great Lakes, and the Origins of Federal Urban Policy’.

<sup>15</sup> On conflicts over the pollution of interstate waters between New York and New Jersey, see *New York v. New Jersey*, 256 U.S. 296 (1921); *New Jersey v. City of New York*, 283 U.S. 473 (1931), 289 U.S. 712 (1932), 290 U.S. 237 (1933). On the pollution of the New York Bay, see Hurley, ‘Creating Ecological Wastelands’.

<sup>16</sup> Many Great Lakes cities experienced severe typhoid epidemics in the early twentieth century because of sewage pollution. Thus, one of the first tasks of the International Joint Commission (IJC), which was established in 1909 by the Boundary Waters Treaty, was to study pollution of boundary waters. The report of IJC concluded that, apart from their shore waters and mouths of the rivers that flow into them, the Great Lakes are “in a state of almost absolute purity”. However, with ‘the exception of these pure areas, the entire stretch of boundary waters ... is polluted to an extent which renders the water in its unpurified state unfit for drinking purposes’. The IJC observed that ‘shore waters, besides being in places unsightly, malodorous and absolutely unfit for domestic purposes, are a source of serious danger to summer residents, bathers, and others who frequent the localities’ and continued that ‘[s]o foul are they in many places that municipal ordinances have been passed prohibiting bathing in them’. The IJC considered that the untreated sewage of major cities and vessels was the main reason for water pollution but that forest and food industries were also grossly polluting the boundary waters in places. See International Joint Commission, *Final Report of the International Joint Commission on the Pollution of Boundary Waters* (Washington, DC: GPO, 1918), 51. On IJC, see Kehoe, *Cleaning Up the Great Lakes*, 20–22.

<sup>17</sup> On the dominance of industrial water pollution after the Second World War, see Earl Finbar Murphy, *Water Purity: A Study in Legal Control of Natural Resources* (Madison: University of Wisconsin Press, 1961), 89.

<sup>18</sup> Reasons for industrial relocation were complex. Improving transport networks and technologies made it feasible for producers to locate further away from the markets of their final products. The northern industrial facilities were also already aged in the early twentieth century and it was possible to reconsider location when new investments were made at the end of their economic life span. Relocating made it also possible to tap into new sources of raw materials, which was especially important for the forest industry. Finally, the south had abundant inexpensive and unorganised labour. On industrial reloca-

## INTERSTATE WATER POLLUTION

tion, see Nancy K. Ohanian, *The American Pulp and Paper Industry, 1900–1940: Mill Survival, Firm Structure, and Industry Relocation* (Westport: Greenwood Press, 1993); Nancy Frances Kane, *Textiles in Transition: Technology, Wages, and Industry Relocation in the U.S. Textile Industry, 1880–1930* (Westport, CT: Greenwood Press, 1988); John S. Hekman, ‘The Product Cycle and New England Textiles’, *Quarterly Journal of Economics* 94 (1980): 697–717; James A. Morris, ‘Cotton and Wool Textiles – Case Studies in Industrial Migration’, *Journal of Industrial Economics* 2 (1953): 65–83. Robert J. Newman, ‘Industry Migration and Growth in the South’, *Review of Economics and Statistics* 65 (1983): 76–86. Gavin Wright, ‘Cheap Labor and Southern Textiles, 1880–1930’, *Quarterly Journal of Economics* 96 (1981): 605–29.

<sup>19</sup> See ‘We Believe in Clean Streams, But – Say the Polluters Who Are Opposing the Lonergan Legislation’, *Outdoor America* (New Series Vol. 1, June 1936), 7.

<sup>20</sup> For the assessment of state public health work, see Charles V. Chapin, *A Report on State Public Health Work* (Chicago: 1916), 175–82, 196–7. For reviews of early statutory water pollution control legislation, see Edwin B. Goodell, *A Review of Laws Forbidding Pollution of Inland Waters in the United States*, 2nd ed. (Washington: U.S. Geological Survey, Water and Irrigation Paper 152, 1905); Leroy Parker and Robert H. Worthington, *The Law of Public Health and Safety, and the Powers and Duties of Boards of Health* (Albany: Mathew Bender, 1892); Stanley D. Montgomery and Earle B. Phelps, *Stream Pollution: A Digest of Judicial Decisions and A Compilation of Legislation Relating to the Subject* (Washington; US Public Health Service, Public Health Bulletin 87, 1918).

<sup>21</sup> In 1939, Harold L. Ickes, Secretary of the Interior, was the chairman of the National Resources Committee. Other members included Harry H. Woodring, Secretary of War; H. A. Wallace, Secretary of Agriculture; Harry L. Hopkins, Secretary of Commerce; Frances S. Perkins, Secretary of Labor; and F. C. Harrington, Works Progress Administrator. Advisory committee members were Frederic A. Delano, Charles E. Merriam, Henry S. Dennison, and Beardsley Ruml. See National Resources Committee, *Water Pollution in the United States: Third Report of the Special Advisory Committee on Water Pollution* (Washington: Government Printing Service, 1939), ii. See also Patrick D. Reagan, *Designing a New America: The Origins of New Deal Planning, 1890–1943* (Amhurst, MA: University of Massachusetts Press, 2000); Frederic S. Lee, ‘From Multi-Industry Planning to Keynesian Planning: Gardiner Means, the American Keynesians, and National Economic Planning at the National Resources Committee,’ *Journal of Policy History* 2 (1990).

<sup>22</sup> See the Natural Resources Committee, *Water Pollution in the United States*, xi-xii. See also Reagan, *Designing a New America*.

<sup>23</sup> See National Resources Committee, *Report on Water Pollution by the Special Advisory Committee on Water Pollution* (Washington: Government Printing Office, 1935), 12–20; National Resources Committee, *Third Report*, 68–72.

<sup>24</sup> National Resources Committee, *Report on Water Pollution*, 15–16. See also Goodell, *A Review of Laws Forbidding Pollution*.

<sup>25</sup> See *Report on Water Pollution*, 16. See also Goodell, *A Review of Laws Forbidding Pollution*.

<sup>26</sup> See *Report on Water Pollution*, 16–17. See also Goodell, *A Review of Laws Forbidding Pollution*.

<sup>27</sup> See *Report on Water Pollution*, 16–17. See also Goodell, *A Review of Laws Forbidding Pollution*.

<sup>28</sup> See *Report on Water Pollution*, 18–19. On shared responsibility for water pollution control in Wisconsin, see Murphy, *Water Purity*, 84–91.

<sup>29</sup> See Paavola, 'Water Quality as Property'. See also Louise A. Halper, 'Nuisance, Courts, and Markets in the New York Court of Appeals, 1850–1915', *Albany Law Review* 54 (1990): 301–57; Christine Rosen, 'Differing Perceptions of the Value of Pollution Abatement across Time and Place: Balancing Doctrine in Pollution Nuisance Law, 1840–1906', *Law and History Review* 11 (1993): 303–81.

<sup>30</sup> See Paavola, 'Water Quality as Property'. For the capital subsidy thesis, see Morton J. Horwitz, *The Transformation of American Law, 1780–1860* (Cambridge, MA: Harvard University Press, 1990).

<sup>31</sup> For cases where courts were hesitant to find municipal polluters liable, see e.g. *Child v. City of Boston*, 4 Allen 41, 81 Am. Dec. 680 (1862); *Merrifield v. City of Worcester*, 110 Mass. 216, 14 Am. Rep. 592 (1872, 597); *City of Richmond v. Test*, 18 Ind. App. 482, 48 N.E. 610 (1897); *City of Valparaiso v. Hagen*, 153 Ind. 337, 74 Am. St. Rep. 305, 54 N.E. 1062 (1899, 1064). For cases where municipal polluters are found liable, see e.g. *Chapman v. City of Rochester*, 110 N.Y. 273, 18 N.E. 88 (1888); *City of Jacksonville v. Doan*, 145 Ill. 23, 33 N.E. 878 (1893, 880); *Village of Dwight v. Hayes*, 150 Ill. 273, 37 N.E. 218 (1894); *Good v. City of Altoona*, 162 Pa. 493, 29 A 741 (1894); *Blizzard v. Borough of Danville*, 175 Pa. 479, 34 A. 846 (1896); *Morgan v. City of Danbury*, 67 Conn. 484, 35 A. 499 (1896); *Peterson v. City of Santa Rosa*, 119 Cal. 387, 51 P. 557 (1897); *Owens v. City of Lancaster*, 182 Pa. 257, 37 A. 858 (1897); *Nolan v. City of New Britain*, 69 Conn. 668, 38 A. 703 (1897); *Attorney General v. City of Paterson*, 58 N.J. Eq. 1, 42 A. 749 (1899); *Rhodes v. City of Durham*, 81 S.E. 938 (1914). For negligence litigation on the delivery of contaminated water, see e.g. *Buckingham v. Plymouth Water Co.*, 142 Pa. 221, 21 A. 824 (1891, 824); *Green v. Ashland Water Co.*, 101 Wis. 258, 77 N.W. 722 (1898); *Hayes v. Torrington Water Co.*, 88 Conn. 609, 92 A. 406 (1914, 407); *Jones v. Mt. Holly Water Co.*, 87 N.J. Law 106, 93 A. 860 (1915); *Stubbs v. City of Rochester*, 226 N.Y. 516, 124 N.E. 137 (1919).

<sup>32</sup> See George C. Whipple, 'Clean Water as a Municipal Asset', *The American City* 4 (1911): 161–5; George W. Fuller, 'Is it Practicable to Discontinue the Emptying of Sewage into Streams?', *The American City* 7 (1912): 43–5; George G. Whipple, 'Standards of Purity for Rivers and Waterways', *The American City* 7 (1912): 559–61; H. Burdett Cleveland, 'The Economics of Sewage Disposal', *The American City* 23 (1923): 235–6. On mortality reductions, see George C. Whipple, *Typhoid Fever*; See also Rosenkrantz, *Public Health and the State*; Paavola, 'Governing Water Quality for Public Health'.

<sup>33</sup> See George C. Whipple, 'Clean Water as a Municipal Asset', 161–5.

<sup>34</sup> For the early 20th century court cases where water pollution control statutes were involved, see *State Board of Health v. Jersey City*, 55 N.J. Eq. 116, 35 A. 835 (1896); *Stone v. Heath*, 179 Mass. 385, 60 N.E. 975 (1901); *State v. Diamond Mills Paper Co.*, 63 N.J. 111, 51 A. 1019 (1902); *Sprague v. Dorr*, 69 N.E. 344 (1904); *City of Durham v. Eno Cotton Mills*, 141 N.C. 615, 54 S.E. 453 (1906, 461); *State Board of Health v. Borough of Vineland*, 72 N.J. Eq. 862, 68 A. 110 (1907); *Board of Health of the State of New Jersey v. Ihnken*, 72 N.J. Eq. 865, 67 A. 28 (1907); *Commonwealth v. Emmers*, 70 A. 762 (Pa., 1908); *Miles City v. Montana State Board of Health*, 39 Mont. 405, 102 P. 696 (1909); *State v. Morse*, 84 Vt. 387, 80 A. 194 (1911); *Commonwealth v. Kennedy*,

## INTERSTATE WATER POLLUTION

87 A. 605 (Pa., 1913); *Attorney General v. City of Grand Rapids*, 175 Mich. 503, 141 N.W. 890 (1913). Whipple is quoted in 'Shall Waterways Be Sewers Forever?', *The American City* 35 (1926): 197. See also National Resources Committee, *Water Pollution in the United States*, 71–2; Joel A. Tarr, 'Industrial Wastes and Public Health: Some Historical Notes, Part I, 1876–1932', *American Journal of Public Health* 75 (1985): 1059–67; Joel A. Tarr, Terry Yosie, and James McCurley, 'Disputes over Water Quality Policy: Professional Cultures in Conflict, 1900–1917', *American Journal of Public Health* 70 (1980): 427–35.

<sup>35</sup> On Bense Act, see Edward J. Cleary, *The ORSANCO Story: Water Quality Management in the Ohio Valley under an Interstate Compact* (Baltimore: Johns Hopkins University Press for the Resources for the Future, 1967), 21. The act was in force until 1948, when it was repealed to facilitate the establishment of the Ohio River Sanitary Commission (ORSANCO). For estimates of national sewage treatment levels, see National Resources Committee, *Third Report*, 7. For estimates of sewage treatment levels in some interstate watercourses, see Hines, 'Nor Any Drop to Drink II', 449–50. See also Andrews, *Managing the Environment, Managing Ourselves*, 204; Murphy, *Water Purity*, 87–8.

<sup>36</sup> See *Missouri v. Illinois*, 180 U.S. 208 (1901), 200 U.S. 496 (1906); *Wisconsin v. Illinois*, 278 U.S. 367 (1928); *Wisconsin v. Illinois*, 281 U.S. 179 (1929); *Sanitary District of Chicago v. United States*, 266 U.S. 405 (1925); *Wisconsin v. Illinois*, 289 U.S. 395 (1933); See also Louis P. Cain, *Sanitation Strategy for a Lakefront Metropolis: The Case of Chicago* (DeKalb, IL: Northern Illinois University Press, 1978). Platt, 'Chicago, the Great Lakes, and the Origins of Federal Urban Policy'.

<sup>37</sup> See *New York v. New Jersey*, 256 U.S. 296 (1921); *New Jersey v. City of New York*, 283 U.S. 473 (1931), 289 U.S. 712 (1932), 290 U.S. 237 (1933). See also H. M. Beardley, 'Interstate Pollution of Streams', *Journal of the American Water Works Association* 15 (1926), 335–40; George C. Lay, 'Suits by States to Abate Nuisances', *United States Law Review* 65 (1931): 73–85.

<sup>38</sup> See Rivers and Harbors Act, § 13, 30 Stat. 1152 (1899); Public Health Service Act, 37 Stat. 309 (1912). See also Diana D. Eames, 'The Refuse Act of 1899: Its Scope and Role in Control of Water Pollution', *California Law Review* 58 (1970): 1444–73; Flannery, 'Water Pollution Control', 181–90; N. William Hines, 'Nor Any Drop to Drink: Public Regulation of Water Quality, Part III: The Federal Effort', *Iowa Law Review* 52 (1967): 799–861.

<sup>39</sup> See John F. Reiger, *American Sportsmen and the Origins of Conservation*, rev. ed. (Norman: University of Oklahoma Press, 1986).

<sup>40</sup> See Herbert Hoover, 'Comments on Pollution', *Outdoor America* 6/3 (1927): 29.

<sup>41</sup> On collaboration between the organisations, see 'The New Anti-Oil Pollution Law', *Bird-Lore* 26: 304 (1924). See also Flannery, 'Water Pollution Control'; On conservation organisations, see Stephen Fox, *John Muir and His Legacy: The American Conservation Organizations* (Boston: Little and Brown, 1981); Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Organizations* (Washington: Island Press, 1993); Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890–1920* (Cambridge, MS: Harvard University Press, 1959); Grant McConnell, 'The Conservation Movement – Past and Present', *Western Political Quarterly* 7 (1954): 463–78. On IWLA, see Scarpino, *Great River*.

<sup>42</sup> Oil Pollution Act, 43 Stat. 604 (1924); See also Gorman, *Redefining Efficiency*, 16–28; N. William Hines, ‘Nor Any Drop to Drink: Public Regulation of Water Quality, Part III: The Federal Effort’, *Iowa Law Review* 52 (1967): 799–861.

<sup>43</sup> On Izaak Walton League, see William Voigt Jr, *Born with Fists Doubled: Defending Outdoor America* (Iowa City: Izaak Walton League of America Endowment, 1992).

<sup>44</sup> On the general history of the League, see especially Voigt, *Born with Fists Doubled*; Scarpino, *Great River*.

<sup>45</sup> On Henry Baldwin Ward, see Hugh Hawkins, ‘Transatlantic Discipleship: Two American Biologists and their German Mentor’, *Isis* 71 (1980): 196–210.

<sup>46</sup> William D. Hatfield lead the national water quality assessment for IWLA. See Charles W. Folds, ‘National Pollution War Opens’, *Outdoor America* 5/4 (1926): 5–6; Charles W. Folds, ‘Pollution Bureau Opens’, *Outdoor America* 5/6 (1927): 26–7; Charles W. Folds, ‘Pollution Campaign Progresses’, *Outdoor America* 5/7 (1927): 5; William D. Hatfield, ‘Sewage Pollution in the United States is Appalling’, *Outdoor America* 5/10 (1927): 15–17; William D. Hatfield, ‘Sewage Pollution in the United States’, *Outdoor America* 5/12 (1927): 12–13; ‘League’s Conservation Platform’, *Outdoor America* 10/6 (1932): 4.

<sup>47</sup> On the Minnesota campaign for the treatment of Twin Cities’ sewage, see Thomas Howard Hayden, *Citizen Leadership in Conservation: The Minnesota Izaak Walton League, 1922–1972* (St Paul: Minnesota Izaak Walton League, 2001) Scarpino, *Great River*. See also Judson L. Wicks, ‘Pollution of the Upper Mississippi’, *Outdoor America* 4/9 (1926): 30–32, 72. On the League’s efforts to prevent the use of boundary waters for electricity generation, see International Joint Commission, *Hearings of the International Joint Commission in re Levels of Rainy Lake and Other Upper Waters of the Woods Watershed and their Future Regulation and Control at International Falls, Minnesota, September 28–30, 1925* (Washington DC: Government Printing Office, 1926); International Joint Commission, *Final Report on the Rainy Lake Reference* (Ottawa: J. O. Patenaude, Printer to the King’s Most Excellent Majesty, 1934). On the Izaak Walton League’s activism in Wisconsin, see Flannery, ‘Water Pollution Control’. On the League’s activism in Maine, see Judd, *The Coming of Clean Water Acts in Maine*.

<sup>48</sup> On the League’s reasons for supporting federal legislation, see e.g. ‘We Believe in Clean Streams, But – Say the Polluters Who Are Opposing the Lonergan Legislation’, *Outdoor America* (New Series Vol. 1, June 1936), 7.

<sup>49</sup> See ‘A National Plan for Water Purification’, *New Waltonian* 2/7 (1935): 8–10; Flannery, ‘Water Pollution Control’, 203–10.

<sup>50</sup> See ‘A National Plan for Water Purification’, *New Waltonian* 2/7 (1935): 9–10. See also Flannery, ‘Water Pollution Control’, 258–79.

<sup>51</sup> See Flannery, ‘Water Pollution Control’, 284–310.

<sup>52</sup> On Izaak Walton League’s involvement in interstate compact preparations, see C. J. Velz, ‘Stream Pollution with Special Reference to New York Metropolitan Waters’, *Outdoor America* (New Series) 7 (March 1942), pp. 4–8. for the reviews, see National Resources Committee, *Report on Water Pollution*; National Resources Committee, *Third Report*.

<sup>53</sup> On the sealing of abandoned coal mines, see Kenneth A. Reid, ‘Sealing Abandoned Coal Mines’, *National Waltonian* 2(8) (1935): 4–5, 16. For information of federal funding and the proportion of people served by sewage treatment plants, see the National Resources Committee, *Third Report*, 5–7.

## INTERSTATE WATER POLLUTION

<sup>54</sup> On interstate cooperation, see John Emerson Monger, 'Administrative Phases of Stream Pollution Control', *American Journal of Public Health* 16 (1926): 788–94; Almon L. Fales, 'Progress in the Control of Pollution by Industrial Wastes', *American Journal of Public Health* 18 (1928): 717, 727; 'Progress Report on Agencies for the Control of Pollution by Industrial Wastes', *Journal of American Water Works Association* 11 (1924): 631; 'Progress Report on Recent Developments in the Field of Industrial Wastes in Relation to Water Supply', *Journal of American Water Works Association* 16 (1926): 302–29; Special Advisory Committee on Water Pollution of the National Resources Committee, *Water Pollution in the United States: Third Report* (Washington: Government Printing Office, 1939). See also Hines, 'Nor Any Drop to Drink II'; On phenols, other industrial pollutants and drinking water, see Wellington Donaldson, 'Industrial Wastes in Relation to Water Supplies', *American Journal of Public Health* 11 (1921): 193–8. See also Tarr, 'Industrial Wastes and Public Health'.

<sup>55</sup> On the constitutionality of interstate compacts, see Felix Frankfurter and James M. Landis, *The Compact Clause of the Constitution - A Study in Interstate Adjustments*, *Yale Law Journal* 34 (1925): 685–749. On the interstate compacts for water pollution control, see Hines, 'Nor Any Drop to Drink II'.

<sup>56</sup> See Public Res. 62, 74th Congress, 49 Stat. 932 (1935); Delaware River Basin Compact, P. L. 87-328, 75 Stat 688 (1961); Pub. Res. 93, 76 Congress, 54 Stat. 748 (1940); Ohio River Valley Water Sanitation Compact, 54 Stat. 752 (1940); New England Interstate Water Pollution Control Compact, 61 Stat. 682 (1947); See Hines, 'Nor Any Drop to Drink II,' *Water Pollution in the United States*, 72–8. On Interstate Sanitation Commission, see Seth G. Hess, 'Interstate Action to Control Pollution', *State Government* 23 (1950): 204–7.

<sup>57</sup> See Cleary, *The ORSANCO Story*; Hines, 'Nor Any Drop to Drink II'.

<sup>58</sup> See Ohio River Valley Water Sanitation Compact.

<sup>59</sup> See Cleary, *The ORSANCO Story*. Interstate Sanitation Commission similarly emphasised influencing of public opinion and voluntary cooperation. See Hess, 'Interstate Action to Control Pollution', 206.

<sup>60</sup> See Hines, 'Nor Any Drop to Drink II', 452: fn107.

<sup>61</sup> See Hines, 'Nor Any Drop to Drink II', 449–51.

<sup>62</sup> See Kenneth A. Reid, 'Pollution Control – A Post-war Public Works Opportunity for the States', *State Government* (February 1945), 1–4. In the quote Reid summarises the Izaak Walton League of America's 1939 assessment of the ORSANCO compact.

<sup>63</sup> On endorsement of interstate compacts, see Water Pollution Control Act, 62 Stat. 1155, Sec. 4 (1948). On reform of state policies, see *Suggested State Water Pollution Control Act and Explanatory Statement* (Federal Security Agency, Public Health Service, Division of Water Pollution Control, 1950), 1. On Izaak Walton League's activism in Wisconsin, see Flannery, 'Water Pollution Control', 51–72; On activism in Maine, see Judd, 'The Coming of the Clean Water Acts in Maine'. On activism in Minnesota, see Hayden, *Citizen Leadership in Conservation*.



