

# **Shaping Environmental Justice: Applying Science, Technology and Society Boundary Work**

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This article applies Gieryn's two concepts of boundary-work, "expansion" and "exclusion", to observing environmental justice (EJ) research. The application of boundary-work in the field of EJ science shows that similar phenomena noted in Gieryn's case studies can also be found in EJ research. EJ scientists continue to shape and reshape the meaning of EJ. Meanwhile, activists also use rhetoric boundaries to discredit the legitimacy of EJ's opponents. I suggest that the EJ movement is still dependent on scientists to provide a scientific way to foster equal distribution of environmental risks. However, to achieve a just distribution, science alone is not enough. Public participation in the field of both EJ science and the political movement is necessary.

## **Introduction**

Science has long been a key element in the broad history of the environmental movement. Generally speaking, scientific knowledge has been assigned the role of identifying environmental risks, measuring the extent of harms, and assessing remedial actions. Needless to say, if the risks are invisible, the public or the authorities have no choice but to trust scientists and their assessments. In an ideal world, the scientific community can develop a unified body of reliable knowledge. Then what policy-makers and citizens have to do is to follow this scientific consensus. In reality, however, it is next to impossible to find a unanimous consensus among scientists. Different occupational and disciplinary divisions between scientists produce substantial variations in terms of their scientific accounts. So in the real world, different groups of scientists constantly disagree with each other on most points. Further, debates among scientists are not always conducted on the basis of reason (Yearley, 2005, Ch.8). Once debates escalate, scientists from different groups may resort to the technique of boundary-work to distinguish themselves (real science) from their rivals (pseudo-science).

This article analyzes boundary-work in environmental justice (EJ) and asks, "Can we distinguish between true science/scientists and pseudo science/scientists?" The phenomenon of boundary work, I argue, can be found not only in the field of science generally, but also in the area of EJ research in particular. To answer the

aforementioned question, this article firstly focuses on Gieryn's analysis of boundary-work (1983; 1999), then suggests how this can be utilized to analyze EJ. The second part deals with how rhetorical boundaries were produced within the EJ science, and questions to what extent scientific knowledge supports the EJ movement. After demonstrating the boundaries of EJ science, the third part turns to an analysis of how science was used by EJ activists to expand their movement and how boundaries were set to exclude science from the EJ movement. Finally, I conclude with some initial comments regarding the nature of EJ.

## **2. Boundary-work**

As noted above, contemporary science is often perceived as the sole source of intellectual authority. However, tracing the history of science, it does not take long to find that science has not always possessed the authority attributed to it in contemporary society. By identifying its own supposedly unique and essential characteristics, science/scientists demarcate a rhetorical boundary to strike back at its challengers. The process, through which science is distinguished from other kinds of intellectual activity, is known in the STS (Science, Technology and Society) study as boundary-work. In this section, I discuss how science came to be defined, and how the scientists involved in this definition interacted with each other.

### **2.1 The "Expansion" of Authority**

Gieryn (1983;1999) demonstrated how boundary-work was used from historical perspectives. In Victorian Times, the most famous scientist was John Tyndall (1820-1893). As a professor and later the superintendent at the Royal Institution, he and other scientists faced two chief rivals: religion and mechanics. In the 19<sup>th</sup>-century, religion was still the greatest intellectual authority controlling the university curriculum. In order to increase the resources available to scientists, Tyndall challenged religion by drawing a rhetorical boundary between science and religion. To that end, he emphasized four distinguishing features: "useful or not", "empirical or not", "skeptical or not" and "objective or not" (Gieryn, 1983, pp. 785-786). Because science possessed the qualities of the first of all these four juxtapositions, Tyndall went on to argue that science, rather than religion, should have the authority to speak about the natural world, set curriculum, and enjoy greater public support. Finally, Tyndall succeeded in constructing an ideology of science for the public and expanding its authority.

Besides religion, Victorian mechanics and engineers presented another obstacle to an expansion of scientific authority. In Tyndall's time, many Britons believed that it was

craftsmen, not scientists, who had driven the Industrial Revolution. Consequently, scientists received less support from the public and politicians. In order to increase scientists' resources and science's authority, Tyndall turned to erect another boundary between science and mechanics by producing new criteria.

This time, science was presented as possessing several characteristics that he had previously used to define religion: it was a "theoretical" activity that could be justified by its "nobler" uses as a practice of "pure" culture and discipline (Gieryn, 1983, pp. 786-787). Clearly, the characteristic of being practically useful has disappeared from his description, and the meanings of some characteristics used in demarcating between science and religion were changed. Without a doubt, Tyndall characterized science differently in response to different obstacles.

## **2.2 The "Exclusion" of rivals**

Once authority has been acquired, a movement's goals may change to monopolizing professional authority and resources. Through an examination of the scientific status of phrenology in early 19<sup>th</sup>-century Edinburgh, Gieryn's research (1983; 1999) shows the way scientists started to exclude rivals within the community by defining them as outsiders. This time, Victorian Edinburgh scholars used labels such as "pseudo", "deviant" or "amateur" to exile dissidents from the scientific community (Gieryn, 1983, pp. 787-789).

Phrenology emerged in the late 18<sup>th</sup>-century. Its basic claim was that a person's mental character could be judged by examining the pattern of bumps on the surface of one's skull. Although phrenologists firmly believed that, just like any other scientists, their research relied on empirical methods, their opponents, anatomists, challenged phrenologists' authority and attempted to establish the scientific validity of their own competing claims. To push competitors beyond of the self-described boundaries of science, anatomists attempted to discredit the legitimacy of phrenology. In so doing, they took four steps.

First, anatomists refuted phrenology's political and religious ambitions. Anatomists accused their opponents of providing unscientific theories because phrenologists placed a "quasi-religious" mission ahead of the search for knowledge about natural phenomena (Gieryn, 1983, p. 788). Second, anatomists argued that the theories of phrenology were vague and undermined by inadequate empirical testing methods. In other words, instead of being based on "objective" experiments, phrenology, according to anatomists, was based on subjective conjecture (Gieryn, 1983, p. 788).

This subjectivism alone was enough for some scientists to dismiss phrenology as “pseudo-science” (Gieryn, 1983, p. 788). Finally, anatomists made the accusation that phrenologists relied on “popular opinion” to validate their theories while ignoring the opinions of scientific experts (Gieryn, 1983, p. 789).

By these means, anatomists successfully established a boundary and pushed phrenology out of the scientific community. Anatomists then established their scientific legitimacy, replaced their opponents in the corridors of power, and eventually won greater access to significant resources.

### **2.3 Using Boundary-work in the EJ Movement**

Gieryn provides two concepts useful for analyzing the application of boundary-work in the field of pure science: expansion and exclusion. Expansion occurs when one group attempts to share authority with others. As Tyndall sought to obtain authority, public support, funding and educational opportunities for the growth of science in Victoria England, he successfully drew a firm boundary between science and religion. However, the boundary-drawing sometimes is not as successful as scientists planned. As the debate between Victorian scientists and mechanics/engineers, scientists have never completely excluded their rivals from enjoying a degree of authority. It is reasonable to conclude that the “expansion” of boundaries happens when one group attempts to win a share of authorities from others. Once professional authority has been established, the goal may shift to monopolizing professional authority and resources. Different camps wishing to dominate the legitimacy of the field start to compete against one another. Thus exclusion happens when fractions contend for legitimacy.

Let us now shift the emphasis from pure science to EJ. When discussing the EJ movement, the subject is undoubtedly the movement rather than science/scientists. When campaigning for EJ, activists regularly claim the evidence they provide is “true” or based entirely on fact. That is, this evidence is validated by scientists rather than being biased information provided by other lay-actors. By so doing, people may come to believe that the movement is authorized by science. However, as discussed above, scientists, as the providers of “fact”, may not always offer unconditional or sufficient support for the movement. Scientists may sometimes lack the ability or expertise to answer questions to which they, or activists, wish to have an answer; at other times they may know less than the public might wish (Shrader-Frechette 2002; Yearley 2005: Ch8). Worse still, instead of providing support, science/scientists may do exactly the opposite and undermine the movement’s campaigns. When that happens,

activists may decide to exclude scientific input, especially once the authority of the movement has been established.

When applying boundary-work to EJ, two things should be noted. First, it is important to observe two kinds of boundaries: one arising *within* EJ science, the other arising *between* EJ science and the EJ movement. Second, the process of exclusion in Gieryn's concept (1983) is much like that found in a zero-sum game. In the case of phrenology and anatomy, when phrenology lost there was "left no room for it within" (p. 789). However, in the EJ case, because the major actor is the movement, excluded scientific actors may not always lose their reputations or authorities in the movement so long as these scientific actors continue to support the movement. Actually, once the "hard" or pure scientists stop providing facts supportive of the movement, those excluded, or "soft" science, may regain some power and authority from the movement, because the excluded are repetitively quoted as "facts" by the EJ campaigns.

### **3. Boundaries within the EJ Science**

#### **3.1 First Wave: Outcome-oriented researchers helped EJ gain its political impetus<sup>i</sup>**

Most commentators (McGurty 2000; Melosi 2000; Brulle & Pellow 2006; Ringquist 2006) agree that the Warren case marks the beginning of EJ. In 1982, residents from Warren County, N.C. and adjoining counties were protesting against the site of polychlorinated biphenyls (PCB) facility. As Warren County was the poorest and "blackest", many of the protesters were convinced that the operators of the PCB site had deliberately chosen to take advantage of this tiny powerless community. Thus, the landfill was considered to be a violation of residents' civil rights and a threat to public health and environmental quality.

While the Warren County protest failed to halt the facility's establishment, it raised awareness of EJ issues across the United States. At the suggestion of Congressman Walter E. Fauntroy, the US General Accounting Office (US GAO) (1983) conducted a study to determine the relationship between commercial hazardous waste treatment, storage and disposal facilities (TSDFs) and the demographic characteristics of their surrounding areas. In that research, the US GAO selected four large hazardous offsite landfill sites in south-eastern states and collected the racial and ethnic data. Their research showed that, in three of the four chosen samples, blacks made up the majority of the population. Additionally, in all these four communities at least 26% of the populations adjoining the sites lived below the poverty line, and most of this population was black (p.1). The US GAO report evidently revealed a correlation

between waste sites, race and income.

Since the mid-1980s, quantitative research was conducted on a national scope in the States. The researchers asked, “Are some groups disproportionately exposed to toxic wastes?” (Weinberg 1998; Williams 2005) The United Church of Christ’s Commission on Racial Justice (UCC) (1983) is usually considered the benchmark study of the time. The UCC study examined the locations of 415 operating, and 18,164 closed commercial hazardous waste facilities across the country (pp.9-12). This study revealed strong racial and ethnic biases in exposure to toxic wastes on the national level, and concluded that race played a more significant role in deciding the location of the hazardous waste sites than did class (p. xiii; see also Lee 1995).

After UCC’s study, other quantitative studies<sup>ii</sup> began to focus on different scales of analysis, such as cities or states. However, almost all of the literature revealed that minorities and the poor were more likely to be exposed to environmental risks than were white and well-off persons. Although literature showed that not only communities of color but also low income groups are disproportionately bearing the brunt of exposure to toxins, activists and experts in the first wave of EJ chose to focus on race, rather than income, in their campaigns (Williams 2005). Pulido (1996) described the framing of the campaigns as a “racializing environmental hazards” (p. 144; see also Yamamoto and Luman 2001).

A crucial figure helping to shape the racial dimensions of EJ was sociologist Robert Bullard. In 1979, Bullard conducted a study on the spatial location of municipal landfills in Houston, Texas with the purpose of offering data for a lawsuit that his wife was arguing. This research confirmed that black and Hispanic residents were most likely to be found in areas surrounding waste facilities. He then wrote a series of articles (1990;1994;1994a;1994b) and his widely cited book, *Dumping in Dixie* (1990). His research documented that these environmental disparities occurred not only in Houston, but across the US as a whole.

In sum, scientists and scientific evidence in general were seen as offering EJ unwavering support during this period. The scientific community not only provided evidence, but also helped the movement to expand. Even today, the EJ studies described above, especially the UCC and *Dumping in Dixie*, remain influential and are cited widely as providing scientific evidence of discrimination in most EJ campaigns. In this wave, there was no obvious boundary set for EJ science.

### **3.2 Second Wave: The Process-oriented researchers attempted to win a share of authority**

The first wave of research did not go unchallenged. The most famous challenge came from a series of Been's studies (for example, Been, 1994; 1995; see also Been & Gupta, 1997), which refuted many claims regarding the correlation between race and exposure. Been singled out Bullard's work and argued that some sites Bullard referred to could be traced back to 1920, and that others ceased operations during the 1970s. Not only that, according to Been, Bullard also double-counted several sites and provided no description of how the neighborhoods surrounding the sites were defined. Been asserted that after excluding such errors, only ten of the 25 sites Bullard identified validly remained within the set (Been, 1994, pp.1400-1406).

In addition to criticizing Bullard's work, Been set up a new process-oriented approach to establishing claims of environmental injustice (Williams 2005). After examining migration patterns, she concluded that the outcomes of injustice might result from low housing prices rather than overt discrimination. In other words, from a historical point of view, people of color voluntarily moved "into" these polluted areas because property values there were much lower than other places. She described the phenomenon of voluntary immigration as "coming to the nuisance" (Been & Gupta, 1997). Before black people moved in, she argued, those communities had been mainly white and economically diverse.

Been's arguments implied that present day risks from those sites may be distributed unevenly, but the process of siting decisions was not discriminatory. Unsurprisingly, Bullard contested Been's findings and her reasoning:

The historical record is clear, Black Houstonians did not follow the garbage dumps and incinerators---the waste facilities moved into Houston's African-American neighborhoods of Fourth Ward/Freedmen's Town.... The racial character of these neighbourhoods was established *before* the waste facilities were sited (Bullard, 1994b, p.1040) (*italics in the original*).

After Been's study, debates arose and scientists (for instance, Zimmerman 1994; Kevin 1997; Lambert and Boerner 1997; Maher 1998) began to question the scope and the causal mechanism of environmental inequity. Concisely, this process-oriented approach stressed that unequal burdens experienced by one group might be caused by prejudice or market forces. If the disproportionate distribution results from intentionally prejudiced behavior in political processes when the locations of the sites

were decided, that is unjust in any sense. Conversely, if the injustice is caused by socio-economic dynamics or “neutral” market powers, then it is hard to determine whether there was any discrimination by observing only the consequences of inequity. Researchers interested in this line of inquiry required a radical shift in methodological approach (Weinberg 1998); the central claim of EJ, they argue, should be about the causality of exposure, not the fact of exposure.

Overall, in this period, EJ has become a part of the mainstream environmental movements and EJ science occupied a position of authority within the movement. Yet, after achieving that authority, the next wave of researchers attempted to monopolize resources by questioning the credibility of rivals, mainly first-wave researchers. In this second-wave, advocates of the process-oriented approach argued that without analyzing the history of specific sites, researchers could never know whether the fact of exposure resulted from discrimination. Thus, these challengers called for a radical change in methodology. By shifting the content of EJ, a boundary was established between first- and second-wave research. Although these challengers enjoy partial control of resources, they have never completely excluded first-wave researchers, because the EJ movement is dependent on their evidence to demonstrate that their claims of discriminating exposure are correct.

### **3.3 Third Wave: The Decision-making approach sets boundaries for exclusion**

From 2000 until now, a burgeoning “decision-making” approach has been advocated by William Bowen (2001; 2002; Bowen, Atlas and Lee, 2009). By asking “what is appropriate empirical evidence which can be used in decision-making process”, the conclusions of what we might call the third wave of EJ research come to stand in contrast to those of the previous two waves of research ( see also Foreman Jr 1998; 2000; Ringquist 2005).

Bowen (2002) reviewed forty-two empirical research projects spanning three decades. On the basis of how well they meet “reasonable scientific standards”, he categorized these studies as being of poor, medium, and high quality, and then argued that only high-quality research should be considered by policy-makers. After evaluating all forty-two articles, he pessimistically concluded that contrary to prevailing opinion in the EJ movement, there were no clear statistically significant nationwide patterns of racial or ethnic discrimination in the location of hazardous sites (p.3). He stressed:

If any such pattern can be discerned, and this is questionable, it appears to be that hazardous sites are located in the white working-class neighborhoods

with residents heavily concentrated in industrial occupations, living in somewhat less expensive than average homes. (Bowen, 2002, p. 11)

To some extent, he agrees that high-quality research indicated the possible presence of patterns at a sub-national level. However, he insists still that politicians should *not* take action. That is, because the empirical foundations of EJ remain underdeveloped, little can be said with scientific authority. Bowen warned decision-makers not to ignore the high levels of uncertainty regarding the existence of geographical patterns and the health impacts of such sites on minority, low-income, and other disadvantaged communities (p.11).

In order to build a scientifically more acceptable empirical foundation for decision-making, Bowen appeals for more empirical studies to be done. Nonetheless, according to his definition, a scientific study can only be a quantitative one. Theoretical research, including case studies, anecdotes and so on, is neither “empirical” nor scientific. To him, theoretical studies cannot reach a “scientific basis”, because they are inadequate for inferring the existence of patterns of disproportionate distribution. He concludes that qualitative description simply cannot “meet reasonable scientific standards”, and therefore such research should never be relied upon by decision-makers.

It is a mistake to claim that the scientific view is all that matters when dealing with EJ issues, but it would be equally wrong, Bowen stressed, to present theoretical or even ethical problems in the guise of scientific arguments (p.13). According to Bowen, when assessing the patterns of the distribution of environmental hazards, researchers should be concerned only with “scientific arguments”. Clearly, theoretical studies are entirely excluded from his definition of scientific knowledge.

Clearly, two boundaries were established from third wave arguments. The first was drawn to exclude previous research results by arguing that the quality of previous waves of research does not reach reasonable scientific standards. As we can see, Bowen acted in exactly the same manner as anatomists of the early 19<sup>th</sup>-century. He described the UCC case as a “gray” study, because the UCC study was published by a “church” (Bowen, 2002, p.6). For him, without proper peer review, scientific validity can never be ascertained. UCC was accused of relying on “popular opinion” to validate its theory while ignoring the opinion of true/real scientists. This accusation was much the same as that those earlier anatomists had made.

In addition, when UCC was labeled as “amateur”, and defined as outsider work, other researchers, mainly those of the first and second waves, faced a difficult situation similar to that of UCC. In order to discredit its scientific legitimacy, the third-wave brigade emphasized the relationship between politics and research in the previous two waves. Bowen (2002) accused researchers from the former waves of being far more oriented towards the advocacy of political ideals than toward “scientific integrity” (p. 5). It is true that Bowen did not condemn his competitors in terms as strong as “pseudo”, “junk”, or “trash”, as was done in the past, yet the effect was the same: In his research, almost all cited research from the former waves is characterized as being of “medium” or even “poor” quality (p.3).

The second boundary was set between statistical/empirical science and theoretical research. Theoretical research simply cannot reveal any geographic pattern of disproportionate distribution, meaning that this kind of research, according to Bowen, contributed nothing to scientific knowledge about the relationship between hazardous site location and socioeconomic variables. He went on to argue that while agreeing that there are other perspectives that matter, these should not be discussed under the rubric of “scientific arguments” and succeeded in excluding theoretical research from science. However, as a consequence of his success decision-makers obtained good reasons to ignore EJ claims wholesale. In response, the EJ movement has begun to exclude so-called “scientific” evidence from its claims.

### **3.4 Section Conclusion: How much support can be provided by EJ Science?**

The relationship between science and EJ movement can be affected by not only how boundaries were set within EJ science, but also how much support can be provided by EJ science. In this section I have investigated the scientific evidence and its support for the EJ movement by observing the scope and content of scientific evidence. Broadly speaking, both race and income were statistically significant on the national scale in the first wave. However, while race and income remain important, no nationwide evidence can be found for a correlation in the second wave. Also, researchers of this wave argued that people should focus on mechanisms in discrimination, rather than the fact of exposure. Finally, race was totally excluded from consideration of third-wave EJ research. In this wave, researchers still considered that the correlation of income could be found on a small scale. Yet, because of the immaturity of empirical EJ research, none of it should be taken into consideration in policy decision-making processes. In sum, the evidence that can be adopted to support the EJ movement has grown less and less.

#### **4. Boundaries between science and the EJ movement**

In this part, I focus on how science was used to help the EJ movement expand; how local knowledge was used in the competition for legitimacy with third wave researchers; how EJ activists used theoretical research to excluded science itself.

##### **4.1 The “Expansion” of the Movement**

Despite examples such as the Warren County case, the initial prospects for a coalition between the environmental and social movements are unpromising. In fact, in the history of the environmental movement, environmental groups have tended to keep their movements separate from general social movements. Environmentalists feared that any alliance would dilute their main goals and further impair their ability to attract new members (Binder, 1999; Melosi, 2000; Ringquist, 2006).

In order to acquire resources, EJ activists have to shift the emphasis of mainstream groups. Their arguments focus on two things. First, it is important, they argue, to examine the ways in which humans destroy the environment as mainstream groups have done. However, it is equally, if not more, important to understand the ways in which a polluted environment destroys people, and they assert, people of color were the greatest victims of environmental mistreatment (Bullard, 1990; Lee, 1995; Taylor, 2000; 2002). If mainstream groups kept blocking black people from joining the environmental movement, it only reflected the biases of well-off whites. The best strategy to accentuate an issue is to demonstrate the gravity of EJ. In order to prove the existence of uneven exposure to toxins, research previously mentioned was conducted. After scientists repeatedly demonstrated the fact of exposure, and after the evidence was widely cited, activists started to argue that scientific authority has confirmed the seriousness of environmental injustice.

A second obstacle EJ faced was the argument that the poor, and minority groups were not as interested in environmental issues as whites. Still, activists needed scientific evidence to show that the poor, or people of color, were no less concerned about environmental protection than the general/white population. Public opinion polls and statistical research was again used as evidence. Finally, EJ was accepted by the mainstream (Taylor, 1989; 1992; Ringquist, 2006).

With the aim of expansion, scientific knowledge was used to present the seriousness of uneven exposure. EJ movement succeeded in joining the mainstream environmental movement. Today, most environmental groups have been involved in the EJ movement.

## 4.2 Competing for the power to shape EJ

Although EJ movement cannot escape from appealing to science for corroboration of its basic claims, excessive dependence is an undesirable strategy. For one thing, the movement may hand over an enormous amount of control to scientists. For another, it is now quite clear that, as noted before, scientists are able to provide less and less support to the EJ movement. There is no doubt that the EJ movement cannot achieve its goals by depending on scientific knowledge alone, another kind of knowledge or “science” must be found to achieve the movement’s goals.

Because EJ emphasizes the importance of proximity, local knowledge becomes a possible recourse. Local knowledge is based on lived experiences, common knowledge, and the understanding of people in affected communities. All of these features in local knowledge are shared with the EJ movement, thanks to the common values of ordinary people and recognition of communities also being pursued by EJ. Tesh and Williams (1996; see also Binder, 1999) described it as identity politics, which is especially useful in analyzing the EJ movement. When the grassroots EJ groups were founded, their goal was the invention of collective identities. All victims of environmental injustice have had experience being exposed to toxins and ignored by those in the mainstream (Binder, 1999). Once these identities were established, campaigners start to use collective identities to fight environmental injustice and “anti”-EJ criticism.

Before offering further analysis, it is necessary to observe the effect of identity politics from a knowledge perspective. In the beginning, activists relied on scientific knowledge to reveal the fact of exposure and thereby form a collective identity as victims of toxic waste sites. At the same time, the importance of victims’ personal knowledge or common sense was also stressed. This process shaped identities and provided the EJ movement with the ability to fight possible criticisms from second or third wave researchers. By emphasizing peoples’ experiential knowledge, activists obtain a powerful weapon—local knowledge—to fight for the authority to construe what is EJ. Activists argue “experts cannot solve your problems”. It is ordinary people, not scientists, not elites, who know their communities best:

No one knows more about a community and its situation than the people directly affected....Trust your instincts; rarely will you go wrong if you follow what you know in your heart to be true and right (Tesh and Williams, 1996:295).

The messages, “I live here so I know what is going on” and “I have common sense” (Tesh and Williams, 1996 p.297), are repeated and strengthened throughout the EJ movement. No matter what scientists say, when you live near the pollutants, you can “see” incidents of disease among your neighbors, and this is the most obvious evidence demonstrating that pollution caused the health problems (but can we really “see” diseases? cf. MacGregor et al. 1999; 2002; Corburn, 2002; 2003).

Perhaps the most crucial political achievement of local knowledge campaigning was realized in 1994 during the period of the Symposium on Health Research and Needs to Ensure Environmental Justice<sup>iii</sup>. As the EPA was one of the conference’s sponsors, the organizers arranged a speech for the EPA chief at the session. When the time came, the chief however did not deliver the speech but asked the audience to share their local experience. The message transmitted from the conference was very clear: although there were many scientists and authorities attended the meeting, it was local knowledge, rather than scientific knowledge, that was best able to solve local problems (Tesh, 1993; Tesh and Williams, 1996). For this reason, local voices should be heard and local knowledge, respected.

Although activists did not define local knowledge, we can observe its “contrast case”, science/scientific knowledge, in order to grasp a rough image of local knowledge. As scientific knowledge was described as “elitist”, “heartless”, and is “useless” in dealing with local problems, the image of local knowledge should be exactly opposite of the description of scientific knowledge: That is, “populist”, “heartful”, and “useful” in tackling local issues.

Local knowledge gradually overwhelms scientific knowledge by setting a rhetorical boundary between them. After the 1994 conference, identity politics successfully grabbed the power in interpreting what EJ is. Although challenges from the second wave of EJ research was roughly coming in the same year, activists could simply ignore those critics by arguing that local knowledge should outweigh scientific knowledge in the EJ movement.

#### **4.3 Kicking “Science” out: An UK case**

As third wave researchers have argued, theoretical research is unscientific because it cannot really explain spatial patterns in the distribution of environmental hazards. However, these theoretical researches were widely cited and most of the time viewed as “scientific”. In this part of the article, I concentrate on how theoretical research

helped shape EJ and exclude science from the movement. Two UK studies will be discussed.

The basic characteristics of EJ movements in the UK, compared to the US, are that there the EJ movements are relatively new, and scientific research has rarely been done (ESRC, 2001; Agyeman, 2002; Agyeman et al. 2003; Agyeman & Evans, 2004; Bulkeley & Walker, 2005). In spite of a lack of statistical evidence, there is more theoretical research conducted in the UK, with Burningham and Thrush's study (2001) being one of the most cited ones. In their research, focus groups were studied in four chosen low-income locales. They found that low-income people's environmental concerns focused on the impacts of local problems on health and well-being. At a local level, pollution may not be the greatest concerns; instead, some "minor" problems, such as dog-fouling and litter, received more attention. At first glance, these minor problems hardly seem to belong in the "environment" category. After discussion however, a broad definition emerged that included various aspects of "the surroundings". Local concerns were then discussed as local "environmental" problems. Burningham and Thrush concluded that placing local environmental issues within a broader scope of a justice and equality agenda could help mobilize disadvantaged communities; however, as the local's pride is often high, the language of EJ, which could easily link to "poor people" and "poor environment", should be avoided in the UK.

In Burningham and Thrush's case study, it is very clear that theorists tried to join in the work of shaping EJ concepts by changing the definition and vocabularies of EJ. In order to promote EJ movement in the UK, minor problems should be added. However, the problem of this reconstructed definition is obvious. Although dog-fouling and litter is disgusting and annoying, does disproportionate distribution exist in these issues? Or, can we suppose that dogs or their owners are deliberately "targeting" these communities? By campaigning for an EJ movement without the slogan of EJ, the problem of how to put minor issues into EJ framework is diluted in the UK context.

Just like the case of identity politics where activists used local knowledge to fight criticism from the second and third scientists, the lack of scientific evidence on EJ in the UK can also be offset by campaigning issues that people do care. Even the most critical third-wave scientists, such as Bowen, will agree that government should respond to those issues that people care, whether scientific evidence can be found or not.

The other theoretical research was conducted by Todd and Zografos (2005) in Scotland, and provided a useful indicator to explore how activists and experts weigh EJ's most important elements, distributive and procedural justice stressed by some theoretical researchers (Schlosberg, 1999; Dobson, 1998; Holifield, 2001). Interestingly, there was a distinct difference between activists and experts. Activists weigh procedural justice more than distributive justice; the majority of "experts" favored distributive justice. Todd and Zografos (2005) explained that because the experts are usually working in "decision-making" roles, activists are more apt to ensure that voices of community members are heard in decision-making systems. A statement by activists was cited: "Participation and being listened to is more important than measuring pollution" (p. 497).

In this case, theoretical research provided a way to escape the potential criticism of a lack of scientific evidence. Although a more comprehensive statistical survey would not have been published until 2005 (SNIFFER, 2005), EJ became an aim of the Scottish government by, at least, the year 2000, because of the national campaign of FoE Scotland (Friends of the Earth Scotland) (Dunion, 2003; Scottish Executive, 2005; Friends of the Earth Scotland, 2006).

Without providing scientific evidence to show that an uneven distribution does occur in Scotland, FoE Scotland's main claim is that the voices from communities should be heard in decision-making system irregardless of outcomes. So, local control over industrial practices was viewed as the most important indicator. Now, communities not only should be heard, their experience should be constantly reflected if a potentially-polluting development is approved. Obviously, theoretical researchers helped change the focus of EJ concepts and weaken the importance of scientific evidence once again.

## **5. Discussion: Treating EJ as a moving horizon**

Using detailed historical exposition, this article seeks to demonstrate the process that leads to the construction of EJ. That is, it investigates the concept of EJ by tracing its origins, the process of its demarcation and re-demarcation, and its adoption in the UK. My main argument is that EJ is *not* a clearly understood, generic class of symptoms; rather, it is a dynamic condensation of boundary-works. Concisely, people commonly refer to a phenomenon called "environmental (in)justice" as if it is something presenting itself readily for observation, description and analysis; yet, no such phenomenon exists. In fact, EJ is gradually becoming constructed through the very process of push and pull between EJ activists and its challengers, i.e. boundary-works.

Seen from this angle, it is clear that the history of EJ is also a history of controversies, within EJ and between EJ and other fields of inquiry.

If my analysis above is correct, then we have every reason to expect that these controversies will not, and cannot, be solved by way of standardizing methods of reasoned discourse, because the claims and counterclaims by different waves are in fact acts in defense of their ways of life. For this reason, trying to make EJ “clearer” for its critics and opponents is never the answer. As one could easily imagine, people from different waves will make every effort to defend a certain thought of EJ. In a word, if EJ is the very process of boundary-works, then clarification will *not* put an end to the misunderstandings, misinterpretations, and mistranslations.

Boundary-work approach discloses new opportunities for the making of EJ in terms of identity, difference, science, and society. It suggests that although treating EJ as a static phenomenon is tempting, one could never reach a just society through such a one-dimensional way. After all, our society is in no way static, but dynamic. Seeing things this way, EJ loses the static connotations that it tends to have when conceived solely as a regime, and shows that it is itself a moving horizon. To say that EJ is a moving horizon is not to undermine EJ, but to recognize that the concept of EJ can be categorized or explained differently. Our research, I believe, could become much more meaningful if we could see the variety of EJ.

## **6. Conclusion: Is EJ a pure scientific issue?**

In this article, I have applied Gieryn’s boundary-work concepts, “expansion” and “exclusion”, in observing the EJ scientific research. I found similar phenomena to those noted in Gieryn’s case studies. Characteristics attributed to EJ vary widely depending upon the particular goals of actors and the boundary-work carried out for these purposes. Just as Gieryn suggested of “science”, we can say that EJ is neither a singular nor a unified enterprise.

Given that the evidence for environmental science is growing more obscure, the question arises, “How much evidence is needed before taking action?” To some, especially the third wave brigade, actions can only be taken once a scientific consensus has been reached. The problem is, as we have seen, scientists may never achieve such a consensus. If that is the case, then the question will be: should we continue to wait and do nothing?

The answer largely depends on how far we care about minorities' health and the economical inequity within our society. Clearly, this is not a pure scientific issue so that it cannot be answered through science alone. For this reason, people should *not* expect science or scientists to find an answer for us. In this light, public participation in the field of EJ research/science and movement may be the only way to achieve the so-called "consensus".

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## Footnotes

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i Instead of using a chronological approach, I adopt the idea of classifying the EJ history into three waves. Literature is categorized on the basis of its similarities in terms of scales of analysis, statistical methodologies, or most importantly their common focus. Some scholars also use “waves” to categorize EJ studies. In most first and second wave cases, my classification is approximately the same as theirs.

However, the classification in the third wave is largely different. Regarding how scholars use the concept of waves, see: Lester et al. (2001) and Williams (2005).

ii A great summary could be found in (Bullard, Mohai, Saha, & Wright, 2007).

iii Program of this symposium can be found in EPA's National Service Center for Environmental Publications (NSCEP) website: <http://www.epa.gov/nscep/index.html>.

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