

Public Awareness and Perceptions of Biodiversity

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ABSTRACT

Biodiversity is a relatively new term which recently has become more prevalent in the scientific and popular literature. It appears that the term is so new that it is familiar to only a small segment of the population. This paper describes the results of a survey which was conducted to determine public awareness and perceptions of biodiversity. Survey participants were asked about their familiarity with the word biodiversity. Respondents included the general public and undergraduate students in introductory level biology courses at two universities (n=1,288). The results show that a large segment of the public remains unfamiliar with the word biodiversity; only 36.72% of all respondents were familiar with the term. However, most (93.79%) of those unfamiliar with the term thought that conservation was important. There was no significant difference in familiarity with biodiversity among age groups or between males and females, yet familiarity with the word increased with the educational level of respondents. A wide variety of definitions for biodiversity were given; few included elements of definitions which are currently recognized in scientific publications. Reasons given for the importance of protecting biodiversity varied widely; some responded that short-term economic gains were more important than protecting biodiversity. Many thought the government should allocate funds to study and protect biodiversity, and many people perceive a conflict between economic development and protecting biodiversity. Clearly it will be critical to conservation efforts that the public not only learns to recognize the term biodiversity, but is also cognizant of the reasons and value in efforts to preserve and protect it.

INTRODUCTION

The term biodiversity is a relatively new word that has only recently become more prevalent in the literature; it first appeared in publications less than ten years ago. Since that time use of the word in common language has steadily grown (Harper and Hawksworth 1994). Yet several surveys suggest that the term is still so new that it is known to only a small segment of the population. In 1993 the Defenders of Wildlife sponsored a telephone survey with 1209 randomly selected adults in the continental United States. During the interviews, researchers assessed people's attitudes toward and

knowledge of biodiversity, and explained the concept to those unfamiliar with it. Seventy-three percent were unfamiliar with the notion of the loss of biodiversity, and it was also unfamiliar to 210 additional interviewees that belonged to environmental organizations. Of those interviewed, few connected the destruction of habitat with the loss of species (Anonymous 1993).

In a related survey, a New York Times/CBS News poll taken periodically from September, 1981 to April and June, 1989 found that only 45% of respondents agreed that "Protecting the environment is so important that requirements and standards cannot be too high, and continuing environmental improvements must be made regardless of cost." In another poll taken in 1989 (after the Exxon Valdez oil spill), this had increased to 80% (Ruckelshaus 1989). This suggests that respondents, and the American public in general, are becoming more aware of environmental issues.

In 1992 and 1994 Roper Organization polls concluded that most Americans are very concerned about the environment and feel that not enough is being done to protect it; many indicated that they believe that economic development and environmental protection can both be accomplished (Anonymous 1992, 1994b).

While these few surveys consider a broad range of environmental issues, and not all specifically focus on biodiversity, it is still unclear whether the American population is familiar with the term biodiversity. The objectives of this study were to determine whether: (1) the word biodiversity is familiar to the general public, (2) if it can be adequately defined by most people who have heard of it, and (3) if it is perceived as being important to preserve. I predicted that there would be a large segment of the population that had never heard of the word, and a large number of people who could not offer a definition.

METHODS

I conducted a survey to determine whether the term biodiversity is familiar to many people, and whether issues about biodiversity are of concern to many people. Demographic questions allowed respondents to be stratified according to gender, age group, occupation, and level of education (see Babbie 1990). People were interviewed on several occasions and at several different locations in the Chicago area. Surveys were conducted in two ways. In November 1994 and May 1995 surveys were conducted orally, and respondents were randomly selected. These surveys were conducted in the city of Chicago, and at the University of Illinois at Chicago. The surveys conducted at the University of Illinois at Chicago were given to biology undergraduate and graduate students and faculty members. In September, 1995 surveys were given to students in the BioScience 101 class at the University of Illinois at Chicago, and the Boston University Science 201 class. Respondents were asked whether they were familiar with the term "biodiversity." If they responded "no," they were only asked whether conservation is important to them. If they were familiar with biodiversity, they were asked whether they could provide a definition. All definitions were later categorized as to the type of response given. They were also asked additional questions concerning their perceptions about whether biodiversity should be preserved, the importance of biodiversity to society, why it is important to preserve, whether state or local governments should spend money to

preserve or to study biodiversity, and finally whether they perceive a conflict between economic development and protecting biodiversity. Most questions allowed the respondent to provide a yes or no answer, but additional comments were recorded. A copy of the survey is available from the author. A Chi-square analysis was used to analyze data.

RESULTS

A total of 1288 people were surveyed. Table 1 gives the distribution for all respondents as to age, gender, and education, and whether they were familiar with biodiversity. Of all 1288 respondents who were asked whether they were familiar with biodiversity, 473 indicated that they were familiar with the term. This represents only 36.72% of respondents; 63.28% of those surveyed who were not familiar with the word were then asked whether they thought conservation was important. Most (93.79%) considered conservation as being important to them.

Table 1. Distribution of Survey Respondents According to Sex, Age, and Education, who are/are not Familiar with the term "Biodiversity."

	Familiar	Not Familiar	Total
Sex			
Male	205 (38.6%)	326 (61.4%)	531
Female	250 (34.9%)	467 (65.1%)	717
Age			
18-25	289 (34.2%)	556 (65.8%)	845
26-40	100 (38.6%)	159 (61.4%)	259
>40	83 (45.6%)	99 (54.4%)	182
Education¹			
Grade	1 (11.1%)	8 (88.9%)	9
H.S. ²	320 (32.6%)	662 (67.4%)	982
A.A.	5 (33.3%)	10 (66.7%)	15
B.A.	17 (43.6%)	22 (56.4%)	39
B.S.	63 (44.1%)	80 (55.9%)	143
Masters	38 (57.4%)	28 (42.4%)	66
Professional ³	23 (95.8%)	1 (4.2%)	24
Ph.D.	6 (60.0%)	4 (40.0%)	10

¹ Highest level of education attained

² Includes UIC and BU undergraduates and general public

³ Includes JD, D.V.M., MD, DDS degrees

Gender

Of the 1288 respondents, 531 were male, 717 were female, and 40 respondents did not indicate gender. There was no significant difference between males and females in terms of their familiarity with the term biodiversity ($X^2 = 3.06$, d.f. = 1, $p < 0.05$). Of all

females interviewed, only 34.87% were familiar with the term. Similarly, 38.61% of males were familiar with biodiversity.

Age Group

When respondents were categorized by age group and familiarity, 34.20% of all 18-25 year-olds were familiar with biodiversity, 38.61% of those 26-40 were familiar with the term, and 45.60% of those over 40 years of age were familiar with biodiversity. Two respondents did not indicate age. The differences among age groups were significant; however, the higher percentage of those over 40 years of age included 8 members of the UIC Ecology and Evolution faculty, all of whom were familiar with the term. When these responses were excluded, the differences among age groups were not significant ($X^2 = 5.693$, d.f. = 2, $p < 0.05$).

Education

The highest level of education was recorded for each respondent. There was a significant difference between the sampled levels of education regarding knowledge of biodiversity ($X^2 = 64.76$, d.f. = 7, $p < 0.05$). Less than 1/3 of those with a high school education were familiar with the term biodiversity. This includes 753 undergraduates that were enrolled in introductory level biology courses. Nine respondents in the Ph.D. category included members of the Ecology and Evolution faculty at the University of Illinois at Chicago, all of whom were familiar with biodiversity. Even when these were removed from the analysis, familiarity level remained high, 93.3% of respondents in this category were familiar with biodiversity.

Location and Occupation

The location where the survey was conducted was recorded in an attempt to correlate location with knowledge about biodiversity. Out of 151 respondents surveyed at the zoo, aquarium, and natural history museum, 45.70% were familiar with biodiversity. This is slightly higher than the overall percentage of 36.72 for all respondents.

Occupation was also recorded and then categorized into the following types: Business-related (includes banking, marketing, sales, accounting, etc.), Clerical (secretarial, reception, etc.), Scientific/Medical (nursing, pharmacy, medical technician, etc.), Service profession (cashier, waiter/waitress, maintenance, housekeeping, etc.), Education (faculty, undergraduate and graduate students), Labor (carpentry, electrician, factory worker, plumber, painter, etc.), Professional (lawyer, dentist, veterinarian, writer, lobbyist, pilot, engineer, etc.), Artistic (includes actor, artist, designer, entertainer, etc.), and Miscellaneous (includes homemaker, unemployed, ministry, retired, etc.). This categorization made it possible to determine whether any particular occupation was more likely to be aware of biodiversity issues. When the responses from the undergraduate students at the University of Illinois at Chicago (UIC) and Boston University (BU) were combined, 34.1% ($n=753$) were familiar with biodiversity. This is similar to the results for the entire survey. A larger percentage of undergraduates in the BioScience 101 course at UIC were biology majors. Only 23 of the BU undergraduates enrolled in the Science 201 class were biology majors ($n=390$), yet 231 undergraduates at UIC were biology majors ($n=363$). Because the numbers of BU biology majors were so low, no comparisons can be made between the biology majors at different universities. However, more of the biology majors were familiar with biodiversity than the non-biology majors.

Forty-two percent of the biology majors (n=254) were familiar with biodiversity, and 29.7% of the non-biology majors (n=499) were familiar with the term. These differences were significant ($X^2 = 49.4$, d.f. = 1, $p < 0.05$).

Types of Definitions

Definitions given in this survey varied widely. There were 369 respondents who were able to provide a definition for biodiversity. Others had heard of biodiversity but could not offer a definition. Definitions were categorized into one of eight categories (see Table 2). Some responses had elements of a correct definition, but could not be considered as correct. These included “different types in nature; wildlife and nature; the full range of what’s available and living; many things living together.” Other definitions had no elements of what could be considered as correct. These included responses such as “a mixture of different cultures, and different kinds of biology.” Several respondents who had heard of biodiversity, yet were unsure of its definition, attempted to break the word down and define “bio” and “diversity” separately. Similarly, some knew that bio means life, and surmised that it must be defined as the diversity of life. Many responded that it had something to do with different life forms or species diversity. Others related biodiversity with specific habitat types such as rainforests, wetlands, or prairies, or equated biodiversity with the variety of organisms seen in nature.

Table 2. Definition Types and Percent of Respondents giving each type (n = 369).

Definition includes idea of a level of diversity: species richness, species diversity, community diversity	2.71
Definition notes that there are many different species and that an interaction occurs between them	5.42
Notes an assemblage of different organisms: species of plants, animals, etc., living together	27.37
Notes that variety exists within a specific area, habitat, etc.	18.97
Concerns the preservation and maintenance of organisms, species	7.05
Notes genetic variety and resources and their preservation	3.25
Definition cannot be included in any of the above categories but has elements of a partially correct answer	17.89
Definition contains none of the accepted, common elements of a definition of biodiversity	17.34

Do You Think We Should be Trying to Preserve Biodiversity? and Why is it Important to Preserve?

There were 416 people who responded to this question. Most of those who were familiar with biodiversity were able to answer this question, and 396 responded that they thought biodiversity should be preserved. When asked why biodiversity is important to preserve, answers again could be classified into several specific categories (Table 3). Six respondents felt that biodiversity does not need to be preserved. Reasons given for not preserving biodiversity included: “there are other more important things; natural selection takes place on its own; it’s important to others but not to me.” Some responded as to why they think others do not feel it is important to preserve. These reasons included:

“society is ignorant; it is not a priority to people; undeveloped countries waste resources and the U.S. sets a poor example; people don’t think it is important enough to everyone’s survival; it doesn’t touch people on a personal level.”

Table 3. Why it is Important to Save Biodiversity - Types of Responses and Percentage giving each response (n = 416).

For continuity, for future generations, to prevent extinction	28.02
To maintain a balance, maintain food chain, because of the interdependence of species	23.07
To preserve variety, because of genetic implications	6.32
For future knowledge, future uses, future economic value	12.09
Aesthetics, less boring world, all life forms are worth preserving	17.86
Respondent doesn’t know why it is important to preserve	4.95
Not important to preserve because economics and short-term gains more important	6.04
Biodiversity is not important to preserve	1.65

Should the U.S., or state or local government spend money to preserve or to study biodiversity?

Of the 298 people responding to this question, 90.60% responded that the government should provide funds for studying biodiversity. Some felt that support should be provided only at the level of the U.S. government, not at the state or local level.

Do you believe there is a conflict between economic development and protecting biodiversity?

Of those people responding to this question (n=404), 89.60% perceive a conflict between economic development and protecting biodiversity. Additional comments in response to this question commonly focused on the practice of thinking and acting in the short-term: current policies are driven by economics while the long-term consequences are not considered. However, some felt that a conflict can be avoided, and that it is possible to make a compromise between economic development and protecting biodiversity.

CONCLUSIONS

The main objective in doing this survey was to determine how familiar the general public is with the term biodiversity. Based on the 27% familiarity with biodiversity in the 1993 Defenders of Wildlife survey, it is not surprising that of all the people interviewed in this survey, only 37% were familiar with the term. These results clearly suggest that, despite a well-publicized international conference on biodiversity, most of the general public has a poor recognition of the word, many cannot define it, and therefore is probably unaware of the importance of protecting it.

As can be seen from the variety of definitions provided, a great deal of confusion remains about how biodiversity should be defined. E.O. Wilson, who has often been credited with the invention of the word, defines biodiversity as an all-inclusive term: “it’s the genetic-

based variation of living organisms at all levels, from the variety of genes in populations of single species, through species on up to the array of natural ecosystems.” (Anonymous 1994a). John C. Ryan, a research associate at the Worldwatch Institute defines it simply as “the ecosystems, species, and genes that constitute the living world” (Kerasote 1993). Many of the respondents knew that a definition of biodiversity included the idea of variety and encompassed many organisms. Some defined it in terms of preservation and maintenance. This association of the term with preservation may have occurred because some environmental groups use it to describe the action of doing everything we can to prevent any change in or impact to biodiversity (Skiba 1994).

Although in this survey there was no correlation between age and familiarity with biodiversity, it is interesting to note that among all those who were familiar with the term, 61.1% were in the 18-25 year-old age category. Most striking however was the correlation between level of education and knowledge of biodiversity. Respondents who had completed high school but not an undergraduate degree responded below the overall familiarity level of 37%. Clearly those with a higher educational level were more aware of biodiversity issues. It should be noted that when determining knowledge and perceptions about biodiversity, this survey does not include questions which relate other relevant experiences beyond education or occupation, and this survey was restricted to an urban setting. If conducted in other cities or rural areas, the results may be quite different. In addition, undergraduates in the two basic science courses were not questioned about whether they had previously taken other relevant biology courses that might have positively influenced their response.

Kellert (1991) conducted a survey concerning attitudes toward animals, nature, wildlife conservation, and behavioral interactions with animals among residents of urban and rural areas in Japan. These results were then compared to American responses. As in this study, college-educated Japanese were significantly more knowledgeable and appreciative of nature and animals than Japanese of limited education. In that study, college-educated Americans expressed greater ecological and ethical concerns for nature and animals than did Japanese of a similar educational level. Similarly, Holl *et al.* (1995), found that Costa Ricans have a limited awareness of environmental and population-related issues, and environmental knowledge tended to vary with level of education.

Many reasons have been cited for protecting biodiversity (see Ehrlich and Ehrlich 1981; Norton 1986; Wilson 1988; Noss and Cooperrider 1994; Meffe and Carroll 1994), and scientists agree that the loss of biodiversity and of species and habitats is a serious threat to the environment and to human welfare. Yet preservation and protection of biodiversity needs public support. Clearly, a public understanding of environmental issues is critical to the success of conservation efforts (Holl *et al.* 1995). Perhaps the current state of awareness of biodiversity was best summarized by Brussard (1994): “In discussions with dozens of people in all walks of life, I have found a rather startling naiveté on what biodiversity is, why it is important, and why we are concerned about it. Most of us are comfortably ensconced in academic or other environments where it is *sine qua non* that biodiversity conservation is good. It comes as a rather rude surprise to find out how many people in the world are ignorant of, indifferent toward, or opposed to the conservation of biodiversity.”

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Figure 1. Educational level and familiarity with biodiversity.

