

ENVIRONMENTAL REMEDIATION: WHY CLEANUP IS WORTH THE COST AND WHO SHOULD PAY

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Abstract

As of 2015, 73 million Americans live within three miles of a Superfund site. Superfund site cleanups have not been funded through excise taxes on petroleum since 1995 and instead are funded through annual federal appropriations of taxpayer dollars. The U.S. government should reinstate a similar tax to continue funding site cleanups but delegate the leadership to the state and local levels. Superfund sites contain toxic chemicals such as lead, benzene, and arsenic that can enter the air, water, and soil. Cleanups have positive benefits on public health, local economies, and equity. Financing these cleanups can be done at either a federal or state level, but the funding stream with the most benefits would be to tax environmentally harmful corporations and then provide this money through grants to the states for cleanup. This policy proposal aims to encourage alternatives to environmentally harmful products, raise money for environmental cleanup, and decrease the tax burden borne by American citizens.

Introduction

In the late 1970s, a variety of environmental disasters occurred that were caused by hazardous waste sites. At this time, the only legislation in place related to toxic waste was the Toxic Substances Control Act (TSCA) of 1976 which provided the U.S. Environmental Protection Agency (EPA) the authority to require reporting and testing requirements but otherwise did not provide much regulation (15 U.S.C. § 2601 et seq., 1976). These include a chemical plant explosion in New Jersey and fire in a toxic waste dump in Elizabeth, New Jersey, within three years (Janson, 1977; Whalen, 1978; Omang, 1980). The environmental emergencies of the 1970s brought the issue of hazardous waste into the public eye and onto political agendas. In 1980, Representative James J. Florio [D-NJ-01] introduced a bill titled, “An act to provide for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous waste disposal sites,” (H.R. 7020). This bill was signed into law on December 11, 1980, by President Jimmy Carter under the name “Comprehensive Environmental Response, Compensation, and Liability Act of 1980” (P.L. 96-510, 1980). This act, also known as CERCLA or Superfund, aimed to determine the location of dangerous hazardous waste sites, identify the responsible party, and perform environmental remediation to restore the land to a state that does not threaten environmental or public health.

CERCLA authorizes three types of EPA actions (EPA, n.d.). The first is the emergency response, occurring when there is an immediate threat such as an oil spill, a chemical explosion, or a leak into a water supply. These actions are intended to be stopped and the effects mitigated quickly. Next is early action. These occur when a site is expected to pose a threat in the near future. Early action is intended to be preventive, such as removing hazardous materials from a site or preventing soil contamination from spreading. Finally, long-term actions may take years or even decades depending on the type of pollutant being targeted. These actions are typically used to reverse long-term pollution of groundwater or deep soil contamination.

As of 2015 census data, the EPA estimated that 6% of the United States population lives within one mile of a Superfund site with 22% living within three miles (EPA, 2020). There are more than 47,000 hazardous waste sites that require potential cleanup (GAO, 2015). Of these, there are 1,322 sites on the National Priorities List (NPL) that the EPA has identified as being of the highest concern (EPA, n.d.). Despite the continuing threat, Superfund is no longer adequately funded while many of these are still causing harm. The U.S. government should reinstate taxes on polluting corporations to fund state-led remediation because, in addition to being beneficial to those living within these sites, the American public at large will benefit from the positive externalities of improving environmental quality, addressing environmental justice issues, and reclaiming usable land.

Importance of Superfund

Environmental remediation and Superfund cleanups can have positive local benefits to public health, local economies, and equity. First, the chemicals in hazardous waste sites can infiltrate the air, water, and soil of the surrounding areas, and have negative health impacts on residents. There have been over 600 chemicals identified at Superfund sites that are classified as corrosive, explosive, toxic, or flammable (Watts and Teel, 2014). The most frequently found contaminants include lead, trichloroethylene, chromium, benzene, perchloroethylene, and arsenic. Lead poisoning is considered the most common environmentally caused ailment and was found at 43% of Superfund sites (Landrigan & Todd, 1994; Watts & Teel, 2014). If ingested, even simply through inhalation, lead toxicity can lead to harms to the central nervous system, red blood cells, and kidney damage; loss of cognitive function; and eventually death (Landrigan & Todd, 1994). Levels of lead above the federally acceptable standard were found in the blood of 22% of children living in the towns surrounding the Tar Creek Superfund Site of Oklahoma before cleanup (OK DEQ, n.d.). Additional chemicals were found in fewer sites but are still very dangerous to the communities nearby. Trichloroethylene is linked to kidney, liver, and cervical cancers (Reyner & Scott, 2000). Chromium is linked to dermatitis, skin reactions, gastro-enteritis, and liver cancer (Baruthio, 1992). Benzene can cause leukemia, and perchloroethylene has been linked to kidney tumors (Witz & Goldstein, 1993; Green, et al., 1990). The Love Canal disaster in New York released additional chemicals that led to a spike in birth defects, miscarriages, and other types of fetal diseases (EPA, n.d.).

Overall, the toxins found in these Superfund sites have been linked to severe and potentially fatal ailments affecting every major system in the human body. While individual toxins can cause harmful effects, these can become amplified when the chemicals are together. A study in Florida found that cancer incidences increased by more than 6% in counties with Superfund sites (Kirpich & Leary, 2016). Another recent study found that living near a Superfund site decreases overall life expectancy (LE), and this impact can be as much as a 1.22-year decrease of LE in areas of high socioeconomic disadvantages (Kiaghadi et al., 2021). While there are many other potentially confounding factors, the trends consistently display negative health impacts linked to proximity to Superfund sites. Cleanup of these superfund sites would provide multiple benefits related to human health. These include improved quality of life, increased life expectancy, decreased medical bills, and fewer overall medical complications.

In addition to human health impacts, living near a Superfund site prior to their remediation is linked to lifelong socioeconomic consequences. A family fixed-effects model was used to study the impacts of Superfund sites before and after cleaning on sibling performance (Persico et al., 2016). This study found that children conceived to mothers living within two miles of a site before it was cleaned are 7.4% more likely to repeat a grade, 6.6% more likely to be suspended, and have lower test scores than their sibling that was conceived after the cleanup was commenced. The study also looked at children conceived by mothers within one mile of a Superfund site and found that their children are 10% more likely to be diagnosed with a cognitive disability than their siblings without prenatal exposure. Because education and cognitive performance can have lifelong impacts on career performance, these differences likely have both a social and economic impact on the affected children for the rest of their lives.

The amount of land within the U.S. is inelastic. However, through programs like Superfund, efforts can be made to increase the amount of usable land. Benefits to local economies can occur from Superfund cleanups through the improvement of property value and housing prices. Following remediation, one study found that property values typically increase between 5% and 11.5% (Haninger et al., 2017). A similar study was conducted assessing two Superfund sites in Woburn, Massachusetts (Kiel & Zabel, 2001). They estimated that the economic benefits of cleaning up the sites range from \$72 million to \$122 million, a figure much higher than the cost to clean these two sites. The economic considerations in this study focused on housing prices and direct economic benefits of the housing market and did not include any of the positive externalities also associated with cleanups, which likely would have resulted in an even larger calculated benefit.

Environmental remediation can also have socioeconomic benefits outside of the immediately affected areas. The first direct impact is improved water safety. If sites are located near a waterway or aquifer, the pollutants can be found several miles from the source and can cause health problems similar to those living near the sites (EPA, n.d.). The same is likely true of air pollution, though it is more difficult to study due to other polluting companies outside of Superfund sites. The movement of these pollutants follows what are known as

migration pathways (EPA, n.d.). The main migration pathways that the EPA focuses on are potable groundwater, potable surface water, soil in direct contact with people, and air.

Indirect benefits are also experienced by the nation as a whole. Currently, there is a much higher demand for houses than the supply available in many parts of the country (Agadoni, 2021). This is especially true around coastal areas where nearly 40% of the U.S. population resides (NOAA, 2021). Environmental remediation will allow for an increase in available land where safe, affordable housing can be built. This will directly benefit those building, buying, and selling homes in the area. The positive externality of decreasing congestion in surrounding cities will occur as well, bringing more economic activity to the cities.

Equity and environmental justice are also important factors in environmental remediation. While the link between health and environmental inequality is widely understudied, it is clear that both race and class play a role in determining who is most impacted by environmental pollutants (Brulle & Pellow, 2006). Demographics of populations near Superfund sites are more likely to be minorities, below the poverty line, linguistically isolated, and have lower levels of education than the national average (EPA, 2020). Notably, the U.S. population was reported as 39.6% minority-identifying, while the population within 1 mile of a Superfund site is significantly higher at 49.8% (EPA, 2020). Environmental remediation should focus on the most impacted communities, but they are frequently excluded from the conversation. Historically, insight from the communities surrounding potential clean-up sites has been from environmental impact assessments (EIAs) and other federal reports, leading to large gaps in the federal understanding of how these sites impact local communities (Bhatia & Wernham, 2008).

The health, economic, and equity issues associated with toxic waste sites are pressing issues. Luckily, when funding is available, Superfund cleanups can be very successful. Between its establishment and 2001, more than 190 Superfund sites had been restored for safe use again (EPA, 2001). These sites have been transformed for a wide variety of uses including athletic fields, playgrounds, office parks, residential neighborhoods, wildlife areas, and retail centers. A variety of goals are achieved with these uses, spanning increased economic activity, more available housing, and improvements to the quality of life of residents. The EPA highlights a variety of other success stories from federally funded Superfund cleanups (Figure 1).

Figure 1: EPA Success Stories (EPA, n.d.).

Site	Location	Contaminant	Success
Eastland Woolen Mill	Corinna, Maine	Textile mill waste	This site has been redeveloped into housing, restaurants, storefronts, a war memorial, and a community bandstand.
Fletcher’s Paint Works & Storage	Milford, New Hampshire	Commercial, residential, and industrial paints and stains	The community had a large say in the reuse of this land. After it was cleaned, it was transformed into a passive recreational space and park.
Otis Air National Guard Base (ANGB)/Joint Base Cape Cod	Boston, Massachusetts	Contaminated groundwater	Groundwater cleanup treatment systems are being used to power renewable energy. 100% of the program’s energy has been offset.
Black Butte Mine	Lane County, Oregon	Mercury and mining pollutants	This site was cleaned sufficiently enough that a school was built on the land
Midvale Slag	Midvale City, Utah	Lead and copper in groundwater	The site has been developed into a multi-use area including rail station, homes, business and parks due in part to stakeholder engagement.

Financing Superfund

A key part of CERCLA was the tax it created. It allowed the federal authority to tax the chemical and petroleum industries responsible for hazardous waste, raising over \$1.6 billion over five years applicable toward

short-term removal of chemicals and long-term remediation responses (EPA, n.d.). Additionally, the EPA can hold those responsible for the hazardous material by requiring them to reimburse the Superfund trust once they are identified. Since this initial law was passed, additional reauthorizations and reintroductions have occurred across many Congresses. However, Superfund has been greatly underfunded recently and is no longer achieving its goals. This tax expired in 1995, shifting the payment burden to appropriations funded by American taxpayers. The trust's balance peaked at \$3.8 billion in 1996 and fell to zero by 2003 (Virjee, 2010). The program was properly funded for less than 5 years after the tax lapsed. From 1999 through 2013, annual federal appropriations to Superfund declined from \$2 billion to \$1.1 billion when adjusted for inflation (GAO, 2015). Since 2000, it is estimated that over \$21 billion taxpayer dollars were spent towards Superfund cleanup efforts; yet the backlog of hazardous waste cleanup sites is greater than ever (DeWitt & Ferrasci-O'Malley, 2021).

Sustained funding is very important to clean up Superfund sites. These projects can take many years and must continue to be monitored even after the initial cleanup is complete. The EPA estimates they will need between \$335 million and \$681 million per year for future cleanups; significantly more than the \$243 million, on average, allocated to this program for the first 20 years after the tax lapsed (Adams, 2014). The funding increase proposed by President Biden for the fiscal year 2022 aims to provide \$328 million, which is close to the amount EPA estimates it needs but must be sustained year-to-year to be effective (Scott, 2021).

The first solution to the lack of funding is to increase federal appropriations toward Superfund cleanups through reallocation of money from other programs or an increased budget overall. Federal grants would be beneficial because they would not require increased state taxes, potentially increasing citizen buy-in and political feasibility. Challenges of federal grants include equity, administrative costs, and taxpayer burden. First, equity because federal grants may be allocated to different states based on political interests instead of needs. Communities near Superfund sites have historically been eliminated from decision-making processes, which could lead to sites nearest to affluent, highly populated areas or those with prominent political players receiving grants instead of being determined through need and risk level.

A concern with any proposal spearheaded by the federal government is that administrative costs could be high with this type of program. For a federal grant program to progress to a place where funding is utilized to remediate sites, large amounts of time and money must be spent on surveying, writing applications, processing candidates, and making selections before funding can be distributed. These processes are very time-consuming, further delaying these vital cleanups for many years. This is an example of an efficiency-equity trade-off. Because Superfund sites already disproportionately impact some communities, a focus on equity in this scenario is important to ensure environmental justice concerns are not continued or exacerbated.

Another solution is to shift cleanup responsibilities to the state or local level and finance these programs through the area's respective taxes. This would allow the funding to go directly towards the areas that need it most. New Jersey alone is home to 114 Superfund sites, more than any other state and, therefore, would need more funding than the national average (Ortiz, 2020). This could potentially be more politically feasible because the individuals living in these areas are more familiar with the negative impacts and may be more willing to pay for their cleanup. On average, state-led cleanups are also more economically efficient than EPA-led cleanups. In 1995, it was estimated that states spend \$700 million annually working on 11,000 sites while the EPA spends \$1 billion annually on 1,000 sites (Porter, 1995). This equates to about \$64,000 per state-cleaned site and about \$1 million per federally cleaned site. While these sites may be different in size and severity, state clean-up projects still seem to be more effective overall. While federal programs may have more resources and funding, the state projects have the advantage of having more knowledge of the area, being in contact with the communities, and having a stronger vested interest in the success of the cleanups. To help states finance this, federal matching grants could be issued to states to help offset some of the costs on the residents. This is especially important because many of the areas impacted most heavily by Superfund sites are of lower income. Increasing state or local taxes would disproportionately harm the people this program hopes to help. However, this would carry high administrative costs similar to other federal grants that must be balanced against the benefits of the program.

Finally, a solution to funding Superfund cleanups is to reinstate a tax on corporations that are harming the environment. Most of the companies that initially dumped the toxic and hazardous wastes are either no longer in existence or are unknown, they cannot be directly targeted to fund these projects. Instead, this could be implemented as a consumption tax on all petroleum products, single-use plastic products, or other goods that are

tied to negative environmental impacts. This tax would be beneficial by creating a funding stream for environmental remediation while also discouraging the use of products that have negative environmental impacts. A concern is that producers would pass this tax on to consumers and cause them to bear the burden of this tax. This could be viewed as a regressive tax, as it would take a larger portion of the total money available from those with lower incomes and less wealth. As a main goal of environmental remediation is increasing equity, implementing a tax that is regressive in nature is counterintuitive because it continues to negatively impact already disadvantaged communities.

Instead, an alternative would be a corporate tax on all petroleum products, single-use plastic products, or actions with high polluting emissions. This would ideally remove the burden from the consumers, raise money for environmental cleanups, and encourage corporations to create more environmentally conscious options to avoid the tax. However, regulations would need to be put in place to ensure that the burden is actually borne by the stakeholders and not shifted forwards towards the consumers, or backward towards the employees. There would also need to be deliberate language added to reduce the chance that corporations will be able to dodge the taxes which would result in little accountability and minimal funding for the cleanups.

A main consideration of every one of these solutions is political feasibility. Many politicians, even those with otherwise liberal-leaning values, are influenced by lobbyists that have ties to these environmentally harmful corporations. While it is true that some of these tax streams may be difficult to pass, it is worth taking a positive approach to this problem and trying to optimistically push for solutions that would benefit millions of Americans.

Conclusion

Environmental health can be viewed as a public good, as it is non-excludable and non-rival. Because of this, it can be subject to the tragedy of the commons, in which no one entity feels responsible and therefore the resource is used until it is destroyed. The solution to this is to increase responsibility and accountability towards corporations with negative environmental impacts, even if they are not the ones directly causing these hazardous waste sites; to demand responsibility for the environmental harm they cause. A funding stream must be secured that is stable and reliable instead of relying only on federal appropriations which vary greatly from year to year. The U.S. government should bring back a tax on polluting companies to increase funding towards Superfund site cleanups. Then, instead of leading the clean-ups directly, the EPA should work to distribute grants to state and local governments that can lead their remediations on a smaller scale. This will be beneficial to the local economies by investing funding into jobs, providing an economic stimulus to the communities most negatively impacted by past pollution. Environmental remediation in these areas will improve not only the immediate health, economic prosperity, and environmental conditions of the sites, but will also allow for upward economic mobility throughout this generation and for generations to come.

Additionally, more funding is needed for research. There are multiple types of research that would be beneficial to improving Superfund cleanups. First, the actual costs of cleanups are not documented. Many programs have existed for decades and have divided the work between the federal government, local entities, and private contractors. This makes it difficult to understand true funding representation and how it should be allocated to future projects. Next, the full impacts of not remediating hazardous waste sites are unknown. While researchers can hypothesize health and economic costs based on external analyses, there is a lack of research conducted directly at these Superfund sites. This is due in part to the people impacted; they are typically people identifying as minorities with education below the national average and low incomes. These people must be centered to begin reversing the years of environmental inequities and the generational harm done by allowing these sites to remain hazardous for decades. This research should include socioeconomic factors as well as health studies to understand a holistic picture of what is happening at these Superfund sites. However, remediation cannot wait for research to be complete. More harm would be done if years were spent conducting research instead of acting. Instead, these projects should be conducted simultaneously to ensure that further harm is being mitigated while information is being gathered to help more communities surrounding these toxic sites.

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