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Environmental Justice and Street Science:  
A Fusion of Community Knowledge and Environmental Health Justice to  
Address the Asthma Epidemic in Urban Communities

By Natalie Robiou

Environmental Tutorial  
Professor John Van Buren  
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Of all the proposed moral environmental theories, none has addressed the problems that plague the urban environment and its habitants quite like the environmental justice theory. Based on the idea that environmental issues are also Civil Rights issues, environmental justice seeks to establish just and equal distribution of environmental benefits and burdens across a whole spectrum of racial and socio-economic groups<sup>10</sup>. The Environmental Protection (EPA) has defined the theory as the “fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies<sup>7</sup>.” With the continued development of the environmental justice movement came outgrowths of various frameworks which urban communities implemented to try and resolve their own local environmental problems. One particular subdivision, termed *street science*, took shape in a local Brooklyn area when members of the community decided to incorporate their local community knowledge with professional knowledge to help improve scientific inquiry and environmental health decision making. *Street science* is an excellent example of active citizens incorporating the principles and values of environmental justice.

This paper will thoroughly discuss exactly how this unique combination of environmental justice and *street science* could be applied to resolve the issue of the increasing rate of asthma in urban settings. Specific examples from Jason Corburn’s book, “Street Science” will be drawn upon to show exactly how the Greenpoint/Williamsburg community in Brooklyn implemented *street science* in their community and attempted to minimize the environmental health risks associated with their local area.

When most people talk about environmental problems they are usually referring to damage to the surrounding physical environment, mostly caused by humans, either directly or

indirectly. Most environment problems are the result of the increasing amount of urbanization taking place across the country. These problems usually manifest themselves into harmful consequences that jeopardize the welfare of humans and ecosystems, currently or in the future. Most scientific experts would agree that these urban environmental problems reveal themselves in the following cases: localized environmental health problems, air pollution, inadequate waste management and pollution of water systems, ecological disruption and resource depletion, emissions of acid products and greenhouse gases. In addition, combinations of many of these issues have been known to lead to local climate and soil changes<sup>1</sup>. For most populations and communities, these environmentally and biologically relevant effects of urbanization can lead to alterations in certain characteristics of the organisms themselves and their responses to the outside environment, such as the following: assimilation rates, biological cycles, disturbance regimes, reproductive rates, succession rates and direction, survival rates, growth rates, and social and behavioral responses<sup>1</sup>.

One of the most pressing environmental health issues facing low-income communities in the United States is the increasing rate of asthma found in urban centers. Asthma is defined as

“a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role, in particular, mast cells, eosinophils, T lymphocytes, macrophages, neutrophils, and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness, and coughing...<sup>5</sup>” Exposure to allergens or irritants has led to a dramatic increase in the number of asthma cases of children and the elderly, in particular. Living in dilapidated substandard housing often constitutes excess exposure to indoor allergens and outdoor pollutants. Allergens associated with dust mites,

cockroaches, and crumbling building structures are probably important in both triggering and worsening asthma symptoms for children and the elderly who are chronically exposed to these agents<sup>4</sup>. In addition, high trafficking in urban areas from vehicular emissions is causing adverse respiratory health effects throughout urban communities.

Recent findings from various studies are beginning to raise questions about the current air quality standards in these urban centers. Using Geographic Information Science, Jason Corburn, author of “Street Science,” and his research team were able to “identify neighborhoods with elevated concentrations of childhood asthma hospitalizations between 1997 and 2000 in US census tracts, analyze the sociodemographic, housing characteristics, and air pollution burdens from stationary, land use and mobile sources in these areas<sup>3</sup>.” His research was critical in distinguishing the specific and often different combinations of poor housing conditions, outdoor air pollution, and toxic land that is characteristic of improvised urban communities. He was able to show that they are all factors that contribute to the high incidence of asthma in these areas. With the new developments gathered from scientific research, such as Corburn’s, many are beginning to suggest that part of the overall asthma management for populations living in inner cities may need to include efforts to reduce exposure to indoor and outdoor air pollutants, not just medical treatment of the patients themselves. Surprisingly, one particular scientific study actually showed that indoor pollutants are more closely linked to increased asthma prevalence and morbidity than outdoor ambient pollutants<sup>4</sup>. They were able to show this because even though ambient pollutants have been declining in US cities, asthma morbidity and mortality rates are continuing to increase. Another research team at Harvard Medical School conducted an even more in depth study which included a look at differences in “hygiene factors,” such as family size, use of

day care, early-life respiratory infection exposures, microbial colonization of the infant bowel, exposure to parasites, exposure to large domestic animal sources of allergen, diet, and cigarette smoking<sup>5</sup>. Their data highlighted the socioeconomic and ethnic disparities in asthma prevalence and morbidity in the United States and discussed the major environmental factors that contributed to the disparities in urban settings. To resolve the specific environmental problem of asthma in urban settings, environmental justice and “street science” can be implemented. When applied properly, these two methods can formulate solid plans of action that any urban resident could use to alleviate the chronic asthma problems that continuously plague their community.

Environmental justice is relatively new compared to other moral environmental theories. Its ideas are contemporary in contrast to other more traditional environmental theories that no longer seem to function as effectively in today’s modern society. The movement, itself, only began taking shape in the early 1980s. The exact history of the movement is not fully known either. Robert Bullard and Hazel Johnson are said to be the first pioneers of the movement, while others believe it started during a struggle over the establishment of a landfill in a predominantly African American community in North Carolina<sup>9</sup>. Most, however, would agree that environmental justice was a direct outgrowth of the Civil Rights movement. People began to see that there was an unfair distribution of environmental burdens, such as denial of green space, poor air quality, and high density of waste disposal areas in marginalized communities<sup>8</sup>. Environmental policies were neglecting their moral responsibilities to urban areas across the country. To try and reconcile these injustices, environmental activists, along with active members of these communities joined forces and helped to establish the fundamental environmental justice principles used to this

day. So, whatever the foundation of the environmental movement itself, its impact has been felt through out urban communities nationwide.

In order to apply an environmental theory to a particular environmental crisis, it is critical that one has a firm understanding of the basics so he/she can properly use it as a proper “weighing mechanism.” The theory of environmental justice is based on the traditional view that all human beings are born with and possess dignity, reason, and certain inalienable rights. For example, for some this may included their religious beliefs that all human beings are created in the image of God and are loved by God<sup>8</sup>. As previously stated, this theory calls for just and equitable distribution of environmental benefits and burdens across race, ethnicity, and social class. However, it tends to pay special attention to the protection of certain vulnerable groups, such as the poor, minorities, developing countries, the unborn, and future generations, who typically share most of the environmental burdens. The criterion of moral standing for this theory is simply reason. The moral community is designated as all rational human beings and resources as everything non-rational or non-human.

The fundamental principles of the environmental justice theory can in turn be used to develop certain values and guidelines which can extend into one’s own personal life. Ttraditional values of Civil Rights, such as right to life, liberty, freedom of thought and speech, pursuit of happiness, decent standard living, and access to health care, are also values set forth by the environmental justice theory. These values clearly show where the two movements overlap and how they strive towards the same common goal. Certain universal and inalienable environmental rights and responsibilities are of value as well. Every individual has the right to a clean and healthy natural environment, right to green space, right

to enjoy pristine nature, and right to enjoy nature-related activities<sup>10</sup>. Environmental policy-making is crucial to the success of environmental justice. This theory calls for non-“environmentally racist” policies and just practices regarding urban waste management, such as the location of industrial sites, garbage dumps, toxic waste dumps, factory farms; commercial and residential suburban development (“urban sprawl”). The “Not In My Back Yard” movement, is an example of environmental activism, in which community members began to confront and put a stop to environmental health hazards, particularly those in their own backyards<sup>8</sup>.

The urban based environmental justice movement has made criticisms about traditional environmentalism, such as Aldo Leopold’s “Land Ethic”, saying that it is much too focused on the importance of the rural wilderness, which is out of touch with most people in today’s society. The book entitled “Environmental Justice and Environmentalism: The Social Justice Challenge to the Environmental Movement” draws exactly on this point<sup>6</sup>. In a society as urbanized as today, many people often find it very difficult, if not impossible, to apply traditional environmentalism to address the issue of urbanization. Environmental justice advocates would argue that environmental disparities in urban areas could not be resolved through traditional environmentalism which exemplifies a much more conventional white, male, elitist type of environmental philosophy, which are all qualities most urban communities cannot identify themselves with.

Many communities, particularly disadvantaged groups seeking environmental justice, are increasingly rejecting the idea that professional scientists should be left alone to define, analyze, and prescribe solutions for the environmental health hazards urban areas face. Instead, these groups are demanding meaningful participation in assessments, decisions, and



pragmatic action to improve community health. It is this incorporation of the local knowledge obtained from active citizens that makes *street science* such a unique subset of environmental justice. The concerned lay public is demanding a greater role in researching, describing, and prescribing solutions for the hazards they face. Professionals are slowing, but surely, accepting the idea that lay people experience how science impacts their everyday lives; and therefore, are in a better position to make certain judgments concerning their own community. By speaking up for themselves, they are in effect putting pressure on environmental and public-health decision makers to find new ways of fusing the expertise of professional practitioners and scientists with the “contextual intelligence” that only local residents could possess. Another important feature of *street science* is the attention it pays to the meanings people attach to their experiences living in polluted neighborhoods and with persistent disease burdens and how these experiences shape social action. This further helps experts understand the inequalities in environmental-health burdens<sup>2</sup>.

One of the essential components of *street science* is local knowledge, such as narratives, scripts, images, and practices. Narratives are ways in which people often give meaning to their experiences and events; it is their way of describing the world they live in. Storytelling is the method by which community members pass on, express, make sense of, and understand the relationships between life experiences and the health of their community<sup>3</sup>. It is important to note that “health” is not just the absence of disease, but the conditions and capabilities—material, physical, social, and biological—that enable populations to make smart, healthy lifestyle choices, in order to avoid disease, and prolong life. So in these urban communities the well-being of many individuals is of the poorest quality, not just physically, but mentally as well. These inequalities in environmental health, morbidity, and mortality

result from a combination of poverty, discrimination, political disenfranchisement, environmental exposures, and biological agents<sup>3</sup>.

Risk assessment is in direct conflict with environmental justice and *street science*. It is defined as “the process of identifying each hazard and its toxicity to humans, estimating an individual’s exposure to the hazard in a particular place, and extrapolating from this information an estimate of potential harm.<sup>2</sup>” Environmental justice criticizes the use of risk assessment because it sees the entire process as burdening to populations of people who were already disproportionately exposed. Environmental justice activists challenge risk assessment because it many times oversimplifies the hazards associated with certain urban areas where there may be multiple hazards from multiple sources. Activists also do not agree with descriptions of hazards being made in quantitative terms. One example is categorically arranging certain quantities or percentages of toxin in a certain area as being acceptable and unacceptable. These quantitative risk assessments do not take into consideration those individuals that vary in their susceptibility to certain diseases as a result of these various health hazards. Finally, risk assessment does not taken in account the synergistic effects certain health hazards can exhibit combined with one another.

The Greenpoint/Williamsburg (G/W) neighborhood located in Brooklyn is an excellent example of residents pulling together and applying “street science” to a variety of different environmental cases within their community. Despite the various hardships faced by its members, this community was able to band together and address the unjust environmental burdens being forced upon their community. Before discussing the how residents addressed the environmental injustices present in their G/W neighborhood, it is important to have some background information about the community. The G/W section is one of the most polluted

communities in New York City. 35.7% of its population lives below the poverty line and only 43.7% of adults over twenty-four years old have a high school diploma or higher education. The ethnically diverse neighborhood is approximately 42% Latino, 24% Hasidic Jew, 13% African-American, and 10% Polish and Slavic immigrant. This neighborhood also has the largest proportion of land (12%) devoted to industrial uses, the average for the rest of the City being 1.9%. The community houses a disproportionate number of polluting facilities, including a sewage treatment plant, thirty solid-waste transfer stations, a radioactive waste storage facility, seventeen petroleum and natural-gas storage facilities, ninety-six aboveground oil-storage tanks, and over thirty facilities that store extremely hazardous wastes. G/W ranks first out of all other community districts in NYC for housing the highest number of Toxic Release Inventory (TRI) facilities. Concentrating all these polluting facilities in this neighborhood has resulted in elevated levels of localized hazardous air pollutants (HAPs). If this were not bad enough, residents are exposed to heavy vehicular traffic and mobile-source pollution from the Brooklyn-Queens Expressway (BQE) and other roadways bisecting the community. Finally, only 3% of the community is shaded by trees, compared to the average of 11.4% tree cover for the rest of Brooklyn and 16.6% for all NYC neighborhoods<sup>2</sup>. However, through the combination of the environmental justice and street science, this community was able to gather important information about potential neighborhood hazards that other environmental agencies and scientists often overlooked to try and improve their overall quality of life. Residents were able to present professionals with valuable information which is often embedded in their cultural practices.

The NYC Department of Environmental Protection supported two neighborhood-health studies in the G/W area, focusing on rates of childhood lead poisoning, birth defects,

cancer, and asthma. Surprisingly, these studies did not find any significantly elevated prevalence of asthma within the community<sup>2</sup>. However, the asthma study was limited to hospitalized rates, which suggests that the results may not have been a true representation of the community. It is clear from this study that professionals did not take into consideration the fact that many residents may have not reported to hospitals for asthma treatment for numerous reasons, such as lack of medical insurance, no free time to take off work/school, and other personal reasons. Most health disparities in underprivileged areas, such as G/W, result from the fact that these communities can not readily access medical care for one reason or another. It was not until residents began to implement “street science” that studies began to take these particular circumstances into account and factor them into the research data being collected.

In response to the asthma problem in their community, a group of high school students conducted a science-class project to monitor air pollution and neighborhood health. The group caught the interest of the local community organization, El Puente, which decided to help take part in addressing the alarming rates of asthma in the area. With the assistance of El Puente and the non-profit organization Community Information and Epidemiological Technologies (CIET), students designed and performed health surveys, lead focus-group meetings to interpret survey findings, and provided basic health-maintenance information through door-to-door outreach to suffering residents<sup>3</sup>. Throughout their research, teams of community residents implemented a technique called “listening research.” In this technique, residents combined their research training with their own skills in observation, questioning, semistructured interviewing, and group discussions in order to gather data from the community. “Thematic investigation” is another technique in which the local data gathered

from community residents is discussed in group settings where it is analyzed by community members for its local relevance and its relation to the larger urban community<sup>2</sup>. The study lead to some surprising findings, such as the prevalence of asthma among older women, details into how locals view professional treatment of asthma, and the common use of cultural and religious-based home remedies for treating asthma. This local knowledge helped the community develop new ways to tackle the health problems. They began enrolling residents in free health insurance, educating doctors on the cultural medicinal practices of local residents to increase cultural competence, and developed asthma-management plans with those living with the disease<sup>2</sup>.

The local knowledge concerning asthma gathered by the G/W community ended up being published in the *American Journal of Public Health*, suggesting that the research caught the attention of professional scientists. Their work has also been acknowledged by the National Institute of Environmental Health Sciences, which ended up funding “The Williamsburg Brooklyn Asthma and Environment Consortium” that established El Puente as the principal investigator of a four-year community-based research with a local medical center and university<sup>2</sup>. Unfortunately, in this particular case, *street science* had less impact on policy-makers and never led to the passage of any city or statewide policies that might have targeted resources toward fighting the urban asthma epidemic<sup>2</sup>. One important factor that may have limited the political influence of El Puente is their efforts were not linked to a larger social movement. For example, they did not enter into a collaborative effort with other groups in New York City that were conducting similar asthma research. This isolation of research organizations is often a result of competition for funding. Nevertheless, the tremendous effort put forth by the G/W community did not go unnoticed by science

professionals. Gaining the recognition of scientific experts was a major step in the validation of *street science* as a legitimately functioning aspect of environmental justice. It is important to also realize that with the exception of this particular asthma case in the G/W, many other urban centers across the country that have implemented *street science* have been successful in influencing policy-making in their communities.

By combining the moral principles and values of environmental justice with the knowledge gained from *street science*, one could develop a number of solutions to the growing asthma epidemic in his/her local community. Since dilapidated buildings are a major factor in increasing asthma in most residents, city and state legislature could be passed that require the maintenance and up keep of all urban buildings. With the help of local hospitals, community leaders could organize clinics, specializing in asthma care, for those residents that lack adequate health insurance. Implementing a home-visiting service would also be helpful to those asthma patients who are unable to leave their homes because of personal or other medical conditions. Asthma awareness and education for people of all ages would enable community members to obtain the knowledge and tools to understand and cope better with the disease in their everyday life. Preventative medicine is another great way to alert residents to the hazards which may be lurking in their surrounding community and how they can avoid them or at least lower their exposure to them.

There are, however, some difficulties when it comes to the local knowledge gathered for use in *street science*. Insights into the particular communities being studied are often very contextual; residents have different experiences and outcomes to different environmental issues. In turn, this makes policymaking extremely tasking. Policymakers, who typically try to formulate general rules for communities, can end up oversimplifying or making unjustified

generalizations. Many times it is necessary to scale up local knowledge to more general policy because of the extreme diversity in ecosystems and human-environment linkages. So while using *all* the local contextual knowledge obtained through “street science” might be difficult to use as a single “weighing mechanism” in policymaking, it does help to improve environmental-health decisions by maintaining a heightened sensitivity to the different contextual situations within the community.

At its basics, *street science* is about pursuing environmental health justice; there are several ways in which it contributes to this pursuit. *Street science* helps professionals by identifying overlooked hazards, providing information that is often inaccessible to outsiders, improving access to difficult to reach community members (i.e. reluctant residents and non-English speakers), increasing understanding of the claims presented by community, and increasing trust and credibility. On the other hand, *street science* is helping communities by establishing community organizations that share their research observations. It also empowers residences through education, raised awareness, and self-help strategies. It has been known to improve decision-making within the community. Implementing local knowledge helps disadvantaged communities organize and educate themselves, as well as increases control over the decisions that impact their lives. Communities also benefit from the application of *street science* by shifting the environmental discourse from protest and refusal to engagement with problem solving<sup>2</sup>.

As the world becomes increasing more urbanized and environmental disparities continue to effect urban communities across the country, environmental justice will be the foremost environmental theory implemented to resolve urban environmental conflicts. It is with its combined effort with *street science* that urban centers will be able to finally have a

hand in reshaping and redefining their urban landscape. However, it is still important to remember that *street science* does not replace professional analyses, but rather supplements it. *Street science* is proof that residents with no prior scientific training not only can competently engage in scientific inquiry, but also have unique information about exposures to environmental hazards and the health outcomes associated with them. When active citizens participate in the scientific process and inject their own knowledge, and refocus certain investigations, outcomes, and actions, they are actively taking part in the process of seeking environmental justice.



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