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ENVIRONMENTAL JUSTICE EDUCATION: EMPOWERING STUDENTS TO BECOME ENVIRONMENTAL CITIZENS

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Abstract:

In this paper, I introduce environmental justice as an important component of social justice education. I argue that there is a need to integrate environmental justice education into the P-12 curriculum. While there is a need to include environmental justice education in all schools, the focus of this article is an emphasis on urban school environments due to the predominant instances of environmental injustice in urban settings. This article will review the history and important concepts of the environmental justice movement for the purpose of educating pre-service and in-service teachers. The power of the environmental justice movement lies in grassroots neighborhood organizations that have worked for change. Therefore, a focus of this work is empowering individuals in urban environments to build communities that stand for environmental justice. Teachers have a unique opportunity to empower children living within impacted neighborhoods to take a stand for justice. However, teachers also have a responsibility to educate children outside of urban areas to stand up for global environmental justice.

Introduction

The United States Environmental Protection Agency (2007) defines environmental justice as "fair treatment and meaningful involvement of all people regardless of race, color, national origin, culture, education, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (para. 1). Environment is understood to encompass "where we live, work play, worship, and go to school as well as the physical and natural world" (Bullard, 2005, p. 2). While traditional environmental education programs give "people a deeper understanding of the environment, inspiring them to take personal responsibility for its preservation and restoration" (Environmental Protection Agency, 2007b, para. 1), environmental justice education fosters a critical understanding of the environment within the context of human political and social actions.

This article outlines a brief history of environmental justice. I will explain the connection between environmental justice education and scientific literacy. Further, three issues of environmental justice facing urban youth will be addressed: access to healthy food and nutrition, the high rates of asthma and lead poisoning. The aim of this paper is to highlight the need to integrate environmental justice education into the Pre-Kindergarten through grade 12 curriculum, especially in urban school environments due to the predominant instances of environmental injustice in urban settings.

A Brief History of Environmental Justice

The environmental justice movement began with a focus on pollution and environmental hazards and their impact on humanity. The platform emerged in the 1960's with the Civil Rights movement. The first national study on environmental racism was published by the United Church of Christ's Commission for Racial Justice in 1987 titled: "Toxic Wastes and Race in the United States." The study provided data that matched waste facility sites to demographics demonstrating a strong pattern of environmental racism. Environmental racism "refers t o any policy, practice, or directive that differentially affects or disadvantages (whether intended or unintended) individuals, groups, or communities because of their race or color" (Bullard, 2005, p. 32).

For some time the focus in the field centered on the impact of environmental injustice on health in the United States (Bullard, 2005). However, with the strong presence of community-based grassroots change, environmental justice has broadened to include "benefits and amenities. For example, the themes of open space and waterfront access, environmental benefits that historically have been withheld from communities of color ..." (Bullard, 2005, p. xvi). In 2007, West Harlem will see the results of the transformation of 42 acres into a waterfront park. This resulted from a strong community-based planning process supported by the West Harlem Environmental Action, Inc. (WE ACT).

The First National People of Color Environmental Leadership Summit was held in October of 1991. The assembled group established The Seventeen Principles of Environmental Justice (see Figure 1) and introduced an important aspect of social justice to an international audience. These principles call people to "begin to build a national and international movement of all

peoples of color to fight the destruction and taking of our lands and communities, [and to] re-establish our spiritual interdependence to the sacredness of our Mother Earth ..." (First National People of Color Environmental Summit, 1991, para. 1). The Second National People of Color Environmental Leadership Summit was held in October of 2002 and focused on solidifying the points of 1991 as well as building structured connections between local, grassroots environmental justice community groups and larger mainstream organizations. This summit highlighted the fact that the environmental justice movement has grown through local community determination.

On February 11, 1994, President Clinton recognized the importance of environmental justice and issued an Executive Order to address injustice in minority and low-income populations. It states, "... each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations..." (Clinton, Executive Order 12898).

Environmental justice won international acclaim with the 2004 Nobel Peace Prize given to Wangari Maathai for founding Kenya's Green Belt Movement. Dr. Maathai was the first African woman and environmentalist to receive this honor. Upon hearing the news of the award, she noted that, "[i]t is evident that many wars are fought over resources which are now becoming increasingly scarce. If we conserved our resources better, fighting over them would not then occur ... so, protecting the global environment is directly related to securing peace ..." (Maathai, 2004, para. 1). Dr. Maathai's work celebrates the profound transformation that occurs when people are educated about the issues of environmental justice and organized to work for change.

Environmental Justice as Embodied Scientific Literacy

Educators have a unique role instilling a sense of environmental justice in their students. By empowering youth who live in areas of injustice, the seeds can be sown to develop strong communities of resistance and planning.

We have to educate young people that it is their right to have access to open space, green space, parks, outdoors, as opposed to people thinking that they're supposed to be living in an area where the only park is a basketball court with no net...and we have to provide funds to make sure that we get them early on and taken them on field trips, take them to a wilderness area, a refuge, a reserve, to a park – a real park and to integrate this information into our curriculum (Bullard, as quoted in Schweizer, 1999, para. 16).

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One objective in educating children in the school system should be to empower them to understand and exercise their own individual rights. Concepts of environmental justice must be incorporated into each curriculum and embedded into scientific literacy in the schools.

Scientific literacy is the "knowledge and understanding of scientific concepts and processes required for personal decisionmaking, participation in civic and cultural affairs, and economic productivity" (National Academy of Sciences, 2007, para. 14). As scientific literacy research evolves, there needs to be a focus on the living literacy of developing human beings (Neilsen, 1998). This approach requires researchers to investigate the lived literacies of individuals, including social context, to develop an effective pedagogy. Inherent in this notion is embodied literacy, a type of corporeal knowing that allows learners to integrate reading and writing in a profound way (Fleckenstein, 2003). Environmental justice education in urban schools must address the local issues of injustice that surround the school, and in many cases include the school building. By tapping into the living literacy of the students through experiential education, abstract notions of environmental justice become integrated into their lived experiences.

Perhaps the most influential way to encourage embodied literacy is to establish a nurturing environment that fosters democratic and socially just relationships between the school, family and surrounding community. These instrumental relationships form the foundation for a socially-just pedagogical model. While it is agreed that establishing this network of community is important, it is also necessary to address practical suggestions of how to accomplish this in a community setting. The history of the environmental justice movement demonstrates that community-based models that involve participatory action research (Shepard et. al., 2002; Hill, 2003) allow individuals to fully embody the living meaning of the complex concepts of environmental justice.

From the Seed to the Table: Organic Food as Embodied Literacy

There are several engaging models of environmental justice education programs that illustrate ways of engendering scientific

literacy and environmental empowerment. Two models that have emerged from the "organic foods" movement are: The Edible Schoolyard Project and The Urban Nutrition Initiative. The organic food business has grown into a \$15 billion industry in the United States. Organic food is defined by the United States Department of Agriculture as

food produced by farmers who emphasize the use of renewable resources and the conservation of soil and water to enhance environmental quality for future generations. Organic meat, poultry, eggs, and dairy products come from animals that are given no antibiotics or growth hormones. Organic food is produced without using most conventional pesticides; fertilizers made with synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation (2007, para. 1).

Throughout human agricultural history, food was always "organic" until the advent of modern agricultural techniques that incorporated artificial chemicals and intensive farming methods. The move to protect organic food through legal means began in the 1970s and was fueled by the concern of small local farms that wanted to protect their product from being exposed to toxic processes.

Access to organic food has largely been limited to farmer's markets and niche organic food stores. Therefore, access to organic products was difficult for those living in "inner city" environments. However, with the recent addition of the multinational food corporations entering the organic food business, the variety of organic food has grown and falling prices of organic food has made it more accessible. While the access to organic food is essential, it is also a pertinent to encourage an embodied understanding of organic farming to develop an ecological sense of nutrition education (Urban Nutrition Initiative, 2007).

The real emphasis among environmentalists is not only organic farming but also the concept that advocates sustainable food. Sustainable agriculture is a method that emphasizes locally grown food using seasonally sensitive planting and ecologically sound methods. The three main goals of sustainable agriculture are: environmental health, economic profitability, and social and economic equality (University of California Sustainable Agricultural Research and Education Program UCSAREP, 2007). It is a concept of growing food that is healthy for consumers, animals, and in a manner that does not harm the environment. Additionally, the call for sustainable farming protects the workers and supports rural communities.

The United States government defined sustainable agriculture in 1990 with Public Law 101-624, Title XVI, Subtitle A, Section 1683, as

an integrated system of plant and animal production practices having a site-specific application that will, over the long term, satisfy human food and fiber needs; enhance environmental quality and the natural resource base upon which the agricultural economy depends; make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; sustain the economic viability of farm operations; and enhance the quality of life for farmers and society as a whole.

It becomes evident that the struggle with sustainable agriculture is that it remains a concept -- a philosophy of farming rather than a set of concrete laws that can be enforced. Individual farmers are left to interpret the law with no legal recourse if food is labeled sustainable when it is not. Despite the diversity of interpretation, there are some themes that are common in the movement. The heart of the sustainable agriculture movement lies with assuring that present needs are met without jeopardizing the needs of future generations through a stewardship of natural and human resources. In this light, "[s]tewardship of human resources includes consideration of social responsibilities such as working and living conditions of laborers, the needs of rural communities, and consumer health and safety both in the present and the future. Stewardship of land and natural resources involves maintaining or enhancing this vital resource base for the long term" (UCSAREP, 2007, para. 6). This stewardship of the earth, both locally and globally, needs to be integrated into standards of scientific literacy.

At a local level, organic farming allows for food to be grown without toxins and large machinery. However, through the discussion of sustainable farming, we see a broader focus on conservation and preservation of the earth, animal rights and the socially just treatment of workers. While teaching about organic farming may be seen as environmental education, teaching about sustainable farming is environmental justice education at the local and global level. Through sustainable agriculture, the process of farming and the harvesting of food are tied to social and environmental sustainability.

On a global level, this gives insight into the call for greater equity in international trade. FINE (an acronym for four international

fair trade networks: FLO, IFAT, NEWS!, and EFTA) defines fair trade as a "trading partnership based on dialogue, transparency and respect, that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers - especially in the South" (2001, para. 1). By educating children about sustainable development, we empower them with the knowledge to work for social and environmental justice and to become stewards of the earth on a local and global level.

The Edible Schoolyard Project

The Edible Schoolyard Project is an internationally recognized program focusing on the concept of sustainable farming and embodied scientific literacy. The project is located in Berkeley, California and was envisioned by a chef named Alice Waters in 1994. Waters' Edible Schoolyard demonstrates the necessity of partnership between the community and local schools. On her daily commute to her restaurant, Waters drove past the dilapidated Martin Luther King Jr. Middle School. Waters formed a partnership with the school to transfer one acre of blacktop into the Edible Schoolyard project. Today the Edible Schoolyard includes a state-of-the-art kitchen and garden.

Through Waters' commitment to experiential learning, the sixth through eighth grade students at the middle school are partners in maintaining the garden and preparing the food for the table. It is Waters' belief that

Being responsible to one's self cannot be separated from being responsible to the planet. I know of no better way to get this lesson across than through a school curriculum in which food takes its place at the core level. From the garden, and the kitchen, and the table, you learn empathy–for each other and for all of creation; you learn compassion; and you learn patience and self-discipline. A curriculum that teaches these lessons gives children an orientation to the future–and it can give them hope (Waters, 1997, para. 12).

Findings from a two-year study on the Edible Schoolyard curriculum by Michael Murphy, associate professor of psychology at Harvard Medical School, offer significant insights. Compared to a control group, the students involved in the Edible Schoolyard Project reflected overall increases in grade point average as well as higher grades in math and science. The students also demonstrated a greater understanding of garden cycles and overall ecological literacy as compared to the control students. Additionally, teachers and administrators noted that the psychosocial adjustment of the students improved significantly as compared to the control group. Perhaps the most important finding, however, was that the students who raised their ecoliteracy scores also had changed their diets by including more servings of fruits and vegetables as compared to the control group (Center for Ecoliteracy, 2003). This truly exemplifies embodied literacy.

The Urban Nutrition Initiative

Another collaborative effort, the Urban Nutrition Initiative (UNI), has integrated the resources of the University of Pennsylvania with the local schools in West Philadelphia. The goal of UNI has been to create a curriculum that "engages students as agents of school and community health improvement...[and to] work with university faculty, students, public school teachers and community residents to realize schools as centers of community health promotion" (2007, para. 2). UNI's emphasis on an ecological approach to nutrition education through experiential education allows student to engage in embodied learning.

UNI offers a variety of solutions to engage urban youth in this embodied, experiential learning. UNI emphasizes the development of school gardens and fosters a philosophy that by increasing the aesthetic beauty of the school, the students improve the quality of communal life. Food harvested from the school gardens is sold in fruit stands and farmer's markets endorsed by UNI. The process of maintaining the fruit stands and farmer's markets encourages students to integrate their problem-solving skills to develop entrepreneurial leadership. UNI also encourages family fitness by offering community fitness evenings. Using the school garden, fruit stands, farmer's markets and community fitness, UNI creates a comprehensive plan to empower students and their families with knowledge of sustainable farming and healthy nutrition.

UNI also encourages participation by the undergraduate and graduate students at the University of Pennsylvania. Service learning is a method of instruction that integrates the academic curriculum with community service and is an example of experiential education for post-K-12 students. UNI brings the students from the University of Pennsylvania to the West Philadelphia schools. Not only are the urban youth learning from the experiential environmental learning, but the university students are also immersed in environmental and social justice issues found in the urban environments surrounding their campus. The University of Pennsylvania is one of many colleges and universities that offer service learning courses in the environmental sciences. Environmental science lends itself to the field of service learning with the call to move beyond the classroom and experience the earth in an experiential, embodied way.

A compilation of essays edited by Harold Ward (1999) offers insight into many different service learning programs in environmental studies classes. Perhaps one of the most important advantages of service learning programs is the ability to engage the campus residents in projects that seek to improve the communities that lie outside the ivory tower. In terms of environmental and social justice issues, the service learning component of environmental education courses allows the collegiate students to see the issues of justice first-hand. The university students also act as mentors for the younger children and with participating community members create a generational impact on the younger students working in the field. This partnership offers a blueprint for building an environmentally just community.

Asthma Rates in Urban Environments

The fight against asthma-related pollutants in urban areas has also spurred several environmental justice education projects. One model program is currently being facilitated by Lehman college in the Bronx, New York. The borough of the Bronx contains the most ethnically diverse (86% of individuals labeled as minority), educationally deprived (38% without a high school diploma) and socially-economic diverse population (31% of people live below the federal poverty level) in New York City (Maantay, 2007; United States Bureau of the Census, 2000). One of the escalating problems for children growing up in the Bronx is the high rate of asthma. According to the New York City Department of Health, the hospitalization rate for children in the Bronx was the highest of the five boroughs of New York City in 2005 (Maantay, 2007; New York City Department of Health, 2007). This is certainly an environmental justice issue that impacts the life of a teacher working in the Bronx schools.

A major mission of the Lehman Urban Teacher and Counselor Education Conceptual Framework (LUTE), which runs the model program, is to prepare our pre-service teachers and counselors to work in the diverse setting of the Bronx. The challenge of our teacher preparation programs is to empower pre-service teachers to succeed in this urban environment. A curriculum was designed to introduce environmental justice for use in the teacher certification course at Lehman College: Methods of Science Education for elementary school teachers. This course integrated the research of Maantay (2001, 2002, 2007) who utilizes Geographic Information Systems to determine the spatial correspondence between asthma and air pollution in the Bronx, New York. Maantay (2007) has studied the relationship between asthma-related hospitalizations and the proximity to traffic roadways and sources of air pollution. She discovered that "people living near (within specified distance buffers) noxious land uses were up to 66 percent more likely to be hospitalized for asthma, and were 30 percent more likely to be poor and 13 percent more likely to be a minority than those outside the buffers" (Maantay, 2007, p. 32). As the results demonstrate the need for sustainable development in urban areas is necessary for healthy air.

Maantay has used GIS maps to plot traffic patterns and other locations of air pollution. Using a constructivist model, a curriculum was established to guide pre-service teachers to apply Maantay's results to their own neighborhoods in the Bronx. The model allows the pre-service teachers to investigate the impact of environmental justice issues in their own life, tapping into the living literacy of these candidates. The exercise educated the pre-service teachers about the concepts of environmental justice, but also empowered the candidates to become aware of injustice in their own neighborhoods. By using the maps generated by Maantay's work and the technology offered by GIS, the individuals in the methods course were able to see the direct impact of traffic patterns and air pollution on their own block. After completing the exercise the teachers were prepared to integrate the lessons into their elementary school classroom at a developmentally appropriate level. Once the teachers have embodied the scientific literacy, the teachers can enter their classrooms and raise the awareness of issues of justice with their own students.

The themes of sustainable development again emerge in the urban setting in relationship to the air that impacts the health of the community. By teaching the concepts of environmental justice in this constructivist method the pre-service teachers not only understood the terms of the field, but were also able to incorporate their understanding into their lived literacies. They were able to see the impact that choices in urban development had on the air they breathe.

Lead Poisoning: Beyond Lead Paint

A third and final example of a model program concerns the fight against lead poisoning, which is prevalent in high poverty areas. The Centers for Disease Control and Prevention's (CDC) lead poisoning statistics show that "approximately 310,000 U.S. children aged 1-5 years have blood lead levels greater than 10 micrograms of lead per deciliter of blood" (2007, para. 1). The CDC acknowledges that lead poisoning causes permanent neurologic, developmental, and behavioral disorders, particularly in children. Regulations in the United States require the identification and removal of lead over the past several decades and this has reduced he percentage of lead poisoned children in the United States. The Lead Contamination Control Act of 1988 initiated efforts to eliminate childhood lead poisoning in the United States. The CDC's current Childhood Lead Poisoning Prevention Program is committed to the goal of eliminating elevated blood lead levels in children by 2010.

As laws were enacted and enforced, there has been a drop in lead poisoning in children across the United States except, to a lesser degree, in minority children living in urban centers (Macey, Her, Reibling, & Ericson, 2001). Traditionally, the focus of lead poisoning education centers on exposure to lead paint. However, recent research demonstrates that this may not be the main cause of lead poisoning in the current urban environment. A study conducted in 2005 by a group of researchers from Indiana

University-Purdue University Indianapolis, Xavier University of Louisiana and SUNY College of Environmental Science and Forestry (ESF) has discovered that lead-enriched dust may be the primary cause of lead poisoning among urban children (Laidlaw, Mielke, Filippelli, Johnson, & Gonzales, 2005). The team of researchers discovered that the top inches of urban soil contain a significant amount of accumulated lead. This soil can be redistributed during dry and windy weather conditions, which also explains the fluctuations of lead levels in the blood especially during the summer months. Therefore, children in high population and transportation areas where the soil tested high for lead values were more apt to have higher levels of lead in their blood (Laidlaw et al., 2005).

Simpson (2007) details a sixteen-week project, The Codman Square Lead Initiative, that empowers high school students to evaluate the soil in their own urban neighborhood. The impetus for the project occurred with the presence of lead contaminated soil surrounding the high school in Dorchester, Massachusetts. The tenth grade students researched the history of lead and the impact of lead poisoning on human development. The students collected soil samples from the Codman Square neighborhood and submitted the samples for testing at the Environmental Protection Agency Lab in Lexington, Massachusetts. In response to the detailed lab results, the students were then required to disseminate the information to their local neighborhood. Finally, they traveled to the Massachusetts State House to meet with government representatives and voice their concern about their findings.

The Codman Square Lead Initiative allowed the students to become agents of change in their neighborhood. Embodied with the scientific literacy surrounding lead poisoning, the students were able to collect and evaluate the evidence of lead in the soil samples. After attaining this knowledge, the students were empowered to alert members of the community about the environmental danger. Finally, by traveling to their elected representatives with their findings the students were activists for social and environmental justice in their neighborhood. The Codman Square Lead Initiative teaches students to become activists for social and environmental justice in a grassroots and systemic way, becoming stewards of the earth in a local and global manner. These students were empowered to form an environmental citizenry with an educated voice.

Conclusion: Educating an Environmental Citizenry

The environmental justice movement has been fueled by grassroots activists and educators. Teachers can play an important role in inviting the next generation to become global environmental citizens however, it is also the greater community that needs the play a role.

The responsibility for the physical deterioration of this school, and so many like it, lies not with the brave and underpaid teachers and administrators. Not at all. I learned that it was my responsibility, as part of a larger society that pays lip service to education, but has not been willing to make it a national priority that every child is taught as well as every other child (Waters, 1997, para. 6).

The model programs described in this paper all reflect success based on the partnership of many different aspects of community that extend beyond the physical walls of the public school. From the vision of a community member, The Edible Schoolyard Project engages children in the life cycle of food production: by the cultivation of the soil, planting, nurturing growth, reaping, and cooking the students and community members become part of the food cycle. The Urban Nutrition Initiative integrates the resources of a university to transform neighboring communities. The University of Pennsylvania lends its economic resources but also the human resources of its students to empower children and their families to raise their own food and bring it to market. At Lehman College, students are taught to use technology to monitor the air they breathe and become aware of various hazardous sites in their own neighborhoods. Finally, in Dorchester students are learning to monitor the soil in their neighborhood and empowered to bring the data to elected officials in an effort to change governmental policy. All four programs encourage the embodiment of scientific literacy and nurture stewardship of the earth.

The solution to environmental injustice is not a continual relocation of toxic wastes and pollution to different neighborhoods of our planet. The real call from the environmental justice educators is to re-examine the impact on our urban environments that have emerged in the face of "modernization" and to reclaim the earth below. We need to do this by educating our very young children what it means to be stewards of the earth and to stand for environmental justice. We ensure a future community rooted in environmental citizenry by empowering our urban youth with the ability to engage in the inquiry of environmental justice.

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Figure 1 Seventeen Principles of Environmental Justice

WE THE PEOPLE OF COLOR, gathered together at this multinational People of Color Environmental Leadership Summit, to begin to build a national and international movement of all peoples of color to fight the destruction and taking of our lands and communities, do hereby re-establish our spiritual interdependence to the sacredness of our Mother Earth; to respect and celebrate each of our cultures, languages and beliefs about the natural world and our roles in healing ourselves; to insure environmental justice; to promote economic alternatives which would contribute to the development of environmentally safe livelihoods; and, to secure our political, economic and cultural liberation that has been denied for over 500 years of colonization and oppression, resulting in the poisoning of our communities and land and the genocide of our peoples, do affirm and adopt these Principles of Environmental Justice:

sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from	injustice a violation of international law,
and justice for all peoples, free from any form of discrimination or bias.	recognize a special legal and natural
right to ethical, balanced and responsible uses of land and renewable resources in the interest of a sustainable planet for humans and other living things.	12. Environmental justice affirms the need for urban and rural ecological policies to clean up and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all our communities, and providing fair access for all to the full range of resources.
universal protection from nuclear testing, extraction, production and disposal of toxic/hazardous wastes and poisons and	informed consent, and a halt to the testing of experimental reproductive and medical procedures and vaccinations on
fundamental right to political, economic,	14. Environmental justice opposes the destructive operations of multi-national corporations.

6. Environmental justice demands the cessation of the production of all toxins, hazardous wastes, and radioactive materials, and that all past and current producers be held strictly accountable to the people for detoxification and the containment at the point of production.	military occupation, repression and exploitation of lands, peoples and cultures, and other life forms.
right to participate as equal partners at every level of decision-making including needs assessment, planning	16. Environmental justice calls for the education of present and future generations which emphasizes social and environmental issues, based on our experience and a n appreciation of our diverse cultural perspectives.
right of all workers to a safe and healthy work environment, without being forced to choose between an unsafe livelihood	17. Environmental justice requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources and to produce as little waste as possible; and make the conscious decision to challenge and reprioritize our lifestyles to insure the health of the natural world for present and future generations.
9. Environmental justice protects the right of victims of environmental injustice t oreceive full compensation and reparations for damages as well as quality health care.	

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