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Of Mud, Myths, and Money: A Citizen's Perspective on Contaminated Sediments

Barry B. Boyer
University at Buffalo School of Law, boyer@buffalo.edu

OF MUD, MYTHS, AND MONEY: A CITIZEN'S PERSPECTIVE ON CONTAMINATED SEDIMENTS

BARRY B. BOYER*

I. INTRODUCTION

A citizen's perspective on contaminated sediments—at least, this citizen's—fittingly begins with one of the classic images in this field: Lyndon Johnson, a citizen activist, and a bucket of mud. The year was 1966, and the President and First Lady were visiting Buffalo to express their support for a clean environment. As protocol dictates in such events, they were scheduled to board a Coast Guard vessel for the standard photo opportunity cruise on the Buffalo River, accompanied by prominent local personages.

One of the locals invited to join the presidential party was Buffalo jeweler Stan Spisiak, an environmental activist and an implacable foe of the then-common practice of dumping dredge spoil in open lake waters. Spisiak boarded the boat early, bringing with him the product of his own dredging operation—a bucket of mud from the bottom of the Buffalo River. In those days the river bottom was a fetid stew of raw sewage, oil and grease, and chemical effluents, so contaminated that not even sludge worms could survive there. When the presidential party arrived, Spisiak proceeded to give the First Family a close-up view (and smell) of the stuff that the Corps of Engineers was dumping into the relatively clean waters of Lake Erie. Lady Bird Johnson, no doubt a bit taken aback by this encounter with the Buffalo River's sediments, exclaimed: "It looks like slop!"[1]

This incident captures both the frustration and the necessity of citizen involvement in environmental issues like contaminated sediments. Government bureaucracies, and sometimes even elected officials, have enormous ability to ignore unpleasant realities, until some feisty citizen breaks through the barriers of denial and rubs their nose

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*. B.A. 1966, Duke University; J.D. 1969, University of Michigan; Dean and Professor of Law, State University of New York at Buffalo; Member, Niagara and Buffalo River Remedial Action Plan Committees. An earlier version of the article was presented at the International Symposium on Environmental Dredging, Buffalo, New York, Sept. 30 - Oct. 2, 1992.

1. Jim McAvey, *Johnsons Take River Ride, Find the Water 'Like Slop,'* BUFFALO COURIER-EXPRESS, Aug. 20, 1966, at A1, A6.

in it.[2] As political scientist Murray Edelman has pointed out, it is very common for government to manipulate myths and symbols in an effort to keep the public quiescent and docile.[3] This myth-making can be especially effective in defusing a problem like contaminated sediments, where there are no identifiable human victims, and little threat of polluter liability apart from the occasional submerged superfund site.[4] Indeed, the public can boat, swim, and fish in rivers lined with contaminated sediments, as both adults and children are currently doing in the Buffalo River. As a result, many contaminated areas will not have the involvement of a core constituency of local residents who have been visibly harmed by the pollution and therefore motivated to push for a cleanup of contaminated sediments.

If this is a fair summary of the situation, it may be worthwhile to spend a few minutes considering some of the most common contaminated-sediments myths.

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2. Spisiak also played the gadfly role in the more traditional setting of congressional hearings on Great Lakes pollution. In 1966, he pointed out that the Corps of Engineers had been dumping contaminated Buffalo River sediment into a one-square-mile dumping area off the Buffalo Harbor for more than twenty-five years-several million cubic yards in all. Yet, the water depth in the dump site was still about the same as when they started. Where had all the polluted mud gone? The Corps responded rather defensively that the dump zone was not *quite* as deep as it had been before they started using it. Besides, they had not put the pollution into the sediment; they were just moving it around, and nature would eventually do that anyway. Since all contaminated sediment from the eastern end of Lake Erie eventually winds up in Lake Ontario, the Corps reasoned, open-lake dumping of contaminated sediments in Lake Erie was not a serious problem. *See Water Pollution--Great Lakes (Part 1--Lake Ontario and Lake Erie), Hearings Before the Subcomm. on Natural Resources and Power of the House Comm. on Government Operations,* 89th Cong., 2d Sess. 60-61, 118, 120-21 (1966).

3. MURRAY J. EDELMAN, POLITICS AS SYMBOLIC ACTION: MASS AROUSAL AND QUIESCENCE (1971).

4. Several Great Lakes Areas of Concern-polluted waterways for which Remedial Action Plans (RAPs) must be prepared pursuant to Annex 2 of the Protocol Amending the Great Lakes Water Quality Agreement of 1978, Nov. 18, 1987, U.S.-Can., Hein's No. KAV 255 [hereinafter 1987 Protocol] have been designated federal or state superfund sites. *See, e.g.,* Julie A. Letterhos, *Dredging Up the Past: The Challenge of the Ashtabula River Remedial Action Plan*; Philippe Ross et al., *Remediating Contamination in the Waukegan, Illinois Area of Concern, in* UNDER RAPS: TOWARDS GRASSROOTS ECOLOGICAL DEMOCRACY IN THE GREAT LAKES BASIN 121-235 (John H. Hartig & Michael A. Zarull eds., 1992).

II. CONTAMINATED SEDIMENT MYTHS

A. Myth Number One: Contaminated sediments have not been identified as a problem until recently. Thus, it is understandable that we don't have a very good handle on the dimensions of the problem, and that it will take a long time to generate the necessary knowledge to solve it.

Like most myths, this one has a kernel of truth and some superficial plausibility. On closer examination, however, it becomes clear that at least the broad outlines of the sediment contamination problem have been described in the literature for more than 20 years. One of the first great consciousness-raising events for the Great Lakes was the near "death" of Lake Erie from nutrient over-enrichment,[5] and sediment pollution was a key part of that story. One of the first signs that the lake ecosystem had been seriously disrupted by nutrient loadings was the discovery that large portions of the lake bottom were devoid of oxygen, wiping out the normal populations of benthic organisms.[6] Subsequent studies documented that nutrients were cycling through the sediments, as algae grew in the spring and summer and then died off in the autumn, falling to the lake bottom. By 1971, Barry Commoner called on this body of scientific knowledge to speculate that "[i]t should be clear that even if overnight all of the pollutants now pouring into Lake Erie were stopped, there would still remain the problem of the accumulated mass of pollutants in the lake bottom."[7] In other words, it was widely known that sediments could be a source as well as a sink for pollutants.[8]

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5. *See, e.g.*, WILLIAM ASHWORTH, THE LATE, GREAT LAKES: AN ENVIRONMENTAL HISTORY (1986); *See also*, A. M. Beeton, *Changes in the Environment and Biota of the Great Lakes, in* EUTROPHICATION: CAUSES, CONSEQUENCES, CORRECTIVES 150, 183-84 (National Academy of Sciences ed., 1969) (linking decline of populations of benthic organisms and eutrophication of Lake Erie to human inputs of phosphorous and other nutrients).

6. *See* BARRY COMMONER, THE CLOSING CIRCLE: NATURE, MAN, AND TECHNOLOGY 97-103 (Bantam Books 1972) (1971).

7. *Id.* at 107.

8. The mechanisms by which contaminants bound to sediments could be released were also established before 1970. *See, e.g.*, Edwin J. Skoch and N. Wilson Britt, *Monthly Variation in Phosphate and Related Chemicals Found in the Sediment in the Island Area of Lake Erie, 1967-68, with Reference to Samples Collected in 1964, 1965, and 1966, in* PROCEEDINGS OF THE TWELFTH CONFERENCE ON GREAT LAKES RESEARCH 325, 326, 338 (International Assoc. of Great Lakes Research ed., 1969) (changes in pH and dissolved oxygen cause release of phosphates bound to sediments; bioturbation of sediments by burrowing benthic organisms may make contaminants

The nutrients example could be dismissed because the primary sediment problem today involves not nutrients but toxic substances,[9] and their chemical properties and mechanisms of action are quite different. Even granting some validity to this point, however, it is clear that warnings about the health and environmental effects of toxic sediment contamination have been sounded for more than twenty years.

The Minimata incident in Japan, which took place in the 1950s, first made the world aware of the risk that inorganic mercury could be transformed in sediments and find its way into food chains to produce devastating human health effects.[10] By the early 1970s, the fate and transport of mercury in the aquatic environment had been clearly established.[11] A set of conference proceedings published in 1972, for example, tracked the movement of inorganic mercury from industrial discharges to aquatic sediments, where it was converted to methylmercury and made available to the biota and the atmosphere.[12]

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available to enter the food chain). Some of the studies that first brought these relationships to the attention of the scientific community had been conducted in England during the early 1940s. Wilhelm Rodhe, *Crystallization of Eutrophication Concepts in Northern Europe, in* EUTROPHICATION: CAUSES, CONSEQUENCES, CORRECTIVES 50, 57 (National Academy of Sciences ed., 1969).

9. *E.g., Contaminated Sediments in Our Nation's Rivers and Harbors, Particularly in the Great Lakes, Hearing Before the Subcomm. on Water Resources of the House Comm. on Public Works and Transportation*, 101st Cong., 1st Sess. (1989) (remarks of Rep. Nowak, Chairman, Subcomm. on Water Resources):

> Contaminated sediments have become a serious problem for several reasons .... In areas such as the Great Lakes, and many of our bays and estuaries, the water acts more like a sink for toxic chemicals because of slow flushing volumes. Secondly, many toxic chemicals do not degrade naturally in the environment. These chemicals accumulate in bottom sediments where they lie until disturbed by storms, currents, or dredging. Finally, toxic chemicals deposited into sediments can combine to form new compounds hazardous to human health and the environment.

Id. at 1.

10. T.W. Clarkson et al., *A Review of Dose-Response Relationships Resulting from Human Exposure to Methylmercury Compounds, in* HEAVY METALS IN THE AQUATIC ENVIRONMENT: AN INTERNATIONAL CONFERENCE 1 (P.A. Krenkel ed., 1975).

11. For example, a 1973 conference held in Nashville, Tennessee contained multiple articles from around the world detailing the toxicological effects of mercury poisoning, the distribution and transport of mercury and other toxic metals in the environment, and possible control and remedial options. HEAVY METALS IN THE AQUATIC ENVIRONMENT: AN INTERNATIONAL CONFERENCE (P. A. Krenkel ed., 1975).

12. Arne Jernelov, *Factors in the Transformation of Mercury to Methylmercury, in* ENVIRONMENTAL MERCURY CONTAMINATION 167 (Rolf Hartung & Bertram D. Dinman eds., 1972) [hereinafter ENVIRONMENTAL MERCURY CONTAMINATION].

Heavy concentrations of in-place mercury contamination were documented in portions of the Great Lakes Basin, including areas that would later be designated as Areas of Concern under the Great Lakes Water Quality Agreement.[13] In March of 1970, Canadian officials had been forced to destroy 12,000 pounds of walleye taken by commercial fishermen in Lake St. Clair because the fish were so heavily contaminated with mercury.[14] By the early 1970s, scientists were also making progress in documenting the build-up of synthetic organic pesticides in sediments and the damage those pesticides were causing to aquatic ecosystems.[15]

In short, the major elements of the sediment story have been spelled out in the technical literature for more than two decades. What has changed dramatically in the past five years or so, however, is the amount of political attention that this scientific information has received. The International Joint Commission's decision to publicize the worst Great Lakes sediment pollution sites as Areas of Concern,[16] the

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13. Jack D. Bails et al., *The Occurrence of Mercury in the Environment, in* ENVIRONMENTAL MERCURY CONTAMINATION, *supra* note 12, at 90; John G. Konrad, *Mercury Contents of Bottom Sediments From Wisconsin Rivers and Lakes, in* ENVIRONMENTAL MERCURY CONTAMINATION, *supra* note 12, at 52-53; 1987 Protocol, *supra* note 4, Annex 2.

14. Jack D. Bails, *Mercury in Fish in the Great Lakes, in* ENVIRONMENTAL MERCURY CONTAMINATION, *supra* note 12, at 31.

15. In 1972, for example, the U.S. Environmental Protection Agency issued EFFECTS OF PESTICIDES IN WATER: A REPORT TO THE STATES, which summarized available knowledge as follows:

> Many pesticides have a very low water solubility, and are often rapidly absorbed on suspended or sedimented materials . . . . [T]he continuous downstream transport [of sediments] tends to reduce levels in the upper reaches of streams while increases may be observed in the downstream areas and eventually in major receiving basins (lake, reservoir, estuary, and ocean) . . . .
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> In lakes, sediments apparently act as a reservoir from which the pesticide is partitioned into the water phase according to the solubility of the compounds, the concentration in the sediment, the type of sediment, and the degree of absorption . . . .

Id. at 3. The Report went on to catalog a series of adverse effects on individual organisms, species and populations that could result from the introduction of pesticides into surface waters. *Id.* at 4-10. *See also* R. C. MUIRHEAD-THOMSON, PESTICIDES AND FRESHWATER FAUNA 7, 190 (1971) (aerial distribution of pesticides causes sediment contamination; benthos may be killed by contaminated sediments). A decade earlier, Rachel Carson had pointed out in her best selling book SILENT SPRING (1962) that synthetic organic pesticides could easily kill beneficial soil organisms (Chapter 5), and also damage aquatic ecosystems (Chapter 9).

16. 1987 Protocol, *supra* note 4, Annex 2.

success of Great Lakes United's "Unfulfilled Promises" hearings in calling attention to the governments' failure to address this problem,[17] and the congressional response in legislation creating the Assessment and Remediation of Contaminated Sediments (ARCS) Program,[18] all reflect the fact that contaminated sediments finally became defined as a policy problem in the mid-1980s. The science supported that change, but it did not make it happen. Good political organizing, by lay people as well as scientists, made sediments a problem to be solved rather than a scientific curiosity to be ignored.

B. Myth Number 2: Now that technical experts are engaged in the quest for solutions to the contaminated sediments problem, concerned citizens should be patient until researchers have developed scientifically defensible sediment criteria. We then will be able to address the political and economic issues of contaminated sediment remediation.

This myth builds upon the now-familiar dichotomy between risk assessment and risk management. The effort to distinguish between the purely scientific task of measuring or assessing risk and the value-choice process of deciding what management activities should be employed to control or eliminate risks is now firmly embedded in the U.S. system of environmental regulation.[19] It would be adopted and elaborated in

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17. The history is recounted in Jack Manno, *Advocacy and Diplomacy in the Great Lakes: A Case History of Non-Governmental Organization Participation in Negotiating the Great Lakes Water Quality Agreement*, 1 BUFF. ENVTL. L. J. 1, 25-39 (1993). Great Lakes United issued a report on the citizen hearing: WATER QUALITY TASK FORCE, GREAT LAKES UNITED, UNFULFILLED PROMISES: A CITIZENS' REVIEW OF THE INTERNATIONAL GREAT LAKES WATER QUALITY AGREEMENT (1987).

18. Great Lakes Critical Programs Act of 1990, Pub. L. No. 101-596, §102, 104 Stat. 3000 (codified as amended at 33 U.S.C. § 1268(c)(3)).

19. *E.g.*, COMMITTEE ON THE INSTITUTIONAL MEANS FOR ASSESSMENT OF RISKS TO PUBLIC HEALTH OF THE COMMISSION ON LIFE SCIENCES OF THE NATIONAL RESEARCH COUNCIL, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS (1983):

> Regulatory actions are based on two distinct elements, risk assessment . . . and risk management. Risk assessment is the use of the factual base to define the health effects of exposure of individuals or populations to hazardous materials and situations. Risk management is the process of weighing policy alternatives and selecting the most appropriate regulatory action, integrating the results of risk assessment with engineering data and with social, economic, and political concerns to reach a decision.

Id. at 3.

some of the legislative initiatives that have been proposed to deal with contaminated sediments, such as Senator Moynihan's bill.[20]

Under these provisions, agency scientists immerse themselves in the technical literature and emerge some months or years later with a technical report of their own called a "criteria document." This report summarizes the state of human knowledge regarding the risks posed by a particular contaminant—ideally, as some form of a dose-response curve. At this point more politically-oriented risk managers and concerned members of the public engage in a public dialogue on the issue of where the line should be drawn on that dose-response curve—that is, "how clean is clean?" At the end of this process, the technical criteria have been translated into legally enforceable regulations and permit limits.[21]

Several criticisms could be, and have been, directed at the process of criteria formulation. Conceptually, it is an effort to draw the line between "safe" and "unsafe" levels of pollution.[22] Yet, the Great Lakes

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20. S. 31, 102d Cong., 1st Sess. § 7 (1990).

21. For example, this criteria document/regulation system is incorporated in the federal Clean Water Act's provisions for water quality standards. *See* 33 U.S.C. §§ 1312-1314 (1988). More detailed descriptions and critiques of the operation of this system may be found in Jeffrey M. Gaba, *Federal Supervision of State Water Quality Standards Under the Clean Water Act*, 36 VAND. L. REV. 1167 (1983) and William F. Pedersen Jr., *Turning the Tide on Water Quality*, 15 ECOLOGY L.Q. 69 (1988).

22. This is apparent in the preamble to the Environmental Protection Agency's methodological appendix describing the process of developing water quality criteria for toxic substances:

> A numerical criterion might be thought of as an estimate of the highest concentration of a substance in water which does not present a significant risk to the aquatic organisms in the water and their uses. Thus the Guidelines are intended to derive criteria which will protect aquatic communities by protecting most of the species and their uses most of the time, but not necessarily all of the species all of the time. Aquatic communities can tolerate some stress and occasional adverse effects on a few species, and so total protection of all of the species all of the time is not necessary.

45 Fed. Reg. 79341-42 (Nov. 28, 1980). This is consistent with the general approach of risk assessment/risk management, which starts from the proposition that "[n]othing can be absolutely free of risk," and derives from this proposition a definition of safety which holds that "[a] thing is safe if its risks are judged to be acceptable." WILLIAM W. LOWRANCE, OF ACCEPTABLE RISK: SCIENCE AND THE DETERMINATION OF SAFETY 8 (1976). EPA's attempts to develop sediment quality criteria have been delayed because of the complexity of the task and uncertainty as to how the criteria would be used in various regulatory programs. *EPA Moves Back Timeline on Soil Cleanup Standards to Allow More Complexity*, INSIDE EPA, Nov. 20, 1992, at 17.

Water Quality Agreement commits the United States and Canada to a rather different goal in the case of persistent toxic substances: zero discharge and virtual elimination of them from the Great Lakes ecosystem.[23] In other words, there has already been a political judgment that *no* levels of these materials should be considered safe or acceptable. If one really believes in these provisions of the Water Quality Agreement, then the whole criteria document/regulation drafting exercise seems rather pointless and superfluous.

Apart from the language and intent of the Water Quality Agreement (and subsequent legislation endorsing and incorporating it[24]), it seems appropriate to ask whether the criteria-document game is really worth the candle when we are dealing with toxic substances. Several decades of experience in regulating toxic discharges suggest that the quest for safe levels of pollution, like the quest for safe sex, is a story of unexpected consequences and unsatisfying experiences. The historical pattern is that toxic exposure criteria are repeatedly ratcheted downward as new scientific investigations disclose new perils and problems with supposedly safe levels of pollutants.[25] However, the lag time between discovery of new risks, formulation of new criteria,

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23. Article IIa of the Great Lakes Water Quality Agreement of 1978 (Nov. 22, 1978, U.S.-Can., 30 U.S.T. 1383, 1387) states that "it is the policy of the Parties that . . . the discharge of any or all persistent toxic substances be virtually eliminated." Annex 12, section 2(a)(ii) provides that "[t]he philosophy adopted for control of inputs of persistent toxic substances shall be zero discharge." *Id.* at 1445. The International Joint Commission notes the incompatibility of the risk-management approach with these objectives:

> The existing [regulatory] framework and philosophy are . . . targeted largely toward control of those toxic substances that the environment can assimilate . . . . [B]ecause of persistent toxic substances' unique properties, this institutional framework and philosophy cannot . . . deliver virtual elimination . . . .
>
> It is not possible to remove a persistent toxic substance from a source completely once that substance has been produced. Nor is it possible to retrieve that substance completely once it has entered the environment. Therefore, the focus must be on preventing the generation of persistent toxic substances in the first place, rather than trying to control their use, release and disposal after they are produced . . . .
>
> "Sunsetting" is a comprehensive process to restrict, phase out, and eventually ban the manufacture, generation, use, transport, storage, discharge and disposal of a persistent toxic substance.

SIXTH BIENNIAL REPORT ON GREAT LAKES WATER QUALITY 24-25 (1992).

24. *See, e.g.*, 33 U.S.C. § 1268 (1988).

25. *See Chemicals: Possible Changes to Toxics Law Seen as a Key Issue This Year*, Env't. Rep. (BNA) No. 11, at S-13 (Jan. 16, 1992).

drafting of new regulations, and implementation of new control or remedial measures often stretches for a decade or more, while the substances in question are discharged, transported, transformed, and metabolized through the ecosystem.

Enough is enough. The burden should now be placed squarely on those who seek to perpetuate the existing system of criteria and regulations to demonstrate, with real-world examples, that it can function in a timely, effective manner to resolve rather than postpone significant pollution problems like contaminated sediment remediation.

Another questionable premise of the traditional criteria-and-regulations approach is the notion that the criteria can and should be pure technical judgments, made by technical experts, without much citizen input or accountability. Experience under some of the long-established media statutes, such as the Clean Water Act, demonstrates that many of the judgments underlying supposedly technical criteria have value premises and value consequences. For example, the methodology supporting most of our water quality criteria for toxic substances are based on the assumptions that human health effects should be assessed with reference to a 170-pound adult male (when the exposures of most concerned involve women of child-bearing age and fetuses); that the average fish consumption for purposes of developing criteria is a couple of grams a day (when many anglers' families far exceed that average); that a simple bioconcentration factor adequately deals with the likelihood that persistent toxic substances will bioaccumulate; and so on.[26]

Scientists have undoubtedly had much to contribute to the debate on these issues, but they should not be the only voices heard. This is especially true in the Great Lakes basin, where substantial numbers of individuals and nongovernmental organizations already have sufficient understanding of the issues to be useful participants in the discussion.[27] Moreover, the process of engaging in such a dialogue would be an important educational opportunity for all participants: ideally, non-scientists would be sensitized to some of the ambiguities and gaps in scientific knowledge, while scientists would be familiarized with the "local knowledge" and value concerns of the citizenry. If the law or tradition compels us to go through the standard criteria-to-regulation process, we should at least build upon the successful experience of the Remedial Action Plans (RAPs). Sediment criteria could be formulated

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26. This point is developed at greater length in Barry B. Boyer, *Building Legal and Institutional Frameworks for Sustainability*, 1 BUFF. ENVTL. L.J. 1, 63 (1993).

27. *See generally* Hartig & Zarull, *supra* note 4 (public involvement in Remedial Action Plans); Manno, *supra* note 17 (Nongovernmental organizations involved in formulation of Great Lakes Water Quality Agreement).

in a more open, participatory, and candid fashion than most prior pollution criteria, with the resulting gains in quality of decisions, "ownership," and support by all concerned.

C. *Myth Number Three: Cleaning up contaminated sediments will be so expensive that we will be better off leaving the pollutants in place.*

From a citizen perspective, perhaps the most frustrating aspect of the contaminated sediment problem is the myopic, sometimes disingenuous treatment that economic factors receive in policy debates. This is nothing new; in the 1960s the Corps of Engineers opposed creation of confined disposal facilities (CDFs) as unduly costly,[28] and the literature is full of stories about the manipulation of cost-benefit analysis to support economically flawed but politically favored water resource projects.[29] However, cost-benefit blindness is less justifiable today, in light of our growing knowledge about the ways in which economic, environmental, and social factors interact to determine the character of a community. Buffalo provides a good example of these things that we know, but often choose to ignore.

Even in narrow, short-range economic terms, the comparison between relatively unpolluted redevelopment areas like the Erie Basin Marina and the abandoned, polluted wastelands along the Buffalo River is dramatic. Whether measured by assessed valuation of properties, job creation, or general attractiveness and image of the neighborhood, there is no question that redevelopment based on environmental amenities produces a stream of benefits for the community. In-place pollutants block this stream of benefits—sometimes absolutely, as when the real estate finance industry "red-lines" an area due to inactive hazardous waste sites,[30] and always indirectly, as investors look at likely future values before buying and developing property. Polluted properties, or those adjacent to areas that need extensive remediation, can easily become economic and legal nightmares, and knowledge of this risk has already been incorporated into many capital markets.[31] However, it

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28. Statement of Gen. Roy T. Dodge, Division Engineer, U.S. Army Division, North Central Corps of Engineers, *supra* note 2, at 118; *See* source cited *infra* note 53 for explanation of CDFs.

29. *E.g.*, MARC REISNER, CADILLAC DESERT: THE AMERICAN WEST AND ITS DISAPPEARING WATER (1986); DONALD WORSTER, RIVERS OF EMPIRE (1985).

30. Amy T. Phillips, *EPA's Lender Liability Rule: A Sweetheart Deal for Bankers?*, Env't. Rep. (BNA) No. 17, at 1158 (Aug. 23, 1991).

31. *Id.*

apparently has not often been incorporated into the cost-benefit analyses that drive public investment decisions on problems like contaminated sediment remediation.

From a longer term perspective, environmental quality seems likely to become an even more important factor in the race to devise effective economic development strategies for the Great Lakes states and provinces. According to a recent study of the Great Lakes economy by the Federal Reserve Bank of Chicago and the Great Lakes Commission,[32] trends in both the manufacturing and non-manufacturing sectors of the economy make it more likely that growth and location decisions will be heavily influenced by environmental amenity factors.

Manufacturing remains a significant force in the Great Lakes economy, accounting for about one job out of every five—just about the same as the national average.[33] As a drive through the South Buffalo-Lackawanna area indicates, however, the nature of that manufacturing base has changed radically. The economic advantages of concentrating heavy industry into large, integrated complexes have largely eroded:

> Many of the great hulking factories in the grimy old industrial districts along the waterfront and the railroads are derelict, and their smokestacks have long been still. They have been supplanted by low-slung new structures on neatly landscaped grounds with ample parking space in planned industrial parks near major highways and expressways, often close to the airport. The new factories reflect the shift from mass production of long runs of standard items to more specialized production that is flexible enough to switch product lines quickly in response to changing demand. Monolithic manufacturing processes have been broken down into specific tasks, and many tasks have been hived off to subcontractors or moved to less expensive sites.[34]

In short, this emerging manufacturing sector will be higher tech, more decentralized, and more mobile. Growth is concentrating in mid-size and small firms rather than large enterprises. These smaller businesses can, and will, locate in areas where communities and property values

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32. THE GREAT LAKES ECONOMY: LOOKING NORTH AND SOUTH. (Federal Reserve Bank of Chicago & the Great Lakes Commission eds., 1991).

33. *Id.* at 22.

34. *Id.* at 31.

are stable, and quality of life is high. The central city is no longer a manufacturing center but rather a recreational and cultural center where suburbanites come to hear concerts, watch ball games, and visit museums.

While manufacturing has declined in importance in the Great Lakes Basin, service and recreation industries have become more important. The finance, insurance, and real estate industries were the "growth engines" of development in both the United States and Canada during the 1980s,[35] and these service industries have even greater freedom than manufacturers to locate where the quality of life, and the quality of the workforce, beckon. At the same time, leisure-time industries have grown to the point where "[t]ourism and recreation are now among the top five industries in every Great Lakes-St. Lawrence River province and state."[36] Areas that cannot provide a clean, attractive environment will be severely handicapped in the competition to attract and hold these growth industries.

Turning our backs on our waterfronts—the major environmental amenity of most Great Lakes cities—has undesirable social and economic consequences as well. Since World War II, we have effectively been depopulating many of our Great Lakes harbor cities, concentrating problems in the urban core, and dispersing opportunities to the adjoining suburban and rural areas.[37] Even in regions like Western

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35. *Id.* at 7.

36. *Id.* at 31.

37. Noah Eiger, *A Shifting Profile,* THE GREAT LAKES REP., Jan./Feb. 1993:

> We are becoming a more suburban region: core cities and farm belts are stagnating or even emptying out as families settle in the suburban rings. . . . .
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> . . . .
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> . . . In this region, the Greater Toronto Area . . . grew more than 12% between 1986 and 1991, and now holds more than 40% of Ontarians. Outlying areas have grown much faster than the central city.
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> . . . .
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> In the rest of the region, urban sprawl follows a different pattern. Cities like Chicago, Milwaukee, Montreal, and Cleveland are growing only very slightly, or are slowly losing population. The surrounding urbanized areas are rapidly spreading out . . . .
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> . . . .
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> Detroit's situation is unique in the history of North America. Once among the five biggest cities in the U.S., Detroit is quite literally emptying out: between 1970 and 1990, the city lost a third of its people . . . and projections place it at less than 900,000 [population] by the end of this decade. The entire Detroit Metropolitan Statistical Area, meanwhile, lost only 1% of its population from 1970-90.

New York, where the overall population is declining and aging, the flight to the suburbs continues and accelerates.[38] Individuals and families make the move to escape from the cities' crowded neighborhoods, declining services, social problems, and pollution;[39] but, as we are seeing in California and Florida, the exodus merely expands and reproduces the problems that people are trying to escape. Environmentally, suburbanization has multiple and unfortunate consequences:

- Large tracts of fish and wildlife habitat are degraded and fragmented, and open space is lost.[40]
- Development outruns the governmental infrastructure, both physical and organizational, for managing effluents like sewage and solid waste.[41]

Id. at 1, 7. The general history of suburban migration in the U.S. during the twentieth century is recounted in KENNETH T. JACKSON, CRABGRASS FRONTIER: THE SUBURBANIZATION OF THE UNITED STATES (1985).

38. *See* ERIE COUNTY DEPARTMENT OF ENVIRONMENT AND PLANNING DIVISION OF PLANNING, RESIDENTIAL DEVELOPMENT TRENDS STUDY 5-19 (Feb. 1991).

39. PETER SCHMITT, BACK TO NATURE: THE ARCADIAN MYTH IN URBAN AMERICA (John Hopkins Univ. Press 1990)(1969); JACKSON, *supra* note 37, at 45-72 (1985). Jackson notes that "[a]s early as the 1950s, suburban real-estate advertisements were harping on the themes of race, crime, drugs, congestion, and filth." *Id.* at 285.

40. A Canadian planning commission recently dealt with this problem in the Toronto metropolitan area by calling for a system of "greenways" or corridors of natural areas linking parks and green spaces:

> Under the relentless pressures of urbanization, it may become increasingly difficult for most people to find a quiet refuge, an unpolluted stream, a place to walk among the trees.
>
> But not only the human habitat is at risk: the rich mix of wild plants and animals with which we share the bioregion are in even more jeopardy. . . .
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> . . . .
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> The essence of greenways is connections - not simply connecting recreational areas through trails, but connecting wildlife habitats to each other, human communities to other human communities, city to country, people to nature.
>
> This emphasis on links contrasts with the traditional approach to conservation of open space and natural areas, which stresses purchasing blocks of parkland, large and small, often isolated in a sea of surrounding development.

ROYAL COMMISSION ON THE FUTURE OF THE TORONTO WATERFRONT, REGENERATION: TORONTO'S WATERFRONT AND THE SUSTAINABLE CITY: FINAL REPORT 177-79 (1992).

41. Norman S. Friedman, *Waste Disposal*, *in* THE SUBURBAN ECONOMIC NETWORK: ECONOMIC ACTIVITY, RESOURCE USE, AND THE GREAT SPRAWL (John E. Ullmann ed., 1977):

- Transportation needs increase, usually met by private vehicles that consume unrenewable energy resources, pollute the air, and require more acres of pavement.[42]
- Acres of prime farmland are converted to lawns, streets, and parking lots, leaving us more dependent on food imported from distant agricultural areas.[43]

Meanwhile our cities, the hollow core of this suburban sprawl, are left crippled and dependent, surviving on the kindness of strangers in distant capital cities.

Public policy seems paralyzed in the face of this environmentally irrational development path, because we train ourselves to look at only a small part of the environmental and economic picture. Honest cost-benefit analysis, that tries to look carefully and comprehensively at the impacts of environmental pollution and remediation, could help to remove the blinders that affect our urban policies.

The current pattern of environmentally and socially destructive sprawl is not solely a product of individual preferences expressed in a free market, but rather was fueled by a variety of subsidies and incentives. These subsidies were the result of conscious policy choices and inadvertent incentive-creation at all levels of government, in fields as diverse as zoning, mortgage financing, highway construction, laws

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> There are not many areas in which the diseconomies of suburbanization coupled with the decline of the central cities are more evident than in waste disposal. Efficient systems for liquid wastes (sewage disposal) and solid wastes (garbage disposal) have exceedingly high economies of scale, especially the former with its need for a large collection infrastructure.

Id. at 176. *See also* DEPARTMENT OF PLANNING AND DESIGN OF THE SUNY BUFFALO SCHOOL OF ARCHITECTURE, CONSERVING ERIE COUNTY'S SEWER INFRASTRUCTURE: POLICIES FOR THE 1990S (May 1992) (county should consider controls on land development to make better use of sewer infrastructure).

42. See generally ROBERT CERRERO, AMERICA'S SUBURBAN CENTERS: THE LAND USE-TRANSPORTATION LINK (1989) (suburbanization of residences and workplaces creates congestion throughout metropolitan areas); THE GREAT LAKES ECONOMY: LOOKING NORTH AND SOUTH, supra note 32, at 75 ("[T]he transportation sector uses almost a quarter of the total energy consumed in the region, fueled predominantly by petroleum.").

43. *See, e.g.*, Harvey Bloom, *Land Use, in* THE SUBURBAN ECONOMIC NETWORK: ECONOMIC ACTIVITY, RESOURCE USE, AND THE GREAT SPRAWL 55, 60-62 (John E. Ullmann ed., 1977) (suburban sprawl causes loss of prime farm lands). Efforts to preserve farmland on the urban fringe by giving it preferential tax treatment may have the paradoxical effect of encouraging sprawl, because the lower assessment or preferential tax rate may encourage owners to hold onto farm land for speculative purposes, while developers are forced to "leapfrog" farther out to find buildable land, thus contributing to the spread of the suburbs. WILLIAM G. COLMAN, CITIES, SUBURBS, AND STATES 40 (1975).

governing incorporation and annexation, income tax deductions, civil rights, zoning, public housing, and even grants for constructing sewage treatment systems.[44] Many of these policy choices would be difficult to modify or reverse, but significant change may be possible, and better understanding of the full costs of the status quo can make change more attractive and plausible.[45]

III. PATHS TO SEDIMENT SOLUTIONS

As this short catalogue of sediment myths suggests, concerned citizens who care about the quality of the Great Lakes environment see both a need and an opportunity for government to take a more proactive role in restoring areas like the Buffalo River where ecosystems have been severely degraded by contaminated sediments. Experience in the remedial action plan process gives us some reason to be optimistic about the prospects for a real dialogue developing between government officials and concerned publics, pointing toward development of a common strategy to press forward, get contaminated sediments removed, treat them where necessary, and restore beneficial uses.

In some Areas of Concern such as Buffalo and Green Bay, we can begin to see the outlines of a real partnership among stakeholders, and a significant commitment of resources to address the contaminated sediments problem. But success is far from assured, and these strong RAP areas still seem to be the exception rather than the rule. At the

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44. *See generally* JACKSON, *supra* note 37, at 283-305; COLMAN, *supra* note 43, at 40-49, 70-84.

45. Framing the issue as a choice between continuation of the current exodus from the cities and a possibility of stopping or reversing the flow may be an oversimplification, since the recent patterns of development may create new relationships between cities and their hinterlands:

> In some instances, the city develops by becoming the center for new and more advanced services while the suburbs develop by gaining those services erstwhile performed in the city but now more appropriately located in the suburbs. Here symbiosis is dominant and competition minimal. In other instances, the city continues to dominate as the focal point of export-oriented activities while the suburbs perform largely residentiary related functions and are providers of skilled workers. Again, competition and conflict are minimal and symbiosis of a sort is dominant. But there are still other metropolitan areas in which the suburbs, or more accurately centers within the suburbs, are building rapidly at the expense of the central city economy.

THOMAS M. STANBACK, JR., THE NEW SUBURBANIZATION: CHALLENGE TO THE CENTRAL CITY 6 (1991).

same time, significant change is risky and difficult in most bureaucracies, while muddling along with the status quo is generally safe and painless. When painful choices arise, the myths of sediment pollution may offer a comforting security blanket, a justification for continued inaction and endless further study.

If the myths do retain their grip over government policy, what recourse will be available for concerned citizens and environmental groups? One path, currently being discussed in a Great Lakes Area of Concern, is direct action. For example, recreational boaters, frustrated by government's inaction and excuses, could blockade shipping lanes, or use their propwash to flush contaminated sediments into navigational dredging areas. Inventive organizers could undoubtedly come up with other tactics to dramatize the sediment pollution problem, and disrupt the status quo. From Love Canal to the ancient forests of the Pacific Northwest, environmental activists have repeatedly demonstrated that a dramatic protest action often gets results when conciliation and cooperation fail.

A less dramatic, but potentially more effective, approach is to use existing laws in an effort to compel responsible officials to take contaminated sediments seriously. Environmental review statutes, such as the National Environmental Policy Act (NEPA)[46] and New York's State Environmental Quality Review Act,[47] require detailed public analysis of actions having significant impact on the environment, and most navigational dredging projects surely meet that criterion. Typically, the Army Corps of Engineers and other responsible agencies have relied on superficial, outdated environmental analyses to support navigational dredging. For example, ocean dumping of sediments from New York Harbor, one of the most contaminated waterways in the country, is supported by an environmental impact statement prepared in 1973.[48]

Local groups and national environmental organizations have mounted a few successful legal challenges to navigational dredging projects. In the state of Washington, a coalition of environmental groups won an injunction prohibiting the Navy from proceeding with dredging for a carrier group home port because the environmental impact statement did not adequately address the environmental risks associated

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46. 42 U.S.C. §§ 4321-4370 (Supp. 1989).

47. N.Y. ENVTL. CONSERV. LAW §§ 8-0101 to 0113 (McKinney 1993).

48. Anne G. Seal, *Regulation of Contaminated Dredged Material from New York Harbor, Part 2*, 3 ENVTL. L. IN N.Y. 129, 142 (1992).

with an experimental method of isolating contaminated dredge spoil.[49] Plans to enlarge the Port of Los Angeles, a $2 billion project involving substantial modifications of existing waterways, were delayed and significantly modified when opponents argued that adverse environmental impacts had not been adequately considered.[50] Closer to home, opponents of the Navy's plan to dump polluted dredge spoil in Long Island Sound won on their claim that the environmental impacts must be carefully analyzed, but failed to convince the court that there was sufficient risk of environmental harm to warrant issuing an injunction preventing dredging until the analysis was completed.[51]

These cases, and others like them, demonstrate that a carefully researched legal action can compel the responsible agencies to deal with the environmental impacts of dredging, and to consider alternatives.[52] In fact, winning such cases may be easier in the Great Lakes basin than in other parts of the country. The RAPs, Lakewide Management Plans, and datasets generated in the federal Assessment and remediation of Contaminated Sediments (ARCS) program all provide the raw material to support arguments that navigational dredging has potentially significant environmental impacts. ARCS reports, along with studies of the CDFs, identify a set of remedial alternatives that could be assessed in a site-specific environmental impact statement (EIS). Lack of criteria would be no problem—and perhaps even an advantage—in such an EIS because the use impairments of the Water Quality Agreement identify the kinds of impacts that need to be assessed. Even if the strategy of trying to require full environmental review of individual maintenance dredging projects proved unsuccessful, it would still be possible for environmental groups to force the issue when the CDFs used to isolate

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49. Friends of the Earth v. Hall, 693 F. Supp. 904 (W.D. Wash. 1988). *See also* Friends of the Earth v. United States Navy, 841 F.2d 927 (9th Cir. 1988), *vacated as moot*, 850 F.2d 599 (9th Cir. 1988).

50. Greg Krikorian, *Coastal Commission Staff Opposes Proposed $2 Billion Port Expansion*, L.A. TIMES, Aug. 9, 1992, at J-3.

51. Town of Huntington v. Marsh, 884 F.2d 648 (2d Cir. 1989), *cert. denied*, 494 U.S. 1004 (1990). *See also* Natural Resources Defense Council, Inc. v. Callaway, 524 F.2d 79 (2d Cir. 1975).

52. Some of the NEPA dredging cases acknowledge that even routine maintenance dredging of previously constructed projects can have many serious environmental impacts. *E.g.*, Wisconsin v. Callaway, 371 F. Supp. 807, 809-10 (W.D. Wisc. 1974); Sierra Club v. Mason, 351 F. Supp. 419 (D. Conn. 1972).

contaminated dredge spoil from the environment[53] filled up and it became necessary to site a new one. According to the Corps of Engineers' projections, all but 2 of the 26 existing Great Lakes CDFs will fill up by the year 2006.[54] Siting a new CDF is a slow and difficult task because of environmental review requirements, local opposition to particular sites, disagreements between federal and state governments over the appropriate criteria to apply to sediment pollution, and new requirements that local sponsors of water resource projects bear a significant proportion of the costs.[55] These aspects of the siting process will inevitably generate public controversy and provide ample opportunity for local environmental groups to push for a full exploration of the various methods of dealing with contaminated sediments.

If environmental groups do attempt to revitalize the EIS as a means of forcing the government to treat contaminated sediment issues seriously, they may also be able to take a hard look at some of the economic data used to support regular maintenance dredging. The Buffalo River, for example, was until recently a busy port serving several major industries. Now, there are a few active grain mills concentrated on the lower reaches of the river, and only occasional barge shipments to upstream companies. How much does it cost to maintain the upper reaches of the river for this remnant industry? What benefits, in terms of jobs and community revitalization, does the public realize from this dredging? Are there alternative delivery systems, such as the pipeline to the Outer Harbor suggested by the Horizons Waterfront Commission, that would meet the remaining industrial needs adequately without requiring regular dredging? How much risk is there that continued river shipments will lead to a spill of oil, gasoline, or hazardous materials, and what would the environmental consequences of a major spill be? These are legitimate issues to debate at this point in the rehabilitation of the Buffalo River, and environmental impact statements for dredging projects should be considering them.

IV. CONCLUSION

In short, contaminated sediment cleanup is an issue whose time is coming, in one form or another, and governments had best prepare to

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53. The nature and functions of CDFs in the Great Lakes region are summarized in UNITED STATES GENERAL ACCOUNTING OFFICE, WATER RESOURCES: FUTURE NEEDS FOR CONFINING CONTAMINATED SEDIMENTS IN THE GREAT LAKES REGION 9-13 (1992).

54. *Id.* at 18.

55. *Id.* at 26-31.

address it. The status quo is rapidly becoming unacceptable, and alternatives are being defined. Since the environmental and economic stakes are both very high, and the potential for gridlock is substantial, the governments and authorities of the basin need to begin addressing this issue seriously and planning for the next wave of decisions that need to be made on contaminated sediments. The ongoing RAPs and Lakewide Management Plans already have both the structure of participatory decisionmaking and lay players around the table. All that is necessary is for the governments to use them in finding real rather than mythical solutions to the contaminated sediments puzzle.