

# Environmental Justice Education: Empowering Ghanaian Students to become Environmental Citizens

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**This article highlights the need to integrate environmental justice (EJ) education into environmental science programs offered in Ghanaian universities. The study was conducted at the University of Cape Coast, which is close to the oil-drilling region in western Ghana. Predominant instances of environmental injustice often accompany oil drilling and extraction of natural resources. Three issues are addressed: students' perceptions of EJ, their attitudes toward studying EJ, and perceived barriers to the practical application of EJ. The history and important concepts of the EJ movement are reviewed for the purpose of educating students. The World Values Survey for determining Ghanaians' perceptions and attitudes toward various environmental issues is also reviewed. Qualitative research design was used. A questionnaire was developed based on the themes of EJ from the review and administered to 75 students. Students showed a satisfactory level of EJ perception and assessed barriers to practicing EJ. Implications for EJ education are covered.**

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**E**nvironmental Justice (EJ) education empowers students to become environmental citizens and thus is an important component of any environmental science program. With the emergence of oil in Ghana and the anticipated environmental issues often associated with harnessing and transporting such natural resources, it is important that environmental science programs offered in Ghanaian universities be strengthened to encompass all aspects of environmental science, including environmental justice and policy. This will enhance the capacity of the students who

graduate from these institutions with degrees in environmental science to engage in education related to environmental governance, justice, and conflict management. Thus, it is important to develop research aimed at adapting and evaluating EJ education concepts and practices in the context of natural resource conflicts. Why natural resources? They are vital to the national economy of Ghana, as well as to the livelihoods of the majority of her citizens. In addition, natural resources are often closely associated with local cultural identities. EJ issues and conflicts related to land and natural resources can pose a substantial threat to social stability, livelihoods, and overall population security. The scope and magnitude of human misery and displacement arising from oil drilling in the Niger Delta in Nigeria's never-ending conflicts offer a chilling example. Many academics and development practitioners in West Africa are increasingly interested in EJ issues, alongside promoting peace building in the region through development of appropriate EJ and peace education.

Although environmental science programs are offered at various institutions in Ghana (including four public universities), the University of Cape Coast (UCC) served as the focal point for this study evaluating the program expertise in the country and throughout the rest of the region. However, because Ghana was identified as a good example of a true democratic nation with a multiparty system of governance in sub-Saharan Africa by the United States (US) president in his 2009 visit, mobilizing and harnessing resources such as oil in Ghana need to be coherent so that the various actors/partners operate in justice and peace. The power of EJ movement lies in grassroots neighborhood organizations that have worked for change. This report presents an evaluation of the environmental science program at the UCC to determine whether the program empowers individual students to help build communities that stand for EJ. At nine years after its introduction and having graduated four student classes since 2006,

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it is important to determine whether the program is providing students with sufficient knowledge about all aspects of environmental issues and the skills to use this knowledge to solve problems in their communities.

Developing effective environmental education curricula is deemed as one way to deal with environmental threats, as described in the Tbilisi Declaration: Environmental education has an evident role to play in environmental issues by providing knowledge, skills and attitudes which can modify existing conditions for the better. It should be integrated into the whole system of formal education at all levels to provide the necessary knowledge, understanding, values and skills needed by the general public and many occupational groups, for their participation in devising solutions to environmental questions. [United Nations Educational, Scientific and Cultural Organization–United Nations Environment Programme (UNESCO–UNEP), 1977, p. 12]

UNESCO–UNEP (1990) prioritizes environmental education in the teaching colleges for preservice teachers, highlighting the role it plays in conceptualizing environmental issues, as well as developing cognitive frameworks regarding the environment. Researchers Taylor (2009), Bullard (2005), Warren (1996), Cheng-Levine (2002), Bowers (2002), Zehle (2002), and Hill (2003) have contributed vastly to the field of EJ education. Taylor focuses on the perceptions of, and responses to, breakdowns in social order in the 17th through 20th centuries. Bullard argues for the need to integrate EJ into all schools and empower students to take a stand for justice. Bowers, Zehle, and Hill have contributed their views to the key concepts of EJ education covering ecological, cultural, economic, and political developments. Bowers's focus on ecojustice covers sustainability (responsibility to future generations), as well as environmental racism and how best to recover the aspects of community that cannot be commoditized. Ecological democracy, colonialism and commodities, and eco-internationalism have been reported by Zehle to be the key concepts of EJ education. Hill saw the importance of addressing agriculture, mining, facility siting, labor issues, and community problems in EJ education. These studies were concerned mainly with community education. Maathai's (2004) Green Belt Movement in Kenya celebrates the profound transformation that occurs when people are educated—they are interested in better conserving natural resources.

Although the UCC environmental science program for the bachelor of science degree has graduated four student classes, it is important that the program is reviewed to ensure that important aspects of environmental issues like EJ are treated

thoroughly and explained to the students especially with the advent of oil drilling in western Ghana, which is next door to Cape Coast. If EJ education is to be successful, it is important to determine the level of knowledge that these environmental science students have about EJ issues, as well as their attitudes and perspectives as they are being trained to address EJ, among other environmental issues.

The *objectives* of this study were (a) to examine students' knowledge of EJ, (b) to investigate their perceptions of EJ, and (c) to identify their attitudes toward studying EJ issues

## A Brief History of Environmental Justice and Related Important Concepts

*Environment* comprises our place of dwelling, employment, recreation, adoration, and training, as well as physical and normal world (Bullard, 2005). The US Environmental Protection Agency (2007b) defines *environmental justice* as allowing equal just participation of all people irrespective of race, color, country of origin, customs, education, or earnings in relation to the advancement and enforcement of environmental laws, regulations, and policies. For some time, the focus in the field centered on the impact of environmental injustice on health in the US. However, with the strong presence of community-based grassroots change, EJ has expanded to include benefits and services such as access to large span of land and to water bodies, which in the past could not be accessed by communities of color (Bullard, 2005).

The history of the EJ movement demonstrates that community-based models that involve participatory action research (Hill, 2003; Shepard et al., 2002) enable individuals to fully embody the living meaning of the complex concepts of EJ. The EJ movement began with a focus on pollution and environmental hazards and their impact on humanity. The platform emerged in the 1960s civil rights movement. *Toxic Wastes and Race in the United States*, the first national study on environmental racism, provided data that matched waste facility sites to demographics demonstrating a strong pattern of environmental racism (Commission for Racial Justice, 1987). *Environmental racism* relates to any rule or guiding principle, observation, or directive that either intentionally or unintentionally is a disadvantage to individuals, groups, or communities as a result of their race or color (Bullard, 2005).

The First and Second National People of Color Environmental Leadership Summits, held in October 1991 and

October 2002, established the Seventeen Principles of Environmental Justice (Environmental Justice Resource Center, 1991, 2002), introduced an important aspect of social justice to an international audience, and solidified the points of 1991, as well as built structured connections between local, grassroots EJ community groups and larger, mainstream organizations (Bullard, 2005). The EJ principles promote ecological preservation; unbiased policies; sustainable use of natural resources; the right to clean air, water, land, and food; accountability for production that contaminates the environment; equal-partner decision making; appropriate compensation of victims of environmental injustice; moderate consumption of the earth's resources; and especially educating present and future generations about social and environmental issues. In 1994, President Bill Clinton recognized the importance of EJ and issued Executive Order 12898 to address injustice in minority and low-income populations (White House, 1994).

People have the basic rights to live, work, learn, and play in a clean, healthy, sustainable, and just environment (Bullard, 2005). This can be achieved by ensuring that the environmental benefits of clean water, fresh air, and other resources are distributed equitably among all population groups while environmental burdens such as resource depletion and water, air, and land pollution are minimized and shared equally among all population groups irrespective of class, income, or location. This often does not happen; instead, vulnerable population groups such as the poor, women, and ethnic minorities or people disadvantaged in terms of education, income, and occupation dwell in the worst environmental conditions while the affluent reside in clean, healthy locations (Bullard, 2005; Shrader-Frechette, 2002). Consequently, some population groups battle unhealthy and sometimes life-threatening environmental conditions at their work, study, and play, whereas other groups are spared such problems. Also, the disadvantaged groups are often disqualified from access to natural resources, as well as to information and participation in environmental decision making on issues that affect them (Shrader-Frechette, 2002). All of these issues are based on such socioeconomic factors as income, class, and even gender, amounting to discrimination against society's weak, powerless, and vulnerable. Gedicks (2005) reports that communities in Columbia and in Wisconsin (US) organized and allied themselves with a wide variety of groups to publicize their situation and pressure multinational mining, oil, and logging corporations to stop the systematic displacement, dispossession and, in some cases, destruction of native communities while extracting resources. In countries around the world, such grassroots environmental

action groups are consistently confronting institutionalized environmental injustices while striving to protect oppressed communities and groups.

Outside the US, precisely in sub-Saharan Africa, examples of environmental protests similar to that described earlier in Columbia include demonstrations in Nigeria. The Ogoni ethnic minority group in the Niger Delta engages in grassroots environmental protest. For several years, the operations of Shell, Chevron, and other multinational oil companies in the oil-rich delta had caused extensive environmental degradation in the homeland of the Ogoni people, who were also denied a fair share of proceeds from oil extraction. In 1993, the Movement for the Survival of the Ogoni People (MOSOP), with over 300,000 members, was led by Ken Saro Wiwa (author, TV producer, and environmentalist) in nonviolent protest campaigns against the destruction of their land and water resources by the oil industry. The Nigerian government ordered its military to crack down on the protestors and arrested many of the Ogoni leaders, including Ken Saro Wiwa. After a long detention, Ken and nine other leaders of MOSOP were charged with incitement to violence and murder and were executed by hanging on November 10, 1995. The execution of the MOSOP leaders prompted international outrage and immediate suspension of Nigeria from the Commonwealth of Nations (Achebe et al., 1995). Another Nigerian, Femi Kuti, fought for peace and justice in Nigeria for several generations and shared his potent inherent activism with others. As a musician, his songs and actions spoke up for the rights of ordinary Nigerians. He accused multinational oil companies operating in Nigeria of draining Africa's resources by setting Africans against each other. Violence in the Niger Delta has always been linked to the activities of Western multinational oil companies, as well as grave impoverishment in the area. Maathai's movement not only confronted local and global environmental threats but stood for human rights and democracy against multiethnic Kenyan power and violence.

White and Hunter (2005) demonstrate that there is significant environmental awareness in Ghana, though this awareness varies by geographic location. In determining public perceptions of environmental issues in developing settings, White and Hunter reported that nearly all residents studied had opinions about local environmental conditions although individual traits also predict relative concern for environmental issues. These individual traits often outweigh the differences in rural–urban attitudes. Cities in developing nations access environmental services such as potable water, sanitation, and waste disposal as a way of

providing employment for the poor as well as improve their quality of life (Hardoy, Mitlin, and Satterthwaite, 2001; Suyanto and Khususiya, 2007). The Benneh et al. (1993) study on solid waste management in cities in a developing country shows that social justice and EJ have received less attention than other concepts in the investigation of environmental issues and need to be addressed. Whittington et al. (1993) report relatively high education levels among a group of residents studied in Kumasi, Ghana, who can and do form ideas about environmental quality.

## Environmental Justice and Education

Agbola (1993) states that cultural derivatives, beliefs, perceptions, and attitudes are learned responses and thus can be modified or changed through education. This means that people's unconcerned attitudes can be changed through education, so it is important to train people to accept shared responsibility. While traditional environmental education programs give people an in-depth understanding of the environment, moving them to take personal liability for its conservation and its reestablishment (US Environmental Protection Agency, 2007a), EJ education fosters a critical understanding of the environment within the context of human, political, and social actions. There are multitudes of ways in which individuals perceive environmental conditions and environmental change, with such diversity of perceptions likely related to the complexity inherent in the environmental issues themselves. High and Shackleton (2000) and Twine et al. (2003) have reported that, although less prevalent, research on environmental perception in less developed regions is particularly significant, given the continuing dependence on proximate natural resources in many areas. Certainly, stakeholder perceptions should be of major concern to policy makers since decisions must be made with regard to policy priorities (Hunter, 2006), where local voices can shed light on the environmental implications of urbanization and development with most social impact.

Critiquing the postmaterialist thesis as related to environmental concerns, Brenchin and Kempton (1994) suggest that high levels of environmental concern also characterize residents of less developed nations, as evidenced by the proliferation of grassroots environmental organizations in these regions. They further provide empirical evidence that, while less likely to be willing to make economic trade-offs, individuals in less wealthy nations express relatively more willingness than their wealthier counterparts to volunteer time to improve the environment.

Cobern (2000) observed that students have different perceptions about environmental issues when he studied a group of senior high school students in Ghana. To cater to such differences in perception, Gibson (2002) recommended that preservice teachers who are trained to teach environmental issues in these schools need to present invariant perceptions on environmental issues in order to help shape students' perceptions about the environment. Zelezny, Chua, and Aldrich (2000) show that women tend to express greater concern regarding environmental issues, whereas older individuals tend to have fewer environmental concerns. Generally, in sub-Saharan Africa, about 53% of women aged 15 and above and 69% of men are literate compared to about 63% of women aged 15 and above and 80% of men in Ghana (Population Reference Bureau, 2002). A high level of literacy often reflects a high level of environmental concern. The recent promotion of ecotourism and the development of beachfronts in central Ghana are likely to put pressure on the environmental resources, leading to key environmental issues such as water pollution and public health problems.

Empowering students to understand and use their individual rights should be an important objective in education. EJ concepts must be integrated into environmental science curricula and rooted in scientific knowledge in the universities and other tertiary institutions. *Scientific knowledge* is the "knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity" (Center for Science, Mathematics, and Engineering Education, 1996, p. 26). As scientific literacy research evolves, there needs to be a focus on learning how to develop human beings through knowledge and its applications (Neilsen, 1998). Thus, educators have a distinct role in imparting a sense of EJ to their students. There is the need to empower people, especially the youth living in areas where activities like mining and oil drilling are ongoing, because management of such facilities, including waste disposal, could raise issues of injustice. Only through such means can strong communities of resistance and planning be developed to address issues of injustice.

This approach requires researchers to investigate the existing knowledge of individuals, in the context of community, to develop an effective educational methodology. Essential to this notion is *embodied literacy*, a type of worldly knowledge that enables learners to integrate reading and writing astutely in their general education (Fleckenstein, 2003). EJ education in universities must address local issues of injustice in surrounding communities and in many cases



include national environmental issues. EJ educators have called for a reexamination of the impact of “modernization” on our urban environments and advocate trying to reclaim the earth. This can be done by educating students on what it means to be stewards of the earth, stand for EJ, and develop the ability to investigate EJ. Through this, a future community rooted in environmental citizenry can be ensured. Experiential education will help deal with abstract notions of EJ if it becomes integrated into the lived experiences of students. Inculcating social responsibilities such as the needs of rural communities, and consumer health and safety, both in the present and the future is vital. Stewardship of land and natural resources involves maintaining or enhancing this vital resource base for the long term (University of California Sustainable Agriculture Research and Education Program, 2007).

Ways of addressing university students about EJ themes have been suggested by Cheng-Levine (2002) and Warren (1996). Cheng-Levine used literature as the main tool to deal with EJ issues in a meaningful and less threatening manner when he taught students, versus Warren, who used real scenarios or situations; for example, exposing White students to communities of color with environmental hazardous facilities as a way of teaching about environmental racism. Both ways used by these men helped to teach EJ issues.

## Methodology

The senior high school and junior high school syllabi were reviewed to determine how much environmental science/studies topics were covered as a way of assessing student’s knowledge of environmental science issues prior to enrolling in the UCC environmental science program. Data from the World Values Survey on Ghanaian attitudes and perceptions toward environmental issues from 2005 through 2008 were added to help compare the trends in these attitudes and perceptions with that of the study group. The courses offered at the UCC Environmental Science Department for earning a bachelor of science degree in four years (from levels 100 to 400) were subsequently reviewed in 2010. The review included a content analysis of the various courses: the course content, descriptions, and objectives. Courses offered at the various levels were as follows: level 100, first semester, five courses; level 100, second semester, six courses; level 200, first semester, nine courses; level 200, second semester, nine courses; level 300, first semester, nine courses; level 300, second semester, nine courses; level 400, first semester, six courses; and level 400, second semester,

nine courses. Courses were either one, two, or three credits. In addition, a questionnaire was developed, based on a review of EJ literature, and used for collecting the survey data. Statements describing the common themes of EJ were adapted especially from the 1991 EJ principles and other studies on perceptions of EJ issues by Jones (2001) and Williams and Florez (2002). The three main ideas of Bowers (2002) on ecojustice (sustainability/responsibility to future generations; environmental racism, and how best to recover non commoditized aspects of a community) as expressed by these authors formed the basis of the statements. Four content-validity panelists reviewed each statement of the instrument to ensure appropriateness and clarity. To examine the reliability of the instrument, Cronbach reliability tests were performed. The internal consistency reliability of the instrument was satisfactory.

## Structure of Instrument

A four-point Likert scale was used to specify respondents’ familiarity with the essential elements of EJ. The scale ranged from 1 to 4, with 1 meaning “strongly disagree” and 4 meaning “strongly agree.” The structure and internal consistency reliability are shown in Table 1.

## Survey Participants and Data Analysis

Questionnaires were distributed to fourth-year students enrolled in the bachelor of science UCC environmental science program. Responses were used to investigate the students’ knowledge of EJ issues based on the courses they had taken and how many of those courses were EJ oriented or covered EJ issues. Data were collected in November 2010. There was a total of 130 students in the fourth year: 104 men and 26 women. Of the 130 students, 85 (70 men

**Table 1.** Structure of the instrument and the reliability of its internal consistency

Section	No. of items	Cronbach’s $\alpha$
A: Perceptions of environmental justice		
A1: Environmental racism and class discrimination	6	0.750
A2: Recovery of noncommoditized traditions of community	6	0.802
A3: Responsibility of future generations	4	0.575
B: Attitudes toward learning environmental justice	4	0.806
C: Demographic data	5	N/A

**Table 2.** Demographic characteristics of students

Characteristics	Frequency (N = 75)	%
Age groups (years)		
20–22	7	9.3
23–25	50	66.7
26–28	16	21.3
Above 28	2	2.7
Gender		
Female	15	20
Male	60	80
Ethnic background		
Fanti–Twi–Nzema	42	56
Ga–Adangbe	12	16
Ewe	14	18.6
Northerners	7	9.3
Fields of specialization		
Environmental policy	18	24
Environmental toxicology	22	29.3
Resource management	22	29.3
Environmental communication	13	17.3
Urban	52	69
Rural	23	31
Total	75	100

and 15 women) voluntarily collected the questionnaires. The basis for distributing the questionnaires was *willingness* rather than random sampling because the student population was small. Of the 85 questionnaires distributed, 75 (15 from women and 60 from men) were collected or retrieved, for a response rate of about 88%. The Statistical Product for Social Scientists version 14 was used to analyze the data collected and coded. Results were presented in frequencies and percentages.

## Results

For convenience, the students were separated into the four main age groups listed in Table 2. The highest proportion

of students (about 67%) were in the 23–25 age group, which is normally the age of most students who take a four-year degree program at the university by the time they reach the final year or graduate. The male–female student ratio was 4:1, with men making up 80% and women 20%. The Fanti, Twi, and Nzema together, categorized as Akans, formed the largest group (56%), whereas Northerners (from northern Ghana) formed the smallest group (9%). More students (29% each) specialized in environmental toxicology and resource management, with only 17% studying environmental communication. About 70% of the students hailed from urban areas, with about 30% from rural areas.

The results reported by the World Values Survey Association (WVSA, 2005–2008), presented in Table 3, indicate that most Ghanaians strongly agree/agree (83%) to having part of their income used for environmental issues, versus 17% who strongly disagree/disagree. In regard to the government increasing taxes to address pollution issues, 74% of Ghanaians strongly agree/agree, whereas 26% strongly disagree/disagree. That 52% of Ghanaians recommend government should reduce environmental pollution and 83% are willing to support that initiative with part of their income denotes a positive attitude among Ghanaians toward controlling environmental pollution, as well as toward other environmental issues.

Global warming was rated the most serious environmental issue by Ghanaians (82%), with only 18% not seeing it as such. Pollution of water bodies (e.g., rivers, lakes, and oceans) was also rated highly as an environmental issue (81%), with only 18% considering it unimportant. Of the study population, 76% identified poor water quality as serious/very serious environmental issue, whereas 24% did not see it as such. Poor sanitation was rated similarly to poor water quality (78%). Air quality seemed to be the factor that Ghanaians worry about least, with 57% rating it as a serious environmental issue versus 43% who do not see it as such.

**Table 3.** Ghanaian attitudes toward environmental issues

Statement (N = 1,509)	Strongly agree		Agree		Disagree		Strongly disagree	
	%	Freq.	%	Freq.	%	Freq.	%	Freq.
Would give part of my income for the environment.	32.9	496	50	755	14	211	3.1	47
Increase taxes if used to prevent environmental pollution.	25.9	390	48.4	729	19.5	294	6.1	92
Government should reduce environmental pollution.	29.9	452	22.2	335	34.6	523	13.4	202

Source: World Values Survey Association (2005–2008).

**Table 4.** Ghanaian perceptions of community environmental problems

Statement (N = 1,534)	Very serious		Somewhat serious		Not very serious		Not serious at all	
	%	Freq.	%	Freq.	%	Freq.	%	Freq.
Community environmental problems								
Poor water quality	56.1	860	20	306	18.4	282	5.5	85
Poor air quality	36.9	563	20.5	313	29.6	451	13	198
Poor sanitation	55.4	847	22.9	350	16.5	252	5.2	79
Global warming	49.9	587	32.4	381	15.1	177	2.6	31
World environmental problems								
Loss of plants and animals	44.1	625	33.4	473	18.9	267	3.6	51
Pollution of rivers, lakes, and oceans	60.8	909	20.1	300	14.8	221	4.3	64

Source: World Values Survey Association (2005–2008).

The percentage of Ghanaians who stated they wanted the government to protect the environment (about 48%) was not significantly different from that for those who wanted to see more economic growth and job creation (about 52%).

The UCC Environmental Science Department aspires to afford its students adequate knowledge in environmental issues and help them develop skills to use in analyzing and solving environmental problems in various communities to the benefit of the society. The environmental science program has been designed to help students build a foundation in the first year of enrollment. Second-year and third-year students take a lot of biology courses to build upon that foundation. After the third year, students are selected for specialized fields. Courses with environmental science content are taken only in the fourth/final year. Courses offered can be classified as follows:

1. Policy  
Science and the Formulation of Environmental Policy
2. Environmental toxicology  
Environmental Hazards and Risk Management  
Monitoring and Remediation of Environmental Pollution

**Table 5.** Ghanaian perceptions toward protecting the environment versus economic growth

Statement (N = 1,509)	%	Frequency
Protecting the environment	47.9	680
Economic growth and job creation	51.7	734
Other answers	0.4	6
Don't know	3.5	54

Source: World Value Survey Association (2005–2008).

3. Resource management  
Environmental quality and management  
Analysis and resolution of environmental problems  
Application of RS & GIS (remote sensing and geographic information science) Technology in Environmental Studies

4. Communication  
Environmental Stewardship and Communication

Alternative courses included Pollution and Biodiversity of Aquatic Ecosystems; Fundamentals of Biodiversity Conservation; and Principles of Conservation and Human Ecology.

#### Environmental Justice: Respondent (Student) Perceptions, Attitudes, and Knowledge

Respondents' perceptions of EJ (see Table 6) on the average were favorable. They perceived the responsibility of future generations as important (mean, 0.48). Prior to enrolling in the UCC environmental science program, students had been exposed to only hygiene, sanitation, and pollution issues, since these were the only environment-related issues covered in junior high and senior high schools.

**Table 6.** Student's perceptions of environmental justice

A: Perceptions	N	No. of items	Mean	SD
A1: Environmental racism and class discrimination	75	6	3.12	0.46
A2: Recovery of noncommoditized traditions of community	75	6	3.06	0.50
A3: Responsibility of future generations	75	4	3.45	0.48

**Table 7.** Students attitudes toward learning environmental justice

Statement about attitudes	No. of students	Mean	SD
It is important to learn about environmental racism and class discrimination.	75	3.31	0.79
It is important to learn about recovery of the noncommodified traditions of a community.	75	3.10	0.81
It is important to learn about responsibility of future generations.	75	3.49	0.62
There is a need for course work to create awareness of environmental justice issues.	75	2.96	1.02

Students' attitudes toward learning about EJ issues on average were favorable (see Table 7). Students strongly believe that learning about "responsibility to future generations" is important (mean, 3.45), whereas "recovery of noncommodified traditions of community" (mean, 3.06) is considered less favorably than other categories. Although students' attitudes toward EJ issues are favorable, they are less in favor of developing course work to instill EJ awareness (mean, 2.96).

Students prioritized up to three factors that could be barriers to addressing EJ issues. They frequently reported "ownership of natural resources" (93.3%) as the most important (see Table 8).

When the interaction effects of the three statements in Table 9 were evaluated with respect to gender and age, the results showed some variation in responses by women and

**Table 8.** Students responses on barriers to applying environmental justice (EJ) to environmental issues in Ghana

Barriers to applying EJ to environmental issues	Frequency	%
Ownership	70	93.3
Students' knowledge of EJ	75	100.0
Race and color nonsignificant	50	66.6
Lack of laws to project EJ	45	60.0
Other	15	20.0

men, as well as in the different age groups. However, this difference was not statistically significant.

## Discussion

Although Brenchin and Kempton (1994) provided empirical evidence that individuals in less wealthy nations are less likely willing to make economic trade-offs but more willing to volunteer time to improve the environment than are their wealthier counterparts, data from the WVSA (2005–2008) showed that 83% of Ghanaians are willing to make such economic trade-offs. The UCC students perceived responsibility of future generations as important and thus, as well, the need to protect the environment. Students' favorable responses on the perceptions and attitudes regarding environmental issues in this study confirm those reported by White and Hunter (2005), who demonstrated that environmental awareness is significant in Ghana but varies by geographic location. The students' perceptions and attitudes on environmental issues were in line with findings from the WVSA. In both cases, reducing environmental pollution (among other environmental issues) and protecting the environment for future generations were applauded. With the similarities in students' perceptions and attitudes with those of other Ghanaians from the World Values Survey, one could propose that the views of these students represent grassroots attitudes in Ghana.

Although students expressed interest in acquiring EJ knowledge and stressed the need to create EJ awareness, they did not want more course work. EJ audit courses probably could be added to the existing courses so that students interested in studying EJ, but who may already have a lot of courses or credits, could still take EJ courses. Alternatively, other, more general courses could be removed from the list of courses offered to make room for EJ courses. Although it is important to have the students take general biology courses as a foundation to help them understand environmental science, doing this may need some caution to ensure that only closely related courses are offered to make room for more specific environmental science courses. When considering the courses offered at Level 400 (the final year), EJ issues clearly were not well covered. Of the environmental science courses offered at level 400, only the course on Environmental Stewardship and Communication seemed closely related to EJ, but it lacked basic EJ terms and concepts and barely covered important EJ topics. This could be an area for further study to help identify EJ concepts that may be most appropriate for our part of the world.



**Table 9.** Age \* gender \* students attitudes toward learning about environmental justice

Statements	Gender	Age (years)								$\chi^2$	df	p
		20–22		23–25		26–28		<28				
		N	%	N	%	N	%	N	%			
It is important to learn about environmental racism and class discrimination.	M	4	5	48	64	6	8	2	3	.501	2	.704
	F	4	5	10	13	1	1	0	0			
It is important to learn about recovery of noncommoditized traditions of a community.	M	7	9	42	56	9	12	2	3	3.020	3	.742
	F	4	5	8	11	3	4	0	0			
It is important to learn about responsibility for future generations.	M	4	5	50	67	4	5	2	3	.474	1	.405
	F	2	3	12	16	3	4	0	0			

Seventy students (93.3%) reported that most of the natural resources available in the country were owned by the government, and thus the impact of the activities involved in mining or extracting these resources was seldom challenged by individuals or communities. This makes it an important barrier in addressing EJ issues in Ghanaian communities. Unlike most developed countries, race or color does not seem to be an issue in Ghana; rather, people are divided by economic status (rich versus poor). In terms of environmental and social justice issues, the service-learning component of environmental education courses enabled students to see these justice issues firsthand (Ward, 1999). The university students could act as mentors for younger children and, with participating community members, create a generational impact on younger students working in the field. This partnership offers a blueprint for building an environmentally just community.

As suggested by Cheng-Levine (2002) and Warren (1996), literature on EJ can help educate students about EJ issues and help them handle general environmental issues in their communities. Cheng-Levine used literature as the main tool in dealing with EJ issues in a meaningful and less threatening manner when he taught students, compared with Warren, who used real scenarios or situations—for example, exposing White students to communities of color with environmental hazardous facilities—as a way of teaching about environmental racism. Both methods used by these men were effective in teaching EJ issues. Students who are well educated in EJ issues will be in a better position to use activism to address issues of environmental injustice, just as MOSOP led by Ken Saro Wiwa and Femi Kuti did in Nigeria and Maathai did in Kenya. The addition of EJ courses to the UCC environmental science program will make it more comprehensive. There is the need

to incorporate courses on environmental law and environmental engineering.

## Conclusion

The EJ movement elsewhere has been driven by grassroots activists and educators. Students can play an important role in inviting the next generation to become global environmental citizens with the support of the community. Student's perceptions and attitudes toward environmental issues in this study conform to those of Ghanaians reported by the WWSA (2005–2008), and thus we posit that the students' perceptions and attitudes could represent the grass roots.

On the average, students had a favorable attitude toward learning about EJ issues and perceived the responsibility of future generations as important. This could serve as a direction for future studies that could help inform policy makers of stakeholders' perceptions, which is of major concern to policy makers since decisions must be made regarding policy priorities.

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