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# Public Understanding of Local Lead Contamination

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## Abstract

Residents of Herculaneum, Missouri have been influential in shaping the management of contamination challenges resulting from the community's proximity to the last primary lead processing plant in the United States. This paper provides a nuanced examination of two perspectives of resident activist groups involved in lead-related controversy in Herculaneum. Ethnographic data collection and storyline analysis were used to trace the evolution in local views from resembling an industrialist–environmentalist dichotomy to more compromising positions associated with ecological modernization. Implications for characterizing public environmental perspectives in the US as beginning to entertain certain aspects of the ecological modernist paradigm are discussed.

## Keywords

public participation, public understanding of science, science policy

# 1. Introduction

You've got victim, villain, hero, and basically that's been how the environmental arena's been performed for the last 35, 40 years; it's victim, villain, hero. We alternate[d] with the agencies between villain and hero depending on what they were doing .... What we really need to do is get beyond the victim, villain, hero template and look at collaboration. (Justin Johnson,<sup>1</sup> Personal communication, June 4, 2009)

In the statement above Mr. Johnson, a high profile lead industry employee, insightfully categorized the stances taken by stakeholders in the local controversy over lead contamination in Herculaneum, Missouri. Herculaneum is home to the last remaining primary lead smelter in the United States, a 200-year-old facility that has served as both the industrial and economic core of the community, and a source of the contamination that has threatened its future.

Herculaneum residents described initial, community-wide alarm after regulatory agencies reported exceedingly high levels of lead in local street dust. However, as the community began to collect information and draw conclusions about the dangers of and potential remedies for contamination, controversy emerged between two resident activist groups who held different understandings of the extent of contamination and related health hazards. Participants characterized the first group, resident health activists, as particularly concerned about the potential impacts of lead contamination on the health of their families and other community members. This group took an environmental protectionist stance on local lead challenges. Participants characterized the second group, resident preservation activists, as more concerned about the economic and social impacts the lead crisis and subsequent regulation had on the Herculaneum community. This group was seen as holding an industrialist view. Group positions were shaped largely by existing social networks in the community involving regulatory agency representatives, environmental activist organizations, and local industry, which influenced the ways that information was received and judgments were made about the trustworthiness of sources (Leach, Scoones and Wynne, 2005).

This retrospective study explored complex and nuanced activist positions that participants described as being transformed as local conditions improved and controversy subsided. The paper provides a descriptive account of the two positions taken by resident activist groups in Herculaneum regarding lead contamination. The account is based on resident activists' reflections on local activist positions at the onset of the contamination crisis in 2000, and their description of contemporary activist group positions following remediation and widely accepted resolution of crisis conditions in 2010. This examination of changing activist approaches in Herculaneum serves two primary purposes: (1) it provides insight into local knowledge about lead contamination and (2) it examines how local knowledge is changing in relation to overarching categorizations of the public understanding of environmental controversy.

## 2. Literature

Dunlap (2002) described two strands of research in environmental sociology: (1) analysis of the influence of environmental variables on social realities and (2) exploration and documentation of environmental controversy. In its treatment of public understandings of environmental threats the first approach tends to rely on overarching categorizations emerging from environmental policy scholarship, seeking to establish the pervasiveness of one dichotomous view in a broad context (Dunlap et al., 2000; Kilbourne et al., 2001). This approach, referred to here as overarching narrative, has dominated environmental sociology in the US. Additionally, overarching narratives resonated within the Herculaneum context as participants self-identified as consistently prioritizing industrial and economic prosperity or local environmental and health protection. The second approach to studying environmental controversy seeks to interrogate the resources and relationships that communities draw upon as they confront environmental threats, finding that knowledge within such

communities can provide valuable context and nuance to situate scientific expertise (Irwin, 1995; Irwin and Wynne, 1996; Leach et al., 2005). Discussed here as local knowledge, this body of research is central to public understanding of science (PUS) research.

This case study presents an intersection between the two above approaches by providing a contextual exploration of two groups, resident health activists and resident preservation activists, each initially identifying with an opposing paradigmatic view. The study retrospectively explored the ways that group perspectives formed and adapted in response to changes in local physical and political conditions. Accordingly, overarching narratives were considered in a deeply contextual way, focusing on the priorities and influences of each resident group as they grappled with threats associated with lead contamination, and adapted to changing conditions.

### Overarching narratives: Industrialist, environmentalist, and ecological modernist

Within discussions of environmental socioeconomic controversy, much research from the fields of sociology, economics, and business correlates the dominant social paradigm with an industrialist stance and the new ecological paradigm with an environmentalist viewpoint (see Dunlap et al., 2000; Kilbourne et al., 2001; Killingsworth and Palmer, 1992; Shafer, 2006). Such characterizations are pervasive. For example, Killingsworth and Palmer (1992) described their own dichotomous classification in terms of conflicts between industrialists and environmentalists, while Dunlap and colleagues have repeatedly characterized an environmentally protective new ecological paradigm, which is opposed to the economically determined dominant social paradigm (Dunlap et al., 2000).

Kaplowitz et al. (2013) objected to the common use of survey instruments that force dichotomous choices, arguing that many respondents to PUS surveys hold views that value both economic growth and environmental protection alongside a belief that it is possible to pursue both priorities simultaneously. Accordingly, they called for acknowledgement of a growing compromise narrative, emphasizing the priorities of both environmentalists and industrialists.

Proponents of ecological modernization add a third overarching narrative, seeking to revolutionize industrial societies by emphasizing priorities of environmental sustainability *and* growth and profitability within capitalist systems. Ecological modernist approaches seek cleaner technologies that are environmentally sustainable, minimally polluting, and highly efficient. Efficiency and sustainability maximize profitability and competitiveness for implementing industries, while ensuring that environmental pollution and degradation are minimized. Christoff (1996) asserted that ecological modernization's "growing popularity derives in part from the suggestive power of its combined appeal to notions of development and modernity, and to ecological critique" (p. 476). Thus, ecological modernization offers environmentalists with interest in economic growth and industrialists with concern over environmental preservation, a powerful discourse in which to situate their views. Although it has been slower to gain acceptance in the United States than in other countries, Schlosberg and Rinfret (2008) suggested that a uniquely American version of ecological modernization has emerged with an emphasis on national security and reconceiving consumerism through "green" products.

While overarching narratives provide for the categorization of perspectives in environmental controversy, they fail to address (1) the reasons that individuals and groups hold such views and (2) the local conditions and interactions in which environmental controversies take place. This study examines resident activist groups as discourse coalitions, which resembled overarching narratives, considering these positions within the evolving context of local lead controversy (Hajer, 1995). This approach is more consistent with PUS research that emphasizes interactions between expert and local knowledge in environmentally controversial contexts.

## Scientific expertise and local knowledge in context

PUS scholars have identified local knowledge as an important factor in community reactions to environmental threat (Irwin, 1995; Irwin and Wynne, 1996; Wynne, 1989). Such knowledge tends to express intense suspicion and practical explanation drawn from years of experience in a context or with a source of contamination. Thus, community understandings often contradict or enhance the scientific understandings of experts who are drawing from less overtly contextualized knowledge sources. Local knowledge is frequently drawn from astute observations over long periods of time and is often insightful and informative. When local knowledge becomes a part of scientific and policy discussions about a local environmental threat, it can have an important influence on the understanding and resolution of local problems (Fischer, 2000).

Another important finding of PUS researchers in communities threatened by contamination has been the ways that local publics encounter and interact with expert knowledge sources. Irwin and Wynne (1996) pointed out that knowledgeable experts present a threat to local identities when they don't account for local knowledge in their evaluations and assessments. The willingness of local stakeholders to accept expert scientific explanations hinges on the level of trust that locals have in the individuals and institutions presenting the information. Locals are able to adapt relevant information from a variety of sources to build and defend a particular stance on local contamination. Accordingly conflicts and uncertainties surrounding contamination issues in the scientific community are often reflected in local controversies. Sources of expertise are further evaluated in light of their ability to support a particular perspective or agenda in controversy over contamination. Accordingly, communities experiencing contamination use and disseminate expertise in relation to existing social networks (Irwin, 1995).

Both the contribution of local knowledge and the presence of overarching narratives were evident in participant discussions of controversy over lead contamination in Herculaneum. Widespread reports that dichotomous positions dominated the Herculaneum context presented a unique opportunity to investigate overarching narratives in a more nuanced manner as aspects of these positions appeared in local activism. Utilizing an argumentative approach to retrospectively examine the two perspectives of resident health activists and resident preservation activists allowed for reflection on developing meanings and identities within and across industrialist and environmentalist perspectives (Hajer, 1995). Accordingly, this study explored two primary research questions: (1) how do groups understand the challenges of living with and managing local lead contamination? and (2) how do the discourses that unite these groups evolve with political and physical conditions?

## 3. Methods

Stakeholder perspectives on lead contamination in Herculaneum were explored using qualitative, ethnographic data gathering techniques and Hajer's (2003) approach to storyline analysis. Interpretive policy analysts focus on the frames that are used by stakeholders to shape policy debates by tracing the language and argumentative strategies used by different groups (Fischer, 2000). Hajer argued that the central discourses structuring such environmental controversies are storylines, which are "narratives on social reality through which elements from many different domains are combined and that provide actors with a set of symbolic references that suggest a common understanding" (1995: 62). Hajer (1995) also contended that storylines with shared meanings united stakeholders into discourse coalitions as they came to interpret events in similar ways. Through analyzing storylines, researchers develop understandings of (1) the perspectives that serve to unite individuals into groups and (2) the ways that these groups defend their own priorities against those of other groups.

Evidence of local positions was collected through observations, interviews, and analysis of related documentary data. Lead management-related events in Herculaneum were observed between September 2008 and November 2010. Observations consisted of two types of public events: (1) relevant community group meetings

and (2) public meetings initiated by regulatory agencies. Stakeholders active in lead management-related events were identified during observations and asked to participate in semi-structured interviews. An iterative networking process was then used to identify other individuals, events, and interactions that would inform the understanding of local activist positions on lead contamination.

Twenty individual interviews and five small group<sup>2</sup> interviews were conducted, with a total of 32 participants between October 2008 and June 2010. Interview questions were developed to engage interview participants in discussions of their positions on various issues related to lead controversy at the onset of the crisis in 2000 and at the time of the interviews in 2008–2010. Interviews and observations were documented with detailed fieldnotes and audio or video recordings when permitted by participants. In the single interview when recording was not permitted, fieldnotes were relied on as the sole record of the conversation.

Transcripts and fieldnotes were analyzed through an initial reading for stakeholder views of the problems associated with local lead contamination and its management. Sections of discussions considered central to the overall argument of the speaker(s) were also identified. Central storylines and argumentative structures of each speaker were outlined through a second reading and summary arguments were developed that paraphrased (1) participants' activist positions, and the ways that participants (2) defended their particular views and (3) related their arguments to other narratives in local lead discussions. Participants were grouped into discourse coalitions according to their own statements of identification with and the alignment of their arguments with a particular group. A review of the observation transcripts and fieldnotes was conducted to examine the ways that that discourse coalition approached lead controversy across settings. Several central themes emerged from the examination of grouped storylines and summary arguments, which were then used to develop a summary statement of the discourse coalition's view on each theme, referred to as supporting arguments. Finally, the supporting arguments and summary arguments of each group were analyzed to emphasize common priorities and approaches central to each perspective.

## 4. Findings

In order to understand resident perspectives on lead contamination in Herculaneum, it is first necessary to consider the context under which the controversy emerged. The following section provides a brief description of the emergence of lead controversy in Herculaneum. A more detailed analysis of local perspectives and the ways they were adapted as controversy progressed follows.

### Background

Throughout its history, Herculaneum has existed as a small town dominated by lead processing. A mostly white working class town, Herculaneum in 2000 had a population of 96.6% Caucasian and its median household income was \$40,365 (U.S. Census Bureau, 2000). In 1995 a St. Louis reporter described Herculaneum as:

a gritty town of 2,300 on the Mississippi River about 30 miles south of St. Louis ... [Where] particulate matter from the plant ... was so heavy that it blocked the sun at times – so people couldn't see across the street or what was happening on the field at a high school football game. (Malone, 1995)

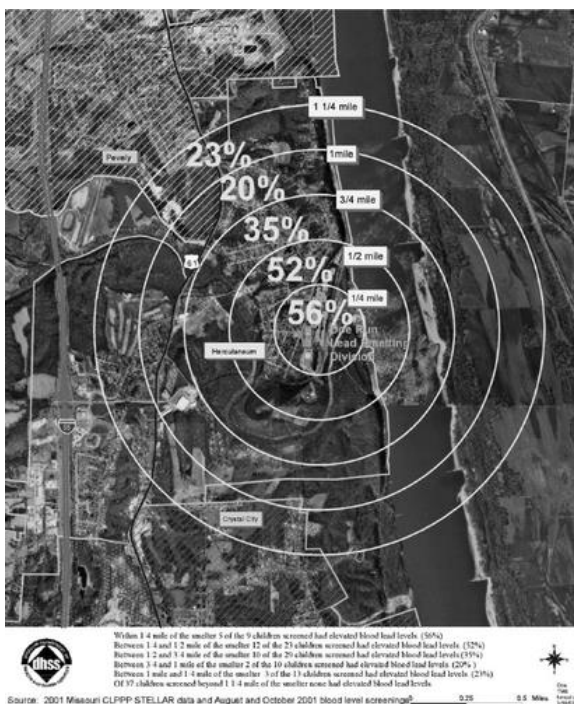
Public discontent with Herculaneum's lead industry was largely unexpressed before a strike in the early 1990s strained the relationship between many residents and the lead company. The strike occurred at a time when local lead management primarily consisted of monitoring area air lead levels. Despite frequently elevated air lead levels, the lead company's continual cooperation in efforts to attain the 1978 lead National Ambient Air Quality Standard (NAAQS) was considered to constitute official compliance with relevant regulations governing environmental lead pollution. In the early 1990s, however, representatives of Missouri Department of Natural Resources (MDNR) and the US Environmental Protection Agency (EPA) began to suspect that ongoing elevated

air lead levels in the area could contribute to other sources of environmental contamination and potential human exposure, prompting them to expand their examination of local lead levels.

At public meetings held to present plans for revising local lead management through the collection of additional data, some residents expressed a great deal of dissatisfaction with the operations of the lead company and the state of the local environment. Wynne (1996) explained that concerns about local contamination problems are often only expressed after a forum emerges in which individuals can discuss “fears and suspicions that they had previously entertained, but felt unable to voice” (p. 28). These “fears and suspicions” suggest local knowledge that stakeholders possess that can be complementary or contrary to decontextualized scientific expertise.

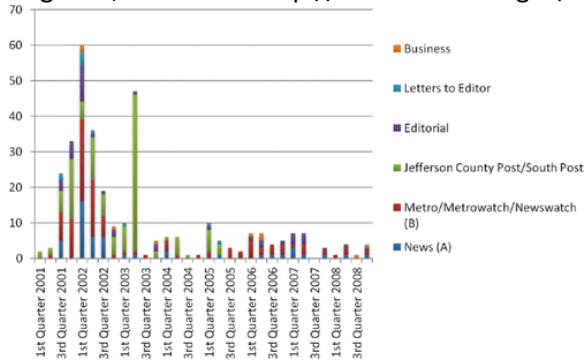
Local knowledge was also evident in Herculaneum residents’ emphasis on non-air sources of lead contamination. Some residents were adamant that trucks hauling lead concentrates through their neighborhoods were spilling material onto streets and residential properties and that the material presented a health hazard to the community. Truck traffic had not been considered significant in the regulatory agencies’ lead management plan for the area since the policy context at that time almost exclusively emphasized lead contamination in the air resulting from smelting technology used in the plant.

One persistent resident, upset over lead dust spilling from trucks, coerced a regulatory representative to collect dust samples on a road near the plant. These samples contained 300,000 parts per million (ppm) lead, 750 times the federal guideline for soil remediation. This finding quickly turned regulatory and local concern to a focus on lead in local dust and soil as a possible source for human exposure. Health screenings conducted in the area linked elevated levels of lead in young children’s blood samples with residing in homes located near the plant (Figure 1). Further investigation of the extent of multi-media lead contamination in the area ensued. As information about the extent of local contamination was collected, additional regulatory activity was enacted to replace contaminated yard soil, maintain clean streets, bring area air lead levels into actual compliance with the 1978 NAAQS, and purchase and vacate 160 homes proximal to the lead plant. Media coverage of contamination events in Herculaneum increased drastically during this time (Figure 2). As events unfolded, residents took opposing sides over the ways that lead contamination should be understood and managed in Herculaneum.<sup>3</sup>



**Figure 1.** Children’s 2001 blood lead levels according to distance from lead smelter. Produced by Missouri Department of Health and Senior Services (2001).

Source: “Herculaneum Missouri – Elevated Blood Lead Levels in Children under 72 Months of Age.” Retrieved August 6, 2009 from <http://www.dhss.mo.gov/hazsubstancesites/herc2001map.pdf>



**Figure 2.** Graph depicting the number of appearances of Herculaneum environmental concerns in the nearest metropolitan newspaper, the *St. Louis Post-Dispatch*.

Following the 300,000 ppm road dust finding resident perspectives reflected a dichotomy between those who supported the local industry (eventually represented by resident preservation activists) and those who criticized it (eventually represented by resident health activists). Resident Alex Hill described the two perspectives as follows:

There are two components of citizens here. Perhaps ... the majority are people who support [the lead company]. There’s a growing group of us who, I guess, would be – could be labeled as health-oriented citizens and have the point of view that we have a right as Americans to live in a healthy environment. (Personal communication, December 4, 2008)

Mr. Hill’s description is typical of participant accounts that consistently portrayed a community that had been divided over lead contamination. Initially resident activism reflected either concerns over potential health and environmental implications, or defended community interests within the context of lead contamination. This dichotomy distinctly resembled the overarching narrative positions described previously, with resident groups prioritizing one view and dismissing or refuting opposing concerns. According to participants, firmly opposed resident health activist and resident preservation activist groups emerged early in the local lead controversy and held views that echoed environmentalist and industrialist priorities respectively. Each resident activist discourse coalition characterized either the lead company or the environmental regulatory complex as the villain in the story of lead in Herculaneum and set out to fight to defend local health or the local economy.

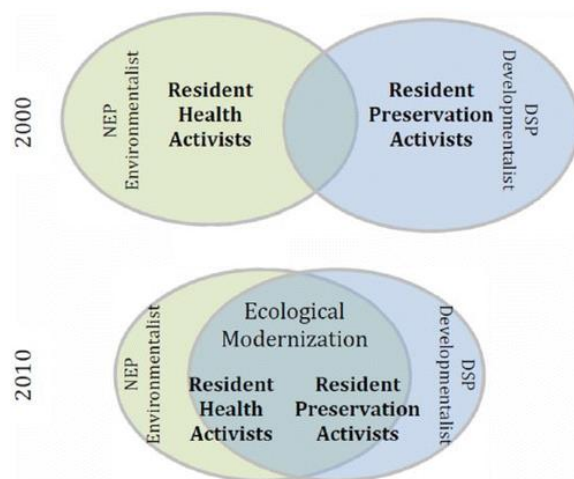
Consistent with literature, discourse coalitions constantly adjust their arguments and viewpoints in order to remain relevant to continually changing physical, social, and regulatory contexts (Hajer, 1995). In response to changes in local environmental and regulatory circumstances, activist groups in Herculaneum tempered their approaches for participating in local environmental controversy such that resident activists came to defend perspectives that acknowledged opposing concerns and sought resolutions that benefitted *both* local health *and* the local economy.

Analysis of storylines around local lead contamination and its management yielded two themes considered central to the position of each resident activist group: (1) their stance on the current science of lead toxicity (science), and (2) their views on the appropriate relationship between industry and regulatory agencies in preventing and mitigating damage (industry & regulation). Perspectives on these themes were integral to participant identification with each discourse coalition. Points of overlap and dissent within each theme and adaptations groups made as contamination events unfolded are discussed in the following sections (summarized in Table 1 and illustrated in Figure 3).<sup>4</sup>



**Table 1.** Outline of changes in resident health activist and resident preservation activist positions across two dimensions: (1) their understanding of relevant science and (2) their expectations of industry and regulation.

		Resident health activist views	Resident preservation activist views
2000	Science	Embraced scientific evidence of health effects of low-level lead exposures as evidence that lead’s impacts on human health extend beyond those scientifically proven. Expected regulatory agencies to protect public from potential health threats	Rejected scientific evidence of health effects of low-lead exposures as inconsistent with local experience. Required proof of actual physical harm to specific individuals to justify regulatory restrictions on lead industry
	Industry and regulation	Expected regulatory agencies to ensure the protection of public health through careful monitoring and punitive restriction of lead industry in light of local exposure	Expected lead company to function responsibly within a broad regulatory framework that both protected the community from known threats and maximized industrial profitability
2010	Science	Accepted current regulatory measures as adequate to protect health from known threats while maintaining vigilance in enforcing regulation and concern over as yet unrecognized health threats	Acknowledged complexity inherent in evolving regulatory interpretation of health risks while promoting strategies and technologies to allow community growth and ensure protection against known threats
	Industry and regulation	Emphasized and supported local industry’s pursuit of clean lead technology. Participated extensively in showcasing Herculaneum as a context for lead contamination and clean up in regulatory discussions. Maintained the importance of resident participation in maintaining safe conditions and contributing to further regulation	Valued presence of lead industry for both economic vitality of the community and enhanced protection of global environment. Cooperated with regulators and industry to pursue developments that would simultaneously maximize economic growth and minimize contamination and exposure



**Figure 3.** The change in resident health activist and resident preservation activist perspectives over a decade of lead controversy and improved management.

## Understanding of science

Both resident health activist and resident preservation activist groups understood decision-making about lead contamination in their community to involve complex scientific issues. Both groups had attained extensive knowledge of scientific topics surrounding community lead contamination. Resident activists were knowledgeable about exposure pathways, health implications, monitoring, levels designated acceptable across multiple media, and interactions between multiple contextual factors and lead in the environment. They accessed information from scientific experts, representatives of both regulatory agencies and industry, reports from agencies and industry, personal experience, and community history with lead. However, they differed with regard to their levels of trust in (1) findings of harmful effects of low levels of lead exposure and (2) assurances of the safety of lead exposures below specified levels for individuals and institutions.

### *Resident health activists*

The resident health activist perspective aligned with an environmentalist narrative, regarding scientific findings that lead exposures in early childhood impact neurological development as trustworthy and alarming. This group was very informed with regard to current lead science as well as emerging findings regarding the neurological effects of very low-level lead exposures, referring to prominent lead epidemiological studies by scientists like Herbert Needleman and Bruce Lanphear.<sup>5</sup> Resident health activist, Ms. Turner exhibited such knowledge describing her reaction to the results from her daughter's blood lead level test:

They would say, "Oh, it's less than five, or more than five." It wasn't a 1.3, or something like that, and I wanted definite numbers ... As far as [my daughter] goes, she has a level of a three, which according to the [Centers for Disease Control] that is not leaded .... And studies have shown that even at that level, it can cause problems, long-term exposure, so it still worries me. (Sophia Turner, Personal communication, December 4, 2009)

Resident health activists suspected that lead exposures likely had potential negative health consequences beyond those concerns commonly associated with lead exposure – disrupting the neurological development of young children – despite the scientific community's claim that lack of sufficient evidence existed to support such allegations. For instance elderly resident, Ryan Zimmerman, identified personal observations that made him suspect contamination levels were up; "I began to acquire some strange taste in my mouth, which kind of tells me that there might be some sort of contamination" (Ryan Zimmerman, Personal communication, April 22, 2009). Although taking varied forms, concern over unidentified health effects of lead contamination was a prominent theme among resident health activists.

As resident health activists acquired experience in dealing with contamination studies, their suspicions became increasingly sophisticated. Several referred to a consultation conducted by health agencies between 1998 and 2002 that found no significant elevation in amyotrophic lateral sclerosis (ALS)<sup>6</sup> incidence in Jefferson County. The study did identify a very small but significant cluster of ALS around the Herculaneum smelter that was not extensive enough to warrant an official linkage between ALS and lead smelting. Resident health activists cited the ALS study as evidence that the possibility of further adverse effects of lead exist beyond what is currently known, and that scientific studies conducted to find such effects were insufficient to rule out the possibility of further harms. Resident health activists considered scientific uncertainty with regard to the health effects of lead contamination to be indicative of further threats to their health yet to be identified.

As regulatory representatives worked to contain local contamination, resident health activists continued to worry that unidentified effects of lead exposure would contribute to health problems for their families and friends. However, they came to accept measures taken by regulatory agencies to reduce and to mediate environmental contamination as sufficiently protective of local health. Accordingly, they turned their attention to the oversight and enforcement of existing management strategies, expressing support for any technological

improvement that could further reduce local lead burdens while maintaining lead industry productivity in the area.

### *Resident preservation activists*

Resident preservation activist perspectives aligned with industrialist views, maintaining skepticism with regard to the actual health harms associated with low levels of lead exposure. Their position was grounded in experience and personal observation from years of living in close proximity to the lead smelter. While they agreed that minimizing human exposure to lead contamination was in the best interests of the community, they deemed findings about the impacts of low-level lead exposures on the development of young children to be unsubstantiated by their experiences in Herculaneum. Accordingly, any drastic or costly measures taken to prevent low-level exposures were considered to be an overreaction to the realities of local lead problems, and often punitive to the lead industry and local economy.

The contrast between resident preservation activists' suspicion about the harmful effects of low-level lead exposure and resident health activists' concern over potential health harms was evident in a contentious a public meeting:

Julie Brown: What about all of these people that are sitting here tonight that were born and raised in this city, and none of them are leaded? ... Why is it all of the sudden we have this big ... problem with [the lead company]?

Alex Hill: I ... don't feel like if there is a danger to human health here that we shouldn't acknowledge it, and say, "Look there's something going on here that we need to address."

Julie Brown: I don't think it's as much a danger as a lot of people think it is. (Public meeting, September 2008)

Apparent in the above exchange, Julie Brown, a resident preservation activist, considered lead's effects less serious than lead management would indicate. To reinforce their stance resident preservation activists cited scientists who have questioned the validity of adverse effects of low-level lead exposure.<sup>7</sup>

Many influential resident preservation activists' perspectives with regard to low-level lead exposure gradually became more nuanced as lead controversy in Herculaneum progressed. The following conversation between two preservationist city leaders demonstrates this transition:

Oliver Bowen: Not even with elevated blood lead. There hasn't been one since 2003 according to the County Health Department.

Jacob Williams: According to the definition of elevated blood lead, yes, [but] you can find children .... Where will science determine what is safe and what is not safe? We don't know .... We care about the children in Herculaneum tremendously ... but we also care about fairness .... So it's a complex problem that requires a complex solution .... We've now taken steps to be part of the solution instead of sitting by and reacting to what the agencies and what [the lead company does] we now are proactive. (Personal communication, October 7, 2008)

In this exchange between two resident preservation activists, Oliver Bowen defended the health of the Herculaneum environment by explaining that no children had been identified as having an elevated blood lead level according to the Centers for Disease Control's guideline. Jacob Williams countered by explaining that complexity is associated with identifying a safe level of lead exposure for children. He further explained that resident preservation activists had turned their attention from focusing on regulatory threats to the community to development strategies that could potentially limit lead exposures *and* enhance economic development.

As controversy progressed, the resident health activist coalition began to prioritize increasingly lower lead levels in the local environment in order to combat the expected recognition of negative health effects at ever-smaller levels of exposure, while maintaining an industrial presence in Herculaneum. Meanwhile, the resident preservation activist coalition developed initiatives promoting community growth and relying on the local lead industry to continue to maximize efficiency in operations to minimize contamination. Both of these efforts reflect common ecological modernist discourses of technological advance, efficiency, and industrial practices that benefit *both* environmental protection and economic growth (Schlosberg and Rinfret, 2008).

## Understanding of industry and regulation

Resident health activist and resident preservation activist groups initially formed in Herculaneum in relation to two different responses to local lead threats, largely in their expectations of appropriate interactions between the lead industry and regulatory agencies. Characterizing the lead industry as the villain in the story of local lead contamination, resident health activists reacted to perceived health threats by demanding stringent reactions by regulatory agencies including posting signs warning of dangerous lead levels, buying out a large portion of the historical core of the town, and restricting industrial activities. Isabella Robinson described this sentiment:

You can't use these kids as lead detectors. You have to prevent it first .... Enough is enough. Enough kids exposed, enough of this. You can't put your trash on the general public at large and not be held accountable. It should not happen, and the agencies that allow it to happen are just as bad. We want accountability and we want it now. (Personal communication, October 7, 2008)

Resident preservation activists perceiving a threat to the viability of their community from regulatory activity reacted to the efforts of regulators and resident health activists by working to defend Herculaneum against the threats presented by media attention to contamination, and the purchase and fencing-off of the town's historical core. Jacob Williams explained his reaction:

We want a safer environment for our children, but we think we can do that without putting up signs around town that say, "Your children will die if they come to Herculaneum." That seemed to be the only thing that one group was going to be satisfied with, where in fact I don't believe that was the case. (Personal communication, October 7, 2008)

Initial efforts by resident preservation activists involved developing a plan describing the vision for Herculaneum's future as a community, enhancing green spaces and historical monuments, and improving city infrastructure. While resident health activists agreed that these were laudable efforts at community-building, they expressed frustration that revitalization would be prioritized over managing and mitigating contamination as Sophia Turner explained; "I'm all for revitalization ... but you can't revitalize until you solve the problem, that was our big beef, and they just didn't see it that way" (personal communication, December 4, 2008). Differences between the groups' understandings of the relationship between local industry and regulation initially arose from (1) their prioritization of economic interests and environmental responsibility and (2) differences between the institutions they considered trustworthy representatives of the health interests of the community.

### *Resident preservation activists*

Resident preservation activists expected the lead company to take primary responsibility for protecting the public from plant-related contamination and to make every reasonable effort to operate with minimal hazardous impacts. The lead company's efforts to be a part of the community by supporting local institutions and events were considered further evidence of their commitment to supporting and improving Herculaneum. Such support was expected to extend to operating the lead plant in as clean a manner as was practical.

Resident preservation activists expected the lead company to conduct lead processing activities in a way that minimized the emissions and fugitive dust that could potentially pose a threat to local health while maintaining

appropriate levels of profit. Jacob Williams described his view of relationships between the lead company, regulatory agencies, and the Herculaneum community:

I sincerely believe that [the lead company] will not let money keep them from making significant strides to improve the [processing] ... I've seen vast improvements in the three years I've been here. They were out of compliance on this monitor right here. But they're tearing down 50 homes and so you've got the dust and debris and lead paint and other things .... So obviously there's lead throughout the community that has to be remediated and we understand that, but we're just trying for people to tell the true story. Don't paint doom and gloom. Children today in Herculaneum are not dying. (Jacob Williams, Personal communication, October 7, 2008)

Resident preservation activists expected the lead company to balance corporate and community interests. When contamination was identified, preservationists judged it an oversight on the part of the lead company and expected the company to cooperate with agencies in rectifying the situation and bringing the area into compliance with existing lead regulations. Thus, they believed that a cooperative relationship, with the lead company spearheading monitoring and cleanup and regulatory agencies ensuring the protection of local health would produce optimal results for Herculaneum.

In the view of resident preservation activists, regulatory agencies were expected to protect the public from substantial, actual harms. This was contrasted with potential harms of a more theoretical nature, like the effects of low-level exposure on intellectual potential. Their mistrust of conclusions about harmful effects at the lowest levels of lead exposure drove resident preservation activists to consider regulatory activity such as posting signs warning of the dangers of lead in the streets, forcing the purchase of homes, restricting access to large areas in the historical core of the town, and placing a heavy burden of restrictions and bureaucracy on lead company operations to be extreme, unfounded, and threatening to the survival of the community itself, positioning regulatory agencies and residents fighting to expand regulation as the villain in local lead controversy. Additionally, resident preservation activists resented the interference of other Herculaneum residents in regulatory processes.

As local lead controversy waned, resident preservation activists began to alter the way they prioritized economic interests versus environmental sustainability and their view of the relationship between industry and regulatory agencies. They began to see the relationship between regulatory agencies and the lead company as complementary. Jacob Williams explained:

My guess is this country regulates them more closely than another one would. We're all concerned with global warming. We're all concerned with the world environment, with the world economy. I don't see that it benefits anybody forcing them out of the country as long as they're making every effort to improve and not hurting any child. (Personal communication, October 7, 2008)

Resident preservation activists began to view improved conditions in Herculaneum in the context of the global environment. This change allowed them to see local regulatory and industrial activities as complementary rather than in the villain and hero roles they had been assigned in the past. Accordingly, regulatory efforts that reduced industrial waste prevented further harm to the global environment by increased lead processing in countries where it would be less carefully regulated. Further, resident preservationists began to focus on community efforts that would enhance community growth while minimizing lead exposure in the community. The primary example of this was their plan to construct a bridge, which would allow truck traffic more direct access to the lead plant without traveling through city neighborhoods and improve traffic patterns from the main highway into Herculaneum. This effort would reduce lead exposure to local households, promote community growth, and reduce the distance traveled by lead company vehicles. Thus, resident preservation activist perspectives

began to reflect the ecological modernist compromise position in seeking resolutions that prevent hazardous conditions while encouraging economic growth and respect the more cooperative relationship between regulatory agencies and industry (Christoff, 1996).

### *Resident health activists*

Although resident health activists considered regulatory agencies lax in their historical supervision of area contamination, they were forced to rely on health and environmental agencies to ensure Herculaneum's safety. They expected that any possible harm attributed to lead processing activities in the area should result minimally in enforced compensation or resolution of that harm and maximally in severe punitive fines and restrictions assessed to the lead company. They also expected the community itself to play a necessary and important role overseeing industrial and regulatory activities in the area and ensuring that health and environmental protection efforts were properly implemented and maintained. Resident health activists argued that while the company played an important economic and political role in the community, it was responsible to do and spend whatever was necessary to ensure that industrial activities pose no threat to the health of residents and to remedy any harm that it had caused.

Although some residents that took this stand were resentful of the local lead industry for past activities, most resident health activists generally appreciated what the company had accomplished in reducing lead emissions and cleaning up contamination over the last decade, no longer characterizing the lead industry as a villain in the town's history with lead. As Ms. Turner stated:

I do think that the cleanup and everything has tremendously helped and I think that the regulations that they [refers to EPA and MDNR] have put on [the lead company] have helped. The problem was that the plant has been here 100 years, so those new regulations didn't really apply ... it was very frustrating in the beginning because everything was a negotiation, and it's like it should not be a negotiation. The lead company basically called the shots. "We'll do this if you give us this." That's not right and so that was very frustrating, but I do think that they are working together now, and I think the lead company has even been going above and beyond to do things that are better for the community, so I see it as improving, definitely. (Sophia Turner, Personal communication, December 4, 2009)

Resident health activists understood that the company's long history in the town predated environmental regulation in the US, and that current standards often failed to address concerns particular to the Herculaneum context. However, they expected the lead company, with strong regulatory oversight, to resolve any harmful conditions it had created.

Resident health activists considered the community itself to have played a vital role and made important advances in lead management. They regarded the policy processes adhered to by agency representatives to be limited when it came to the specifics of managing lead contamination in Herculaneum. Ms. Turner explained:

Well, to give them [regulatory representatives] credit, I guess, they have never been involved with a cleanup that still has an operating smelter, so it's a whole new ballgame, and I think they've done their best to try to, but I don't think they foresee things .... [Now] I just more or less just request more information. It's like the lead results or the street results. We want to know what those are, but they have gotten very good about sending us information .... I think for a long time in my mind the CAG [Community Advisory Group]<sup>8</sup> provided oversight of the agencies to keep them on their toes, so now – and the one frustrating part is that it switches .... Everybody has to relearn all of this stuff, and these people [new representatives] have to become accustomed to what we expect and what we want .... Josh [regulatory representative] would always say, "This is the most important project that I work on." I'm like, "Yeah, but you get to go home. You can forget about it for a month. You don't have to live it every

day. We live it *every day*,” and it’s a fear, and so just getting them in that mindset I think was a challenge, but we did it, and we all learned how to work together. (Sophia Turner, Personal communication, December 4, 2009)

Ms. Turner’s remarks indicated that health activists considered the community’s role to include (1) identifying contamination sources, (2) advocating for resolution, and (3) ensuring that the lead company was held accountable for implementing protective programs. As the local crisis was resolved, this role became one that required ongoing diligence to stay informed about both changing regulatory systems and changing local conditions. This point was further emphasized by Alex Hill:

There is a mindset that takes some energy day in and day out, of vigilance – a vigilance about the conditions here .... It takes different forms. I would drive down the street going out here and I’ll see some yard being replaced and think, “Oh, okay, that’s getting close.” Or I’ll see, not so much now, but, before, these lead concentrate trucks, eighteen-wheelers, coming up and down the street and close to my house .... I’m thinking, “I wonder what the lead levels on the street are right now.” So that’s just kind of a day-to-day experience. (Alex Hill, Personal communication, December 4, 2009)

As the controversy over lead contamination waned and local conditions in Herculaneum improved, resident health activists began to see lead management as more of a collaboration between the community, regulators, and the lead company. For health activists, living in Herculaneum required a constant “vigilance” in terms of living with lead. In addition to their “watchdog” role in supervising contamination management in Herculaneum, participants turned their attention to lead regulation on a global scale. Herculaneum residents played a central role in forcing a review of the lead NAAQS, which resulted in a lowering of that standard to one tenth of its earlier level. Additionally, a health activist representative traveled to Peru to support another community contaminated by lead processing, and maintained an oversight position on ongoing industry and regulatory operations in the area.

## 5. Discussion

Examining changes in the activist positions taken by resident activist groups across a decade of local controversy allowed for the identification of shifting positions of particular entities, much like the “victim, villain, and hero” descriptions from the quotation that opened this article. Findings synthesize the perspectives of Herculaneum residents who took an activist role in addressing lead contamination in their community both at the outset of the local lead crisis and after the crisis had subsided. Characteristics of resident health and preservation activist positions as they adapted to changing local conditions indicated that activist stances in Herculaneum were more complex than a simple defense of industrial/economic or environmental concerns exclusively, and held some resemblance to ecological modernist compromise positions. Findings described local activist views that maintained aspects of dichotomous industrialist and environmentalist perspectives, but also adapted with changing political and physical conditions to include aspects of an ecologically modernistic position that emphasized local health concerns in the context of an industry that functions in a way that respects the local and global environment and protects the health of the surrounding community (Figure 3).

The findings presented here indicate that in Herculaneum changes in resident activist stances have been gradual, indirect, and layered. Vestiges of industrialist/environmentalist dichotomies continue to be evident in the ways groups prioritize economic growth and environmental protection. Meanwhile discourses of compromise between environmentalist and industrialist perspectives, and collaboration between industry, regulatory agencies, and the community all resembling a more ecologically modernistic approach, have become prominent among local resident activists. This study is limited by its retrospective nature, making it impossible to identify a mechanism for the changes participants described in resident activist approaches. What is evident

is that a shift in activist positions in Herculaneum coincided with extensive revision of the local regulatory framework and improved local conditions, as well as the emergence and growth of ecological modernist discourses in policy circles and an increased environmental concern throughout the United States.

Schlosberg and Rinfret (2008), in their description of a uniquely American form of ecological modernization, suggested that in the United States national discourses are characterized by a weak form of ecological modernization focused primarily on technological innovation and green consumption. Additional themes of national security and blatant consumerism have been included in US ecological modernist discussions to enhance the perspective's national appeal. Themes of national security and consumerism were not central in Herculaneum, thus, while these themes appear central in national policy and media discourse in the US, they may be less salient for local communities confronting environmental threats. Residents in Herculaneum focus instead on local industrial activity and environmental management in the context of implications for the local economy and global environment.

Christoff (1996) proposed normative categories to characterize weak and strong versions of ecological modernization: *economistic/ecological*, *national/international*, and *technocratic/democratic*. While the accounts provided here are purely descriptive, it is useful to situate the strength of Herculaneum residents' changing commitments to ecological modernization within his model in order to consider the potential influence of such changing views on environmental controversy. First, Herculaneum residents came to regard (1) concerns about enhancing industrial efficiency and economic profitability (*economistic*) and (2) less tangible considerations of sense of place, local history, and community identity (*ecological*) as integral to their perspectives on local contamination. Second, Herculaneum residents increasingly considered the implications of local industrial activity and contamination both for their community in the context of US political and environmental conditions (*national*) and on a more global scale (*international*). While resident activist discourses increasingly reflected global considerations, they continued to emphasize that local health trumped global environmental and economic concerns. Finally, much of the discourse surrounding lead management in Herculaneum remains *technocratic*, with government and industry representatives presenting new technologies that will increase the efficiency of lead processing and reduce waste in its transport. However, residents have developed a rare view of the centrality and potential influence of local activism on environmental management and economic development. Both resident health activists and resident preservation activists have come to view their roles in shaping lead regulation and promoting the growth and development of Herculaneum as having made important contributions to the current and future state of the community with implications for larger contexts. Thus, resident activists have a very *democratic* view of environmental management in terms of their own activism. Therefore, on all dimensions both strong and weak aspects of ecological modernization have emerged in local discourse, further indicating that local positions don't easily fit prescribed categories or dichotomies. Rather, the activist stances described here remain fluid and responsive to multiple contextual dimensions.

The resemblance of aspects of both strong and weak versions of ecological modernization in local resident activist positions suggested that rhetoric emphasizing compromise between economic and environmental priorities has more fully permeated the public understanding of environmental issues in the US than researchers anticipated (Schlosberg and Rinfret, 2008). Further research is required to provide insight into the mechanisms through which local activist positions come to resemble aspects of international discourse. Such work could inform regulatory understandings and approaches to working with contaminated communities in the future as public involvement could transition from focusing primarily on debating and enforcing strategies for managing contamination to developing solutions to local environmental threats that *both* benefit the local economy *and* protect local health and environment.



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## Notes

1. All proper names of participants have been replaced with pseudonyms.
2. Small group interviews occurred in four instances when participants invited others into scheduled conversations. Procedures for group interviews echoed those for individual interviews with added time for discussion and reflection among participants.
3. For a more detailed overview of the lead controversy in the Herculaneum context see [McNew-Birren \(2012\)](#).
4. It is important to note that this discussion is focused on the positions taken by two resident activist groups and does not attempt to describe the landscape of individual perspectives both within those groups and of residents that were not active in the local lead controversy.
5. See for example [Lanphear et al., 2000](#); [Needleman, 2000](#).
6. Also known as Lou Gehrig's disease, ALS is a degenerative disorder affecting the nervous system.
7. See for example [Bowers and Beck, 2006](#); [Kaufman, 2001](#).
8. The Community Advisory Group (CAG) was an EPA-supported forum for connecting regulatory representatives with community members. Over time community health activist residents came to dominate the leadership of the CAG.

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