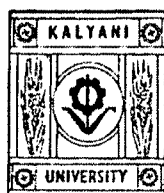


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IMPACT OF EDUCATION ON CONSERVATION OF BIODIVERSITY

**A THESIS SUBMITTED TO THE UNIVERSITY OF KALYANI
FOR THE FULFILMENT OF DEGREE OF DOCTOR
OF PHILOSOPHY IN EDUCATION**

By
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**DEPARTMENT OF EDUCATION
UNIVERSITY OF KALYANI
KALYANI, NADIA
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**INDIA
2012**

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SOUL*

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CERTIFICATE

This is to certify that the research work entitled “**Impact of Education on Conservation of Biodiversity**” by Smt. Sulagna Sen for the fulfillment of the requirements of the award of Ph. D. Degree in Education under the Department of Education, University of Kalyani is based on the results of research work accomplished by her. No part of this theses has been submitted for any other degree. She has completed the research work under my guidance.

Date : 3.5.12

A handwritten signature in black ink, appearing to read 'Dibyendu Bhattacharyya', is written over a horizontal line.

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Dated: 3.5.2012

Sulagna Sen.

(Sulagna Sen)

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CHAPTER - I

INTRODUCTION

CHAPTER – I

INTRODUCTION

1.1 Introduction

The ‘environment’, defined as those whole outer physical and biological systems in which man and other organisms live as a whole. Interaction between man and the ‘environment’ has been existed since it is an intrinsic aspect of human development. Man’s capacity to adjust his relationship with nature and man-made (i.e. social and cultural) environment and to transform the environment itself has passed through various phases. Environment plays a very important role and influences us in many ways so keeping into consideration its preservation had been the major concern for all. So today the study of the environment have emerged as major concern for all because our environment is being destructed due to various factors, and one of the major causes of environmental destruction is human activities. Man with his great skill and adaptive power has brought lot of changes and what distinguishes modern society from proceeding societies is the accelerating pace of the changes caused in the environment by scientific and technology revolutions. Technology based civilization has led to sophisticated world whereas a large number of environmental problem has also appeared due to misuse and overuse of natural resources. Hence, efforts are being made for inculcating environmental consciousness or awareness among the masses. It is education which can make the human being conscious and knowledgeable about environment and environmental problems. Moreover, awareness is essential for the action. The main purpose of environmental education in schools is to acquaint and sensitize the young minds to the environmental problems and concerns, to inculcate in them healthy personal and social attitude and behaviour towards environment. Thus, students must have awareness about environment and the problems associated with it so that they can play their role very effectively. Hence, it is necessary to know how far the school students are aware about environment and environmental problems.

1.2 Emergence of the Problem

Today environmental degradation and preservation have emerged as major issues in globalization studies. Our environment is being deteriorated every now and then due to various factors like population explosion, uncontrolled and lavish consumption of precious environmental resources, industrialization, urbanization and exploitation of abiotic and biotic components of environment. These have resulted in the present day environment crisis condition. In the past because of lack of awareness about the environment, nations developed in science and technology, but at the expense of degradation of environment. From here it is not surprising that half of the environmental degradations are due to human activities. With the progress in science and technology man has made a lot of revolution in various fields. Man has made a lot of progress through science and technology but at the same time overuse and misuse of environmental resources is destroying the equilibrium of environment. Man in an effort to fulfill his demands has exploited the environment. The environment has its own system of recovery but depletion of large amount of resources due to the activities of man has failed the self-recovery system of environment in many areas. So it has led to many adverse impacts on the environment.

Therefore, the forms of environmental awareness & the conceptions of nature in different social and cultural context, and the implications of social and cultural differences need to have environmental education. Environmental awareness is conceived as the totality of cognitions, attitudes and action. It is our goal, through empirical analysis & theoretical works, to depend on the theoretical understanding of the forms and dimensions of environmental awareness, particularly to outline the way, structural, cultural and social context & the everyday living environments influences the environmental thinking & the practices of people and social groups.

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different social and cultural context, and the implications of social and cultural differences have to incorporate on environmental education. Environmental awareness is conceived as the totality of cognitions, attitudes and action. It is our goal, through empirical analysis & theoretical work, to depend on the theoretical understanding of the forms and dimensions of environmental awareness, particularly to outline the way of structural, cultural and social context & the everyday living environments influences the environmental thinking & the practices of people.

1.3 Background Study

At the **Belgrade International Workshop (1975)** working documents were provided by the trend papers that described the state of the art of environmental education in all parts of the world and provision to extend and explore environmental awareness. It also states environmental awareness may provide power and understanding.

To recognize the interdependence among materials of the physical environment, plant, animal life for survival, growth and development. To take decisions individually and collectively an initiative action for social and cultural and economic survival growth and development and for conservation of native natural resources.

- To identity human, material, space and time resources in the environment.
- To recognize ways of making effective use of environmental resources for social, economic and cultural survival growth and development.
- To take decisions for the effective use of resources, to recognize the special significance of conservation of natural resources and initiative for support community efforts for the purpose.

As per directives of the **Hon'ble Supreme Court, the N. C. E. R. T.** has developed a model syllabus on environmental education for all stages of school education and the name has been published under the title '**Environmental**

Education in School'(June, 2004).

A number of Govt. and NGO's in different parts of the country are actively engaged to serve the course of environment and environmental problems by way of their programmes and activities through direct involvement of school children and general public. In the process many NGO's and Govt. have developed considerable experience and expertise in formulating and implementing programme involving research, development and dissemination on various aspects of issues and problems relating to environmental awareness and environmental education. The idea of introducing 'Environmental Studies' at the primary stage and secondary was conceived by council for the first in 1977 and since then the syllabi and text books have been revised during 1987-89 and again 2001-04.

Rajput, J. S. (1988) conducted "A research study for identification of teaching skills and training strategies for implementing the environmental approach at primary level".

Objectives :

- i) To produce integrated material for environmental studies (social studies) and environmental studies (science) for class III to IV.
- ii) To develop a strategy for teaching environmental studies I and II in class III and IV through the environmental approach and test the relative efficacy of the developed strategies in relation to the methods being used for realization of the objectives of primary education and
- iii) To identify teaching skills for the teaching through the environmental approach.

Findings of the Studies :

- i) The mean scores of environmental awareness for the experimental and the control group at pre-test level indicated that out of the comparison groups in seven schools, nine groups had no significant difference as a result of the treatment.

- ii) The result of comparison between the groups and within the groups indicated that out of 14 groups, five groups had no significant differences in both cases.
- iii) The significant differences obtained in some groups did not follow any uniform pattern.

Sahanawaj (1990) conducted a study on “**Environmental awareness and environmental attitude of secondary and higher secondary teachers and students**”.

Objectives :

- i) To determine the extent of awareness about the environment among students and teachers.
- ii) To find out the attitude of teachers and students towards the environment.
- iii) To find out the differences between teachers and students and male and female groups concerning the environment

Findings of the Studies :

- i) It was found that 95% of teachers and 94% of students possessed positive environmental attitudes.
 - ii) The environmental trained teachers and untrained teachers did not differ in their attitudes.
 - iii) Teachers had more awareness of the environment than students.
 - iv) Trained and untrained teachers did not differ on environmental awareness.
- Girls possessed significantly more awareness of the environment than boys.

Praharaj, B (1991) conducted a study on “**Environmental knowledge, environmental attitude & perception regarding environmental education among pre-service & in-service secondary school teachers**”.

Objectives :

- i) To find out the level of environmental knowledge & attitude of pre-service and in-service secondary school teachers.
- ii) To study their perception regarding environmental education in the

secondary school.

Findings of the Studies :

- i) The level of environmental knowledge was found low among per-service teachers, although conceptual knowledge was moderate.
- ii) Among the in-service teachers, environmental knowledge was moderate & factual knowledge about the environment was low.
- iii) Both the groups differ significantly in their level of environmental knowledge. They had a favourable attitude towards environmental education though the in-service groups had a higher level of attitude than that of the pre-service groups.
- iv) There was moderate co-relation between environmental knowledge & environmental attitude.
- v) Teachers perceived that environmental education could be a core part of social science, general science and science subjects also in secondary school as well as mass media have a potential role to play in imparting environmental education.

Sahool, K. C. (1992) conducted “**a critical study of the conception and perception of environmental education**”.

Objectives :

- i) To study the concept and constituents of the environment
- ii) To study the environment man relationship
- iii) To study the dynamics of the environment and
- iv) To renovate the concept of environmental education.

Findings of the Studies :

- i) The concept of the environment is broadly divided as natural and man made types
- ii) Flora and fauna constitute the biotic environment
- iii) The atmosphere, hydrosphere and lithosphere constitute the abiotic environment

- iv) Man made environments are different types, such as social, economic, political, cultural, aesthetic, historical, geographical, psychological, religious and academic
- v) The fusion of different types of environment from the holistic concept of environment. The relationship between man and environment is symbiotic in nature
- vi) The different stages of evolution – the hunting-gathering stage, the agricultural stage and industrial stage reflect such a relationship.
- vii) Gradually man's domination over the environment has created complexities in the man-environment relationship.
- viii) Efforts are continuing with regard to environment management with focus on unity of life. Sustainable development, human welfare, futuristic and cultural programme.
- ix) Self management is perceived as the best formula for good environmental management
- x) General workshop at national and international levels have thrown light on the conceptual analysis of environmental education. Environmental education is a broad concept and is perceived as lifelong experience for all

P. N. Mishra and G. Airen (1994) studied on **environmental education** and revealed that there are many campaigns for environmental awareness and for banning activities that endanger environment. However these are only external and superficial measures that do not get to the root of the problem. Solving environmental problems requires greater co-operation and co-ordination between nations both at the regional level and also worldwide level leading to attitudinal shift among the masses.

V. Sandhu and T. S. Dhillon (2004) made a study of “**Environmental education awareness among elementary school teachers**” in Punjab. This study was conducted on 1800 elementary school teachers to study their environmental education awareness with respect to their residential

backgrounds and subject specialization.

Findings of the Studies : Results revealed significant variation in the environmental education awareness with regard to their residential background and subject specialization but no significant variation was observed in relation to the sex of elementary school teachers.

R. C. Sharma (2004) prepared a paper on **“Implications of environmental education in teacher education”** in New Delhi. Revealed that education, particularly school education could play a greater role by making an impact on the thinking of young minds to protect the universe from deterioration. This paper suggests ways to attract teacher education for bringing out effective changes in school evaluation. Adopting to an inter disciplinary nature. The author suggests, the environmental education should go beyond school boundaries for reacting to all sections of the society.

M. Abraham and N. K. Arjuna (2005) conducted a study on **“Environmental interest of secondary school students in relation to their environmental attitude”** in Kerala. The environmental interest inventory and the environmental attitude scale constructed and standardized for the purpose of the present investigation were used for collecting data from a sample of 624 secondary students. The results showed that the secondary school students did not have a high level of environmental interest. A differential effect of gender and locality were observed in their environmental interest, the boys and urban subjects were found to have more interest in environmental matters compared to their rural counterparts. A high positive and significant co-relation was found to exist between environmental interest and environmental attitudes in all the sample groups studied.

Kamla-Raj (2010) conducted a study on **“Assessment of Environmental Awareness among Higher Primary School Teachers”**.

Objectives : To study the environmental awareness of higher primary school teachers of Mysore city in India.

Main findings : Majority of the teachers had moderate levels of environmental awareness. Female teachers found to have higher levels of environmental awareness compared to male teachers. Teachers in the age groups of 31 to 50 years had higher levels of awareness as compared to other age groups. Teachers working in private schools had higher levels of environmental awareness as compared to teachers working in government schools. The overall analysis revealed though majority of the teachers had moderate awareness, only few of them had high levels of awareness.

Rajinder Kaur & Manpreet Kaur conducted a study on “**Environmental Awareness of Secondary and Senior Secondary Students**”.

Objectives : To study the environmental awareness level of students.

Findings : Level of environmental awareness among secondary and senior secondary students. There were 117 items in the EAS and each item was given a credit of ‘1’ point and a ‘zero’ for wrong answer. The observed means score of the entire sample of secondary and senior secondary students was 88.16 which is quite high. The secondary ($M = 88.62$) and senior secondary ($M = 87.5$) students of Patiala district have more awareness regarding the environment. The reason behind it is that Patiala is considered to be the educational hub having all kinds of educational institutions like a university, engineering colleges, medical and dental colleges, various arts and science colleges and numerous schools.

Biodiversity from the above studies may be defined as existence of various forms of life on earth both in plant and animal kingdom. Biodiversity is the result of evolution over the long geological ages. All the living organisms including man are inter-related and interdependent. They have each evolved out of another in certain conditions with certain structures. Each has a definite biomass, number of varieties and geographical spread. One species depends on another for its survival. In fact all the living beings including plants have acquired an ecological balance amongst themselves.

Biomass is the weight of living organism on the earth. The biomass of

marine organisms is only 0.13 percent of total biomass of the planet, the remaining 99.87 percent is contributed by the organisms living on the continents, of this again 99.2 percent is contributed by green plants. The earth is a body of finite size which has only limited resources, essential for life. These resources are available only because life has adopted the method of recycling the limited resources within a circle, thus making them ever inexhaustible. Each species, animal or plant is a link in this biotic cycle. Each has to release to the environment, materials which will be used by others.

The essential conditions required for survival of life on earth are as follows :

Natural Factors : Solar energy, optimum temperature on earth, water and soil.

Biological Factors :

1. Producers : These are plants and algae phytoplankton, utilizing the solar energy through the process of photosynthesis, they produce glucose, and oxygen which are partly utilized by themselves and mostly released to the atmosphere for the consumption of other living creatures.

2. Consumers : These are living beings who entirely depend on producers for their food and respiration.

3. Decomposers : These are microbes, bacteria and fungi. They decompose the dead tissues of producers and consumers, breaking down complete protein into elementary substance, necessary for photosynthesis by the producers.

So it is quite apparent that various forms of life are essential for the existence of life or in other words life cannot exist on earth in limited forms. This is why “Biodiversity” is essential for all living beings and specially human beings. It is also necessary for the development of new seeds, foods etc. Therefore, the key element of the convention signed during the Earth Summit in June 1990 at Rio-de-Janeiro, Brazil, is the conservation of biodiversity.

India’s graphical location provides best possible bio-ecological conditions necessary for biodiversity. In the north, India is provided with great

Himalayan system, in the West, desert system, in the East Great Gangetic Peninsula, and in the South, Ghat systems with tropical rain forests. Moreover, India has more than one hundred surface flowing rivers and more than 600 m. long coastline.

Scientists estimate 45,000 plant species. Of them 15,000 species originate in India. In India, there are 850 species and sub-species of mammals, 2,000 species and sub-species of birds, 450 reptile species, and 25,000 species of fresh water and marine fish. Besides, there are nearly 1 lakh species of invertebrates. And then one has to remember that still many a species remain unexplored both in plant and animal kingdom. In fact India is certainly one of the richest bases for global biodiversity. Hence, India has to play a major role in maintaining biodiversity for its own interest as well as for whole mankind.

Conservation of biodiversity is not possible unless human society become aware of dangers inherent in destruction of nature and adopts alternate approach to its development. For this, worldwide mass awareness has to be built up at a fast pace. In this task education both formal and informal, has to play the key role. The older generations of society are naturally more resistant to new ideas and practices. It is very difficult to make them give up their old habits and ideas. On the other hand it is much easier to approach the younger generations and make them aware of new realities. In the task of creating environmental awareness, therefore, one has to lay stress on children. They will not only enthusiastically embrace an environmental perspective of tomorrow, they will also make the necessary changes without delay. More than that, they will insist their parents and others to change as well. Hence environmental education has to start from the very primary level and must proceed upto the highest level.

For environmental education role of mass media, newspaper, radio and television is vital. They are essential for educating both children and older generation. With all these in view, Environmental Education Programme was established by UNESCO in 1975.

In this study the researcher tried to find out how the level of education in urban and rural female influenced to build up consciousness about conservation of biodiversity.

1.4 Statement of the Problem

The human species entered the industrial age with biological diversity possibly at an all time high. Biological resources were freely available for exploitation to support development. But now, in the 21st century people are beginning to realize that biological resources have limits, that those limits are being exceeded and that over exploitation result in substantial loss of biological diversity.

But unfortunately, except scientists and naturalists most of the people of our country are ignorant about this problem. Only a handful of people, though gradually increasing in number are pressing for recognition of the problem and urgent steps for its solution.

To convince the people that it is in their own interest that biodiversity and other natural resources should be maintained, education about ecology among common people is needed. An attitude of kindness and sympathy from the point of human consideration should be inculcated in their minds from their childhood. Therefore, ecological education should be included in the primary level as well as in higher level of formal education. Also through informal and mass education, awareness of the people about the situation should be built up.

Therefore the study includes “Impact of Education on Conservation of Biodiversity”.

In this study the researcher tried to investigate the role of education in females in building up awareness about the conservation of biodiversity. She also made a comparison between the consciousness of rural people and urban people, which reveals the influences of environment on human being in building up ecological awareness.

1.5 Definition of the Terms

1. Education :

Education means bringing up of a child; it is also described as instructions for strengthening of the powers of the body and mind. Popularly education means imparting knowledge and giving guidance to the pupils so that they acquire skill and collect information.

Education has been defined by different educators in many ways. Some of the definitions are as follows –

“Education is the manifestation of perfection already in man” – Swami Vivekananda.

“Education aims at the full manifestation or expression of the inherent traits and characteristics, talents and tendencies” – Adams.

“By Education I mean which helps you to hate what you ought to hate and to love what you ought to love from the beginning of life to the end” – Plato.

2. Environment :

The environment of any organism consists of the sum total of conditions that enter in an active way into the direction of functions of any living being. Environment therefore is not equivalent merely to surrounding physical conditions. There may be much in the physical surroundings to which an organism is not responsive, such conditions are no part of its true environment. Whatever affords its food, whatever threatens it, whatever operates as signal to direct it toward food or a mate, or away from an enemy or hostile conditions are true constituents of its environment.

3. Biodiversity :

Biodiversity covers all forms of life and all the habitats that support life. We must preserve these not only for their aesthetic or scientific value nor out of our kindness towards them but also for a more essential purpose, to maintain the

varied forms of life we eat, use and live with and for ourselves to survive.

People alter the biodiversity of the earth in both direct and indirect ways. The extravagant use of renewable resources, for instance, often directly decreases species diversity. This is especially true in extractive industries such as forestry or fisheries, which tend to over exploit useful species and destroy or modify the native biota. In addition people indirectly change biodiversity by burning fossil fuels, biomass for energy, by altering hydrological patterns, by intentionally or accidentally introducing exotic species that reduce interregional biodiversity; and by destroying hedges, forest fringes, and fallow lands that provide habitat. A new and powerful human threat to species diversity is the releases of toxic chemicals such as lead mercury, fluorocarbons and chlorinated pesticides into the atmosphere, soil, rivers, lakes and oceans.

Efforts to save the planets rich diversity of plants, animals, and natural ecosystems from human encroachment have been largely inadequate. According to the best estimates available, more than 10,000 species become extinct each year due to habitat destruction. Now, an even more dangerous and literally invisible threat looms large before us, that is global climatic change caused by the build up green house gases in the atmosphere. If it occurs as predicted by the majority of climatologists, greenhouse warming would trigger a massive disruption of natural environments, overwhelming today's preservation efforts and setting off a wave of mass extinctions.

Wilson and Peter (1988) define biodiversity as "Biodiversity encompasses the totality of life on earth, in all of its variety of molecular, cellular, specific, ecological and landscape patterns".

According to J. A. McNeely, Kenton R. Miller and others (1990), "Biodiversity is the variety of the worlds living species, including their genetic diversity and the communities and ecosystems that they form".

"Environmental awareness means to help social groups and individuals to acquire an awareness of and sensitivity to the total environment and its allied

problems”.

Dr. Praveen Kumar Jha (1998) – “Environmental awareness may be defined to help the social groups and individuals to gain a variety of experiences in and acquire a basic understanding of environment and its associated problems”.

R. A. Sharma – “Awareness describes a human and animal perception and cognitive reaction to a condition or event. Awareness does not necessarily imply understanding, just as ability to be conscious or feel or perceive”.

Wikipedia (the free encyclopedia) – “Awareness focuses on an internal state, such as a visual feeling, or on external event by way of sensory perception. Awareness provides the raw material from which animals develop idea about their experience”.

Develop Conscious Awareness

Environmental education has been an integral part of our school education and also problems related to the environment are either integrated with different disciplines or introduced as a subject.

The terms environmental education and environmental awareness used interchange for the same meaning but there is significant difference in these two terms, environmental awareness may be defined as to help the social groups and individual to gain a variety of experiences in and acquire a basic understanding of environment and its associated problems.

4. Ecological Balance :

All the living organisms including man are interrelated and interdependent relationship is hardly realized by man who has been through the ages the principal agent of changes, trying to create a new order in which he is the master. Condition of imbalance is not used to bear with a state of imbalance for long, it must seek to restore its balance even at the cost of causing large

scale human misery.

So the study of ecology has assumed immediate importance because common people must know what constitutes the ecological balance.

5. Sustainable Agriculture :

In the remaining years of this century about 1.3 billion people will be added to the human family. The global food system must be managed to increase food production by 3–4% yearly. The agriculture system that have been build up over the past few decades have contributed greatly to the alleviation of hunger and the raising of living standards. They have served their purpose upto a point. But they were built for the purpose of a similar, more fragmented world. So the sustainable agricultural system can only meet the challenge of the future.

The word sustainability is now widely used in development circles. But what does it really mean ? According to a dictionary definition, sustainability refers to keeping an effort going consciously, the ability to last out and keeping from falling. In the context of agriculture sustainability basically refers to the capacity to remain productive while maintaining the resource base.

Sustainable agriculture is the successful management of resource for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources.

It can also be said, that sustainable agriculture is an agriculture which makes optimal use of locality available natural and human resources (such as climate, landscape, soil, water, vegetation, local crops and animals, local skills and indigenous knowledge). It is economically feasible, ecologically sound, culturally adopted and socially just. The use of external inputs, such as mineral fertilizers, pesticides and machinery is not excluded but they must be used as complementary to the use of local resources and they have to meet the maintained criteria of sustainability.

6. Gene Bank :

Genetic resources are the resources of genetic materials of biological world. Genetic resources are being collected by research centers but are usually stored in high technology gene banks either in developed countries or in international agricultural research centers.

These genetic resources are preserved in the gene banks for various purposes. They are as follows :

1. For collecting, evaluating safeguarding, improving, multiplying and distributing indigenous genetic resources in their place of origin.
2. For development of better qualities of plant and animal products of economic importance.
3. For development of disease resistant varieties of plants and animals.
4. For development of drought resistant and flood water / logging varieties.
5. For improving biotechnological techniques.
6. For development of antibiotics.
7. For immunology.
8. For production of new drugs.

7. Conservation :

Conservation is one of the most significant application of ecology.

Odum (1972) has defined conservation as “the process in which careful exploitation, protection and management of our natural resources is carried on and the process by which these natural resources are protected from destructive influences misuse and decay are together known as conservation”.

The term ‘conservation’ embraces measures to protect and to enhance the productivity of the biosphere and not simply “preservation”. It is really a dynamic process to effectively safeguard the living resources of the biosphere and their habitat and endanger their optimum development and to develop without destroying.

Conservation emerged as an issue of popular concern only in recent times, notably during 1970s. In March, 1980 the conservation movement reached a peak with the launching of the “World Conservation Strategy” prepared by IUCN in cooperation with UNEP and the World Wild Life Fund.

8. Wild Life Conservation :

Animal living in their natural habitats and varieties of birds, the nature's masterpiece, together constitute the treasure of wild life in a country.

The wild life animals are in danger and threatened to be extinct unless immediately protected by laws and other means. With the advancement of civilization, man uses more and more natural resources. The sports of hunters, unlimited greed of the businessmen, unscientific use of forests, and lastly rehabilitation of people due to population explosion at the expense of the forests, are the major causes of rapid decline in the number of wild life animals. Man kills the wild life at random for flesh, skin, horn etc. If these are allowed to be continued the wild life animals are going to be extinct very soon.

However, fortunately for the wild life animals, both the national and the international authorities have become fully aware of seriousness of the problem and the utility of the conservation of wild life and have taken adequate measures against the want on destruction of these wild life animals.

9. Forest Conservation :

With modernization, means of various activities for better living is increasing day by day. By destroying nature man is creating conditions for self destruction.

Big forests are being uprooted for the development of cities. Forest plants are utilized as fuel as well as for making furniture.

Random utilization of these natural resources will endanger the civilization in future. Utilization of natural resources should be done in a

planned way. For this, proper knowledge of ecology is essential.

The forests provide us with fuels, give shelter to a number of organisms, supply food to primary consumers and induce rainfall. The forests also resist soil erosion and even flood. Moreover, fibers, resin, paints etc. are forest products. Many animals live on seedlings while others feed on leaves of nature. Plants are frequently destroyed by fungi and bacteria. The forest plants are occasionally burnt on getting fire.

There are certain measures of forest conservation. These are –

- a) to clear up the woody creepers frequently,
- b) to avoid possible norms to the seedlings during cutting the trees,
- c) to separate the branchlets after cutting the trees,
- d) to uproot the plant growing in excess,
- e) to cut down only the fully matured trees,
- f) to control plant diseases as soon as possible,
- g) to extinguish the fire immediately in emergency,
- h) to plant every year double number of the trees which have been cut down in that period,
- i) to destroy the affected plants etc.

10. Attitude :

A term which has been used to describe in a general way the reaction of a subject upon any impression received from his environment. Used in this fashion it is sufficiently comprehensive to include feeling, attention, and other similar general phases of mental experiences. It refers also to bodily activities when these are directed toward given objects and thus serves the useful purpose of associating in discussion mental states with the bodily reactions which they condition or by which they were themselves conditioned. Thus one speaks of an attitude of disgust or pleasure and includes at once the inner mental emotional experience and its physical external accompaniments of muscular response.

11. Attitude Scale :

The most common type is probably the subject-centred type which was introduced by Likert. This approach represents a direct application of test theory as developed from the measurement of general cognitive activities. The construction of a Likert Scale starts with the collection of a large number of prime facie relevant statements which are administered to a sample of subjects who are asked to indicate their agreement or disagreement with each statement. Item analysis or factor analysis is then used to remove from the initial collection those statements which do not show sufficiently high correlations with either the initial total score or other items, in order to insure a scale with high internal consistency and reliability.

Technical and Social Aspects of Biodiversity Conservation :

ESD can contribute by making opportunities available for societies to train people in these skills. This group will create the framework through which societies can identify the required skills and values. Urban populations rely on biodiversity, whether it is that which is proximate to their surroundings, or the ecosystems which encircle our cities. Urban countries are also places where sustainable patterns of consumption and production can be fostered. This group will explore strategies that cities can use to promote biodiversity protection and encourage sustainable development.

Biodiversity and Cultural Diversity

The rich diversity of life on Earth encompasses not only biological, but also cultural diversity, including variety of practices, traditions, languages, artistic expressions, and belief, value and knowledge systems, which are rooted in and depend on specific aspects of biodiversity. Recognizing that biological diversity is intimately linked to cultural diversity and that together these two forms of diversity hold the key to sustainable development, this group will explore the ways of linking the issues of cultural and biological diversity in the

context of ESD and in particular by focusing on integration of the following aspects in education and learning processes referred from UNESCO World Conference on Education for Sustainable Development (31 March–2 April, 2009) Bonn, Germany.

1.6 Objectives

The study was conducted with the following objectives :

1. To study the impact of biodiversity on education in female population.
2. To find out the impact of different dimensions of biodiversity on education.
3. To determine the attitude of urban and rural females towards impact of biodiversity.
4. To find out the impact of different dimensions of biodiversity on education on the basis locality and different groups of female population.
5. To prepare and standardize a suitable tool for assessment of biodiversity.
6. To study the impact of education on conservation of biodiversity on the basis of knowledge, attitude, awareness, participation, values.

1.7 Significance of the Study

1. The study throws light on a very recent and most important problem of the world of ecology.
2. Through the study, different aspects like wild life conservation, forest conservation, gene bank, sustainable agriculture are discussed.
3. The awareness about biodiversity is inculcated in the illiterate females.
4. In this study, the level of consciousness, regarding conservation of biodiversity among different types of people in our society is also revealed.

1.8 Methodology

The study is survey type of research. Only females of different groups are taken from selected parts of West Bengal as population and the sample is purposive in nature .

1.9 Tool

The Questionnaire constructed by the researcher and standardised was used as a tool in the study with the following dimensions :

- 1) Knowledge.
- 2) Attitude.
- 3) Awareness.
- 4) Participation.
- 5) Values.

1.10 Hypotheses

The study formulated and tested following hypotheses :

1. The adult educated subjects and adult illiterate subjects will differ significantly in their knowledge about conservation of biodiversity.
2. The urban teachers and rural teachers will differ significantly in their knowledge regarding conservation of biodiversity.
3. The urban students and rural students will differ significantly in their knowledge about conservation of biodiversity.
4. The urban illiterates and rural illiterates will differ significantly in their knowledge regarding conservation of biodiversity.
5. The adult educated subjects and adult illiterate subjects will differ significantly in their attitude about conservation biodiversity.
6. The urban teachers and rural teachers will differ significantly in their attitude regarding conservation of biodiversity.
7. The urban students and rural students will differ significantly in their attitude about conservation of biodiversity.
8. The urban illiterates and rural illiterates will differ significantly in their attitude regarding conservation of biodiversity.
9. The adult educated subjects and adult illiterate subjects will differ significantly in their awareness about conservation of biodiversity.

10. The urban teachers and rural teachers will differ significantly in their Awareness regarding conservation of biodiversity.
11. The urban students and rural students will differ significantly in their awareness about conservation of biodiversity.
12. The urban illiterates and rural illiterates will differ significantly in their awareness regarding conservation of biodiversity.
13. The adult educated subjects and adult illiterate subjects will differ significantly in their participation in conservation of biodiversity.
14. The urban teachers and rural teachers will differ significantly in their participation in conservation of biodiversity.
15. The urban students and rural students will differ significantly in their participation in conservation of biodiversity.
16. The urban illiterates and rural illiterates will differ significantly in their participation in conservation of biodiversity.
17. The adult educated subjects and adult illiterate subjects will differ significantly in their values regarding conservation of biodiversity.
18. The urban teachers and rural teachers will differ significantly in their values about conservation of biodiversity.
19. The urban students and rural students will differ significantly in their values about conservation of biodiversity.
20. The urban illiterates and rural illiterates will differ significantly in their values regarding conservation of biodiversity.

1.11 Delimitation of the Study

The study was delimited in terms of samples, content and tools. The delimitations are as follows :

The study was conducted on female population only. Three groups of females were selected randomly. These are (a) teachers, (b) students, (c) illiterate adults. The researcher has collected the samples for her research work from

rural and urban areas.

Out of 600 samples, 200 were school teachers of whom 100 subjects were taken from urban area and 100 subjects from rural area. 200 subjects were students having twelfth grade education of whom 100 were from urban area and 100 from rural area. 200 subjects were from illiterate adult females of whom 100 were from urban area and 100 from rural area.

CHAPTER - II

REVIEW OF RELATED STUDIES

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REVIEW OF RELATED STUDIES

2.1 Introduction

A fundamental measure of biological richness and ecosystem health, is a concept called ‘Biodiversity’. Biodiversity, and its impacts, is the subject of this report. The report was commissioned by the Conservation Planning Tools Committee, a consortium of Ministries and NGO’s with a conservation mandate. This report will become part of the larger Biodiversity Status Report, which will be used as a basis for the development of a Biodiversity Action Plan. It is important to note that climate change impacts on biodiversity is addressed in a separate background report, and is not addressed directly in these pages. Biodiversity is not only a challenge to maintain, it is a challenging concept to define.

First coined in 1980, we have been in almost daily contact with the word for over twenty five years. Yet it remains a vague concept for the average person, and even among scientists, there are widely differing interpretations.

The working definition of biodiversity used in this report is “the variety of species and ecosystems and the ecological processes of which they are a part including ecosystem, species and genetic diversity components”. The highest conceptual level of biodiversity is the number of different ecosystems within a given area. Next is the number of species also known as the Biodiversity within a specific ecosystem or site (this level is also known as alpha diversity) and the lowest level of biodiversity is the amount of genetic diversity within a population of a single species. These three categories or levels are somewhat arbitrary. We could just as easily come up with two or twelve but they are useful for describing and managing biodiversity. The individual levels of biodiversity are like Russian dolls, one level is nested within the next one above it, and so on.

The term biodiversity itself is not spatially specific; it can be used to describe the biological characteristics of a pond, or of a continent. Biodiversity can also be described not by genes, species and ecosystems, but on the basis of functional types. For example, moose and caribou are separate species, but their ecological function – large herbivores is the same. Functional biodiversity is a less common approach, but has the advantage of focusing on ecological processes – herbivore, nitrogen fixation, predation, etc. rather than cataloguing genes, species and ecosystems. However, this report will confine itself to the conventional approach.

Although the results are often visually obvious, there is a paucity of quantitative data linking various environmental impacts to permanent, or even temporary, decreases in biodiversity. Loss of habitat through land conversion presents a clear, quantifiable case, but linking less dramatic impacts, for example connecting pesticide use or invasive plants to biodiversity losses is much more challenging.

One crude method of monitoring biodiversity loss is to track fluctuations in the number of species on the federal and provincial species at risk lists. However, species additions to the various lists often occur as a result of recent monitoring or research rather than as a result of actual declines in population size or range. So it is not an entirely accurate barometer.

Ref. : Major Impacts to Biodiversity (Excluding Climate Change). D. Gayton, Forrex, May 2007.

2.2 Describing Impacts on Biodiversity

In review of the literature and discussions with biodiversity practitioners, it became clear that cataloguing the impacts on biodiversity in several different ways. The basis for this difference lies in the concepts of “proximate cause” the specific biophysical event that causes the loss of genetic, species or ecosystem diversity “intermediate cause” For example, the proximate cause for the decline

in a particular fish population might be excessive siltation of gravel beds where they customarily spawn.

The intermediate cause of the decline could be a hydroelectric dam upstream of the spawning bed, which has reduced the volume and velocity of the spring freshet that normally flushes silt out of the gravel. The ultimate cause, in this same instance, is the human demand for electrical energy. Much of our current attention is focused on proximate and intermediate causes.

Impacts on biodiversity are also a matter of degree. Stepping on an ant is theoretically an impact on biodiversity, but we deem it to be insignificant. At the other end of the scale, there is general agreement that we have severely damaged the life of the river with an excessive number of dams on its main stem and tributaries. Somewhere between these two extremes lies the notion of sustainability – that ecosystems and biological processes are able to tolerate and absorb certain thresholds of human activity, but above those thresholds, biodiversity inevitably declines. And finally, social priority and level of knowledge affects our understanding of biodiversity. As little as two decades ago, this rapid change is symptomatic of a larger shift in social attitude toward nature, a shift that proceeds apace. If the trend continues, one may assume that previously ignored aspects of our biodiversity will gain in importance.

For instance, insects are a functional part of our biota, yet except for a handful of forest insect pests, we commonly ignore that component when describing and managing ecosystems, mainly because we know so little about them. The cataloguing of British Columbia's insects including those that are rare and even new to science proceeds very slowly since only a handful of entomologists are available to work on it. However, it is quite possible that in a few decades insects and other invertebrates will play a major role in our biodiversity measures.

An attempt was made to identify and document the major impacts on biodiversity in British Columbia (excluding climate change). An initial attempt

was made to develop quantitative criteria for selecting “major” impacts, but the impacts themselves are so diverse and multifaceted, that they almost defy quantitative comparison. In the final analysis, the criteria used for selecting major impacts was expert opinion, research, and my own judgment. It is worthy of note that the major impacts selected for this report are similar to those selected by The Nature Conservancy of BC in their Okanagan Ecoregional Assessment (Pryce et al, 2006).

There are positive human impacts on biodiversity, as well as negative ones. The creation of protected areas, for instance, can slow the loss of biodiversity. Although positive impacts are mentioned tangentially in the various Discussion Sections of each impact, this report confines itself to negative impacts. The impacts selected for the report are generally intermediate and ultimate causes, as described above. “Habitat loss” is obviously a major source of biodiversity impact, but avoided this catch-all term, opting instead to identify the major drivers of habitat loss. Proximate causes tend to be amenable to technical solutions; ultimate causes generally require major economic, political and / or cultural solutions. At the conclusion of the report, speculation was made on ultimate causes and their potential solutions.

Major Biodiversity Impacts :

Thirteen impact categories have been selected, based on research and consultation. They are :

- Urban sprawl.
- Aquatic, terrestrial and atmospheric pollution.
- Fresh water use.
- Water-body alteration and impoundment.
- Energy use.
- Introduced invasive species.
- Forest harvesting.

- Roads, transmission lines, pipelines, seismic lines.
- Mineral, gravel, oil, coal and gas extraction.
- Agriculture.
- Fire suppression.
- Back country recreation.
- Fishing and fish farming.

2.3 Biodiversity Education

1. Research on the impact and effectiveness of biodiversity education including different pedagogical methods, use of different media and innovative technologies on the values of society, on the level of awareness on biodiversity related problems and on perceptions.
2. Research on the use of biodiversity as an interdisciplinary educational resource.
3. Research on assessment methods to evaluate and measure the effect and effectiveness of biodiversity education.
4. Research on the active participation of schools in gathering and delivering biodiversity related data and information in cooperation with the biodiversity research community.
5. Promote the involvement of the educational community in inter- and transdisciplinary biodiversity research.
6. Improve access to biodiversity related data and information, ensuring that data can be used in education; using and further developing existing facilities, including the CBD Clearing House

The participants of this meeting also agreed that education as such plays an essential role in communicating biodiversity and biodiversity research. To optimize the impact education has on the understanding of biodiversity, responsible authorities should :

1. Further increase the impact of scientific research by fostering cooperation

between scientists and formal, non-formal and informal education institutions.

2. Support development of curricula, pedagogical methods and innovative tools to facilitate education on biodiversity and biodiversity research.
3. Establish participatory mechanisms for effective education and active involvement of multiple.
4. biodiversity stakeholders to ensure sustainable use of biodiversity.
5. Strengthen educator training concerning biodiversity.
6. Promote the involvement of families in biodiversity education.
7. Promote the involvement of pupils, students and their families in biodiversity monitoring, management and conservation, including urban areas, as a pedagogical strategy.
8. Develop and promote education related aspects within a concept of a “UN Decade of biodiversity”.

These research priorities were derived from the following considerations :

- Biodiversity is an integral part of sustainable development (CBD).
- The UN has declared a Decade of Education for Sustainable Development for the years 2005-2014.
- The Council of the European Union emphasizes that education is a prerequisite for promoting the behavioral changes and providing all citizens with the key competences needed to achieve sustainable development.
- The EU countries have decided to implement the UNECE Strategy for Education for Sustainable Development adopted in Vilnius in 2005.

1. Mainstreaming Biodiversity into Education and Learning :

Provision of food, fuel and fiber, shelter and building materials, purification of air and water, detoxification of wastes, moderation of floods and droughts, stabilization of climate, control of pests and diseases, as well as

cultural and aesthetic benefits: these are just some of the many services that biodiversity, the diversity of genes, species, and ecosystems, provides to all forms of life on Earth, including humans. Yet, for most people, biodiversity remains the invisible basis for human existence. Increasingly settled in urban settings, the global community is largely unaware of the extent to which their economic, social and cultural well-being is founded on strong, resilient ecosystems, landscapes and seascapes which are themselves buttressed by a rich diversity of genes and species. For those communities that directly rely on biodiversity for their livelihoods, short-term considerations may obscure the impacts of their practices on the capacity of ecosystems to provide essential services on the long-term.

In both cases, this lack of awareness leads to practices that overexploit natural resources and harm biodiversity. Raising awareness of the critical role that biodiversity plays in ensuring environmental sustainability, economic prosperity and social and cultural well-being will contribute to the enhancement and/or the development of sustainable development actions, including ways of organizing thoughtful consumption and production behaviors that are sustainable from local to global levels. People are willing to take the steps to engage in a life long learning process that will allow them to live in a way that will ensure a sustainable future including saving biodiversity. ESD can provide the values, competencies, knowledge and skills for citizens to realize this process. During the workshop, participants will engage in group exercises to reflect on the following concepts, linked to the objectives of the Conference: Objective 1 : “Why is ESD relevant ?” Participants will reflect on how ESD is a key approach for the promotion of the conservation and sustainable use of biodiversity. Objective 2 : “What can we learn from each other ?” Discussions and activities will promote the sharing of how people experience biodiversity, and how it contributes to the identity of communities. Objective 3 : “What have we achieved so far, what are the lessons learned ?” Participants will share the

ways in which biodiversity has already been mainstreamed into different contexts of learning. Objective 4 : “Where do we go from here ?” The discussions will culminate in the development of recommendations/guidance for action plans focused on mainstreaming biodiversity into concrete thematic settings and their integration into ESD plans overall.

2. Structure and Organization :

- a) Understanding biodiversity and its place in ESD.
- b) Bringing biodiversity into contexts of learning.
- c) Action for a sustainable future : experiences with biodiversity.

a) Understanding biodiversity and its place in ESD :

A sustainable relationship between human communities and the biodiversity upon which they rely is the cornerstone of a sustainable future. Understood by scientists and resource managers, the concept of biodiversity and its relationship to human well-being however remains opaque and intangible for many. The Millennium Ecosystem Assessment identified the ways that human well-being is founded on the services provided by ecosystems and biodiversity. Mainstreaming biodiversity into education and learning processes requires that people begin to recognize the relationship between biodiversity and human well-being and reflect on how this is exemplified in every day life.

b) Bringing Biodiversity into Learning Contexts :

Formal : Formal education systems around the world are continually asked to include a range of social issues in their curricula. At the same time, a concern for the loss of biodiversity and the ethical issues surrounding its sustainable use remains central to ESD. Therefore the goal is to infuse key biodiversity messages into the pursuit of a more sustainable future and engage formal education on this basis

Non-formal learning providers support this “everyday” learning by

offering structured and free-choice opportunities for people to explore ideas, to satisfy curiosity, to gain information and skills, and to improve their quality of life. The goal is to identify ways that biodiversity is being explored by these communities and encourage sharing of experiences

c) Action for a Sustainable Future – Experiences with Biodiversity :

Taking the principles elaborated in the first two themes as a point of departure, workshop participants will create action plans for including biodiversity into ESD for specific themes: cultural values if biodiversity diversity of cultural practices impacting biodiversity and diversity of knowledge systems .

d) Using Ecosystem Services Sustainably :

The drivers of biodiversity loss: habitat destruction and fragmentation; pollution; invasive alien species; climate change; over-exploitation of resources, are strongly related to unsustainable patterns of consumption by individuals and groups.

e) Training the Biodiversity Managers of the Future :

Management of biodiversity and sustainable production requires a particular set of skills. For example, a body of trained taxonomists is required to understand ecosystem functioning. Resource managers need to be trained in the relationship between the technical and social aspects of biodiversity conservation.

f) Cities and Biodiversity :

Urban populations rely on biodiversity, whether it is that which is proximate to their surroundings, or the ecosystems which encircle our cities Urban centres are also places where sustainable patterns of consumption and

production can be fostered. This group will explore strategies that cities can use to promote biodiversity protection and encourage sustainable development.

d) Biodiversity and Cultural Diversity :

The rich diversity of life on Earth encompasses not only biological, but also cultural diversity, including variety of practices, traditions, languages, artistic expressions, and belief, value and knowledge systems, which are rooted in and depend on specific aspects of biodiversity. Recognizing that biological diversity is intimately linked to cultural diversity and that together these two forms of diversity hold the key to sustainable development. – **UNESCO World Conference on Education for Sustainable Development (31 March– 2 April 2009) Bonn, Germany www.esd-world-conference-2009.org**

The study was conducted on 600 students selected from different schools situated in rural and urban vicinity of Patiala district. Stratified random sampling technique was used to collect the sample. The tool used in the present investigation was the environmental awareness scale (EAS) developed by Haseen Taj. This tool measures the extent and degree of awareness of students about environmental degradation and its protection. The statistical measures used in the present study are Mean, SD and t-test (significance level).

e) Variation in Environmental Awareness between Secondary and Senior Secondary School Students :

Level of Environmental Awareness Among Secondary and Senior Secondary Students : There were 117 items in the EAS and each item was given a credit of '1' point and a 'zero' for wrong answer. The observed means score of the entire sample of secondary and senior secondary students was 88.16 which is quite high. The secondary (M=88.62) and senior secondary (M=87.5) students of Patiala district have more awareness regarding the environment. The reason behind it is that Patiala is considered to be the educational hub having all

kinds of educational institutions like a Mean (M) score of environmental awareness of secondary school students was 88.62 and that of senior secondary school students was 87.58. Standard deviation (SD) score of secondary school students was 11.90 and that of senior secondary students was 11.95. Critical ratio score (t-value) was 0.08 which was significant at 0.05 level of significance. Therefore, the hypothesis no. 1 that there might be no significant difference in environmental awareness of secondary and senior secondary school students was accepted. As it is concluded that both secondary and senior secondary students have almost equal environmental awareness shown by non significant value ($t=0.08$). The main reason for non-significant differences in environmental awareness between secondary and senior secondary students is that these days environmental education is being taught as a compulsory subject in all schools throughout the India, after an order by the honourable Supreme Court was passed in this regard in the year 2005. The main aim of this order was to educate the people of India about the various environmental issues affecting our planet earth. As the students at both the levels have studied environmental education in school so no significant difference in environmental awareness exists between them.

f) Variation in Environmental Awareness Gender wise :

Mean (M) environmental awareness score of boys was 87.89 and that of girls was 88.43. Standard deviation (SD) score for boys was 12.25 and that for girls was 10.19 and the t-value was 0.428. Therefore, the hypothesis that no significance difference exist between male and female school students environmental awareness was retained at 0.05 level. It is concluded that gender is not a factor for affecting environmental awareness of school students. The main reason for almost equal environmental awareness of boys ($M = 87.89$) and girls ($M = 88.43$) is that they are studying together in the same teaching learning environment in the schools.

g) Difference in Environmental Awareness between Students of Private and Government Schools :

Mean (M) environmental awareness score of students of private schools was 96.22 and that of students of government schools was 78.78. Standard deviation (SD) scores of students of private schools was 9.57 and that of government school students was 8.303. t-value was 14.53. Therefore, the hypothesis that there might be significant differences in environmental awareness of students of private schools and government schools was retained at 0.01 level. These findings reveal that students of private schools have more environmental awareness than government school students. The main reason for higher environmental awareness among students of private schools (96.22) than government school students (78.78) may be the family background and educational qualification of parents. Parents of students studying in private schools are graduates and are having well to do and affluent family background. Such parents are mainly concerned with inculcating environmental awareness in their children as they are aware of the dangers and consequences of environmental degradation at global level. On the other hand, students staying in government schools come from poor families and have less educated or illiterate parents. Their main priority is to fulfill the needs of their family members. They are not aware of environmental issues so they can't pass on these awareness measures to their children so the students of government schools do not get the learning environment in their homes because of which they score less than students of private schools.

h) Difference in Environmental Awareness between Students of Semi-government and Government Schools :

Mean (M) environment awareness score for semi-government school students was 87.45 and that for government school students was 78.78. Standard deviation (SD) scores for semi-government School students was 9.036 and for

government school students was 8.303. t-value was 7.41. Therefore, the hypothesis that there might be significant difference in environmental awareness between students of semi-government and government schools was retained at 0.01 level. These findings reveal that students of semi-government schools (87.45) have more environmental awareness than government school (78.78) students. The main reason for this difference is that the students in semi-government school have better educational environment than those in government schools. The teachers in semi-government schools make more efforts to provide better education and environmental awareness to their students than the teachers of the government schools who make little efforts in this regard.

i) Difference in Environmental Awareness in Students of Rural and Urban Areas (Rural Urban Variation) :

Mean (M) environmental awareness score of students in rural areas was 80.17 and that in urban areas was 95.43. Standard deviation (SD) score of school students in rural areas was 8.14 and that in urban areas was 9.17. t-value was 16.23. Therefore, the hypothesis that significant differences exist in environmental awareness of school students of rural and urban areas is retained at 0.01 level. Therefore, it is concluded that environmental awareness of urban areas school students is much higher than that of rural areas. The main reason for such differences is that school students in urban areas have more facilities in terms of education, entertainment, competitions etc. than students in rural areas. Urban area school students have an easy access to internet which provides them information about various factors which are responsible for degrading the environment in different parts of the World. Their parents are educated and they got good learning environments at home, which increase their knowledge concerning environment. Various programmes like Van Mahautsav, World Environment Day, No Tobacco Day etc. helps in creating awareness about

environment among school students. Whereas, rural school students do not have such facilities. Their home environments are also where they do not get any awareness about the environment. They are not aware about the various threats to the environment. They mostly study in government schools where very little efforts are made to provide them environmental awareness.

j) Difference in Environmental Awareness between Students Studying in Punjabi and English Medium Schools :

Mean score of environmental awareness of Punjabi medium students was 78.78 whereas the mean score of English medium students was 96.92. Standard deviation of Punjabi medium students was 8.303 whereas the standard deviation of English medium students was 9.576. The t-value comes out to be 14.53. Therefore, the hypothesis that there might be significant differences in environmental awareness of students studying in Punjabi and English medium is retained at 0.01 level. The main reason of this difference is that most of English medium schools and students are in urban areas and Punjabi medium schools are in rural areas. Students studying in English medium have more environmental awareness because most of the literature on environmental issues is available in English medium. On the other hand Punjabi medium students have limited access to world environmental problems and environmental awareness because they never leave their homes to know about the rest of the world and very limited literature is available in Punjabi medium related to environmental awareness.

All these findings urges us and the government to make efforts to provide the necessary infrastructure in the form of internet facilities, proper classrooms, library facilities, environment related books in Punjabi medium for the students studying in different schools run by the different types of school managements and specially in the government run schools.

k) Environment Education Division

Environmental Education is a process of recognising values and clarifying concepts in order to develop skills and added tools necessary to understand and appreciate the inter-relationship among man, his culture and his bio-physical surrounding. It creates an overall perspective, which acknowledges the fact that natural environment and man-made environment are interdependent. It should consider the environment in its totality and should be a continuous lifelong process beginning at the pre-school level and continuing through all stages. It should be inter-disciplinary and examine major environmental issues from local, national and international points of view. It should utilise various educational approaches to teach and learn about and from the environment with stress on practical activities and first-hand experience. It is through this process of education that people can be sensitized about the environmental issues.

To achieve the above objectives, the ministry has been implementing several schemes and programmes. Some of the major schemes implemented for imparting environmental education and for creation of environmental awareness among the general public are as follows :

1. Environmental Education and Training :

Objectives :

- Development of educational / teaching materials and aids in the formal education sector.
- To encourage non-governmental organisations, mass media and other concerned organisations for promoting awareness among the people at all levels.
- To promote environment education through existing educational / scientific / research institutions.
- To ensure training and manpower development in environment education.
- To mobilise people's awareness for the preservation and conservation of

environment.

The programmes conducted / initiatives launched as part of this scheme are categorised under formal and non-formal sectors.

Programmes under Formal Environmental Education are :

- Environment Education in School System.
- Environmental Appreciation Courses.
- Environmental Concepts in Management and Business Studies.

Programmes under Non-Formal Environmental Education are :

- National Environment Awareness Campaign (NEAC) .
- Eco-clubs (NGC).
- GLOBE.
- Mass Awareness.

Formal Environmental Education

Though formal education is the mandate of the Ministry of Human Resource Development (MHRD), the Ministry of Environment & Forests has been interacting with the MHRD, NCERT, State Departments of Education etc. to ensure that environmental components are adequately covered at the school levels by infusion into the school curricula at various levels. The major initiatives taken by the Ministry in this direction recently are mentioned below :

Environment Education in School System

Under this project, which was initiated in 1999, an exercise to strengthen environment education in the formal school curriculum has been undertaken. During the first phase of this project, a comprehensive study was conducted to assess the status of infusion of environment content in the school curriculum in the country and to assess the effectiveness of classroom teaching. The study was conducted in all the States / UTs of the country and textbooks of all the classes from standards I to XII were analysed. Based on the findings of the study, the

textbooks in Science, Social Science and Languages of middle school level in eight States (100 schools in each State) are being modified to strengthen the infusion of environmental concepts. The modified textbooks would be used for one academic session (2002–2003) in the selected schools of the selected States on pilot basis. The concerned teachers of the selected schools would also be trained to effectively teach the modified textbooks. The states participating in this project are Andhra Pradesh, Assam, Goa, Jammu & Kashmir, Maharashtra, Orissa, Punjab and Uttaranchal. Depending upon the success of the pilot implementation, the revised curriculum may be taken up in the remaining schools. The findings of the phase I study are also being shared with the States/UTs which are not participating in this project so that they can also environmentalise their textbooks.

Environmental Appreciation Course

Though there are several courses on environmental sciences at present in the formal system, there are no structured courses available outside the formal system for people who desire to learn about environmental issues. The Ministry has taken an initiative in this regard and it is presently working out a framework for environmental appreciation courses in consultation with IGNOU.

Environmental Concepts in Management and Business Studies

Realising that the industry managers and leaders need to be sensitized towards environmental issues and concepts of environmental management so that they can play an important role in introducing environmentally sound practices in their operations, the ministry has taken an initiative to introduce / enhance environmental concepts in the business / management education. A committee comprising representatives from management institutions, AICTE, UGC, Industry and MoEF is already looking into various aspects like course content and syllabi of the existing courses so that gaps could be identified and

suggestion could be given for enhancing/introducing the environmental content where necessary.

Non-formal Environment Education and Awareness :

Environmental education, awareness and training play significant roles in encouraging and enhancing people's participation in activities aimed at conservation, protection and management of the environment, essential for achieving sustainable development. The ministry, therefore, accords priority for the promotion of non-formal environment education and creation of awareness among all sections of the society through diverse activities using traditional and modern media of communication. Some of the major activities undertaken in this regard are as follows :

National Environment Awareness Campaign (NEAC)

The NEAC was launched in mid 1986 with the objective of creating environmental awareness at the national level. It is a multi-media campaign which utilises conventional and non-conventional methods of communication for disseminating environmental messages to a wide range of target groups. Under this campaign, nominal financial assistance is provided to registered NGOs, schools, colleges, universities, research institutions, women and youth organisations, army units, state government departments etc. from all over the country for organising / conducting awareness raising activities. These activities which include seminars, workshops, training programmes, camps, padyatras, rallies, public meetings, exhibitions, essay/debate/painting/poster competitions, folk dances and songs, street theatre, puppet shows, preparation and distribution of environmental education resource materials etc., are followed by action like plantation of trees, management of household waste, cleaning of water bodies etc. Diverse target groups encompassing students, youth, teachers, tribals, farmers, other rural population, professionals and the general public are covered

under NEAC. The programme is being implemented through 28 designated Regional Resource Agencies (RRAs) for specific states/regions of the country. The list of these RRAs along with their addresses is given at the end. The applications for participation in this programme are invited every year through advertisement in major national and regional newspapers during the months of May/June. Any additional information can be obtained from the concerned regional resource agency.

Eco-clubs (National Green Corps)

The main objectives of this programme are to educate children about their immediate environment and impart knowledge about the eco-systems, their inter-dependence and their need for survival, through visits and demonstrations and to mobilise youngsters by instilling in them the spirit of scientific inquiry into environmental problems and involving them in the efforts of environmental preservation.

Since the modification of the scheme in 1993, more than 10,000 eco-clubs had been provided grants until 2000-2001 in various parts of the country. Considering that the total number of schools covered were grossly inadequate compared to the total number of schools in the country and keeping in view the potential of this programme in sensitizing the school students. It was decided to intensify this programme to cover each and every district of the country.

A programme of raising 'National Green Corps' through the eco-clubs was, therefore, launched during 2001-2002. Under this programme, eco-clubs are being set up in 100 schools of each district of the country. 47,000 eco-clubs have been set up so far in the country. This programme is being implemented in each State / UT through the Nodal agency appointed by the State / UT Govt.

The Government of India provides financial assistance for establishment of eco-clubs @ Rs. 1000 per eco-club. training of master trainers, teacher training and distribution of resource materials.

Global Learning and Observations to Benefit the Environment (GLOBE)

The GLOBE is an International Science and Education Programme, which stress on hands-on participatory approach. India joined this programme during the August, 2000. This programme, which unites students, teachers and scientists all over the world, is aimed at school children. The students of GLOBE schools are required to collect data about various basic environmental parameters under the supervision of a GLOBE trained teacher and use it for explaining hypothesis as well as to enhance their scientific understanding of the earth. This data is also used by the scientists in their research work. The GLOBE also provides an opportunity to the students to interact not only with the GLOBE scientists but also with the students from GLOBE schools in other parts of the world. About 100 schools spread over different parts of the country have already joined this programme. The teachers of these schools have also been trained in various GLOBE protocols. An international training workshop for trainers was successfully organised at New Delhi during January, 2002. The participants at this workshop, which included representatives from Nepal and Thailand besides India, were trained in Basic and Advanced GLOBE Protocols by a training team from GLOBE Headquarters in USA.

Mass Awareness

Despite great efforts to spread environmental awareness by the ministry through several schemes, it is felt that a large population especially in rural areas is still left out. The best way to reach out to them and make them aware of the environmental problems is through media, particularly the electronic media. "Mass Awareness" has therefore been identified as one of the thrust areas of the Ministry, not only to intensify the efforts already being made in this direction but also to launch new initiatives. The Doordarshan and few other television channels are proposed to be extensively used for telecasting environment based programmes and infomercials. Professional media agencies which are hired to

assist the Ministry in carrying out the campaign also play a major role. To encourage individual efforts in producing films / documentaries on environment / wildlife related themes in the country, the ministry has sponsored organisation of a film festival “Vatavaran–2001” by Centre for Media Studies, Delhi in April 2002.

2.4 Other Awareness Programs

The ministry also sponsors various programs which do not fit into straitjacketed programs like NEAC, NGC, etc., and are aimed at creating environmental awareness among children. These include environment quiz (both written as well as telecast), organization of activities for observation of special occasions such as earth day, special programs for children, etc. These proposals which are received throughout the year from various NGOs and other agencies, are considered on merit as and when received and are supported. Few examples such programs are:

- An international written Environment Quiz Program known as Green Olympiad conducted by TERI. It is conducted in more than 200 centers across the country. Last year the quiz was conducted in both Hindi and English and more than 70,000 school students from India, Russia and UAE participated in this competition. The regional winners were selected for the televised quiz program named TERRAQUIZ which was telecasted on national channel of Doordarshan. It was a great success in sensitizing the children about environmental issues.
- Awareness activities / events by NGOs, academic institutions etc. on the occasion of special environment days like Earth Day etc.
- Written environmental quiz programs in different regional languages are being started. The winners of written quiz would participate in a televised quiz program.
- Organization of an Annual Vacation Program on Environmental Resources

for high school level students namely “Vacation program on Natural resources – building a broader constituency of support for conservation”

The major purpose of this study is to investigate the philosophy of environmental education in school system. The major contribution of this paper would be to help the respective agencies in the government in building up the environmental awareness among people starting from schools. It is part of the National Philosophy of Education to state the importance of this aspect. This paper embarks on the following objectives and expectations :

1. To identify the philosophy of environmental education. School system from the perspective of the school management;
2. To determine the characteristics among schools members that are likely to influence the environmental awareness,
3. To determine the effectiveness of school-based environmental awareness
4. programmes in order to enhance self-regulated strategies to school members;
To discover school members' attitudes towards the extensive environmental awareness programmes introduced by the respective authorities; and
5. To develop an environmental awareness suggestions.

All these approaches will assist us in analyzing how far they impact on ‘the betterment of the personal well-being, family, society and the nation, as stated in the National Philosophy of Education by referring to the importance of having environmental awareness.

One of basis within the National Philosophy of Education is regarding the element of knowledge, which is the value of the knowledge itself, as well as the role of the premise within the development of individual and the society. The significance of knowledge comes from the basic truth of the knowledge that is not only functions to provide the explanation and information, but the most important, knowledge emerges as the medium in influencing, developing, and also shaping the notion of human and the society itself. This element has make

knowledge gain its high value.

As the fundamental concept within the realm of academic, National Philosophy of Education focuses towards the factor of individual within several relation and connection. This is applicable with the element of National Philosophy of Education which is the appreciation towards the creative education such as environmental awareness, since the objective of education is not solely based on the development and the tranquility of human itself, but also includes the improvement of the whole society, nation as well as the harmony of the environment.

National Philosophy of Education focused on the aspect of producing the holistic and balanced individual, which appear as the knowledgeable, responsible, as well as well-mannered individual that able to appreciate their surrounding. Thus, in relating to this aspect, the environmental awareness is the supportive element that should be implemented among the students in fulfilling the aspiration of National Philosophy of Education. It is because, the individuals that able to remain the healthiness of their surrounding would be able to keep the good relation with the society. This is one of the factors which show that the environmental awareness has been adapted within the National Philosophy of Education.

By looking at the scopes and the impacts of environmental problems, this phenomenon has become very important issues on the international agenda since 1990s (Madruga, K. and Batalha da Silveira, C. F., 2003).

As being capable to affect human beings and all living species (Gore, 1993 in O'zden, M., 2008), this nature's catastrophe had brought the serious implication towards the earth such as choking air pollution, water pollution in the vast majority of rivers, water shortages throughout much of the country, ocean pollution, mountains of solid and toxic waste, acid deposition spoiling land and water, destruction of the remaining scattered habitats, near-total deforestation, rampant overfishing, depletion of agricultural land, and

conspicuous consumption of even highly endangered species for food and traditional medicine (Harris, P. G., 2006).

The issues of environment are the effect from the human's activities that have no civic conscious and only think the profit without concern about the impact towards the environment and their future of life. The long term effect from the environmental pollution can be seen when the ecosystem is not able to endure the pollution (Zaini Ujang, 2008).

According to Sardar and Ziauddin (1985), the major cause of this ecological crisis is regarding the value and belief in shaping human's relation with the surrounding and the lifestyle itself.

Realizing of the extremely expanded environmental catastrophe, a preventive way should be carried out to slow it and thereby mitigating long-term environmental damage (Harris, P. G., 2006).

Thus, one of the best ways of preservation is by creating environmental awareness among society especially students as they are future leaders, future custodians, planners, policy makers, and educators of the environment and its issues (Thapa, B., 1999).

Students are also the right aim as they were the one who's responsible to fulfill and realize the aspiration of the National Philosophy of Education (NPE) to develop high levels of personal well-being towards contribution to the harmony of society and nation (Curriculum Development Centre, 1990).

Viewing Environmental Awareness from Educational Philosophy Aspect

Environment is the combination of living things and closely related to the element of nature such as human, animal, as well as plants. Through this connection, there are such doctrines and beliefs from the aspect of philosophy regarding the emergence of this universe, and it has develop an awareness within humans self towards their responsibility to take care of the environment.

It has been agreed by many philosophers that education and awareness

towards environmental protection and conservation require knowledge, understanding, and the change of attitude by each individual. Within the context of education, it is the process to solve the problem which is needed to be implemented among the students since their primary school, as it able to provide them with the technique in dealing the difficulty within their life. This element is supported by the idea of western philosophy, which is the pragmatism movement. The philosophers believe that the role of adolescent and adult in taking care of the environment is different based on their development of age (Mak Soon Sang, 2000). This philosophy presumes that knowledge can be acquired from the relation between human and nature, as both elements are interconnected (Abd. Rahman Aroff and Zakaria Kasa, 1987).

Thus, within the context of education, the implementation of the environmental values among the students can be carried out by giving them the experience through the basic activities such as working together to remain the healthy environment and expose them with the impact of environmental pollutions. For instance, there are several ideology and philosophy that has been introduced, such as the programme of “green consumerism” by the consumer association and “green chemistry” that introduced by the chemist in order to reduce the effect of environmental damage (Zaini Ujang, 2008). Through these activities, it shows that the students are not only trained from the aspect of their intellect and physical, but also from the element of spiritual and emotion through their courage and appreciation towards the programmes.

2.5 Environmental Values from the Aspect of Axiology

Furthermore, the aspect of axiology focuses towards the moral of students. Thus, consistent with the effort to produce the balanced individual from the aspect of intellectual, physical, emotional and spiritual, the awareness towards environment should be implemented among the students. It is because, from the aspect of axiology the theory of value is closely related with the

element of belief and faith. As the branch of axiology is divided into two factors which are moral and esthetic, thus, the awareness towards environment should fulfill both aspects. In producing the ethical students, the students should obey the rule of society. If the rule concerns the awareness towards environment, the students will directly concern the environment and will produce the society that will be aware towards their surroundings. In addition, from the aspect of esthetic the students will reinforce their appreciation towards the beauty of nature and this will encourage them towards environmental awareness.

Furthermore, from the context of The National Philosophy of Education, the aspect of axiology plays the important role to produce the moralistic and responsible students towards their surroundings. Hence, the level of environmental awareness among students is very important in fulfilling the aspiration of National Philosophy of Education. It is because, the good and healthy environment is able to encourage and develop students' mind towards the learning process. However, most of the students still do not realize the fact that the surrounding plays an important role within their daily life.

Thus, the aspect of consciousness along with the knowledge, understanding, the change of attitude and physical participation are very important for the students in developing their awareness towards the environmental aspect, and directly apply the values within their life.

2.6 Environmental Knowledge

From the aspect of philosophy reflectively, students are getting more opportunity to view the importance of environment for getting knowledge. It is because, from the aspect of reflectively thought, the individual needs to examine the reality of emergence of the creator, the concept of knowledge and values with the deeply thinking. Thus, students need to be taught to think the existence of nature and its significance and implication within the human life, as the description of nature cannot be defined solely from the physically view. Since

the students understand the concept of nature, they will realize the essential of harmonious environment.

Moreover, they will also encourage by the responsibility to analyze the cause and advantage of healthy environment. It is because, through the reflectively approach, students are taught to find the answer based on concept of cause and effect. Hence, the student that gains the awareness regarding their surrounding and environment, is more concern about the cause of environmental problem. Besides, students are more inclined to consider and analyze the implication of their behavior towards environment.

Besides, from the view of western education philosophy which is idealism, the element of moral is defined as universal and general concept and exists within the spiritual and mental. Thus, to fulfill the aspect of moral, environment is very important in producing the balanced individual from the aspect of spiritual and emotion. This is because students need to be revealed with the importance of cleanliness and the beauty of nature. The value towards the significance of environment is very

The Approach of Educational Measures to Overcome Environmental Problem

Undoubtedly, the process of environmental education is complicated and should be reviewed deeply at the affective, cognitive, behavioral and meta cognitive levels (Sanera, 1998). In the same way, Jaus (1982) found that there is a positive correlation between environmental education instruction and favourable attitudes towards environment. Then, Worsley and Skrzypiec (1998) examined the environmental attitudes of senior secondary school students in South Australia and the results were analysed with respect to students, locality, gender and socioeconomic status. Male students having lower socioeconomic status are pessimistic but supportive to environmental development and scientific solutions than females.

Since the solution for the environmental problems depends on the improvement of students' attitudes, school plays an integral role. The educators have to seek new approaches and methodologies for students to make them understand that the preservation of nature and efficient use of resources are vital to prevent environmental problems. Besides, many people believe that environmental education is one of the most important factors for preventing environmental problems (O'zden, M., 2008). According to Abd. Rahman Aroff and Zakaria Kasa (1987), students thinking process depends on the concept of psychology such as the emotion, observation, learning, as well as the aspect of consolidation. Their observation towards their surrounding will develop the empirical knowledge, which is from the experience and application of sense. Hence, the role of educators is very important to encourage the good behaviour and right attitude of the students, along with the well and healthy environment (Sharifah Alawiyah Alsagoff, 1992).

Among the endeavour that has been carried out in implementing the environmental education among the students is of theoretical model. Hungerford and Volk (1990) in Palmer (1998) has identified the critical components which is needed to be implemented within the educational programme in order to change the students' attitude towards the environment. These components have been shown through the theoretical model which discusses the relation between knowledge and attitude. According to this theory, the knowledge regarding the environment and the skill of action are very important for an individual in changing his attitude. Theoretically, when the knowledge regarding environment is increased, the positive attitude towards environment is indirectly expanded. This model has been applied in Environmental Education in Malaysia.

Moreover, by viewing from the context of education, the actual knowledge is not only focusing towards the fact, but also consider on the perception, observation, experience, as well as the reason. All of these elements

come from the interaction process between human and the surrounding. If the environment is healthy and safe, the society will live within the harmonious and pleasant surrounding.

Thus, the significance of the concept of environmental awareness has been implemented since the primary school. For instance, the Primary School Curriculum has focused towards the aspects of spiritual, value and human's behavior with their surrounding which had been taught through the subjects such as Islamic and Moral Education. It is because, the sensitivity towards the balance between human and environment is able to produce the balance of ability to think, as well as the physical and spiritual development. Thus, through the objective of primary school curriculum, students are able to recognize and appreciate this balance, and generate the concerned society towards the well and harmonious environment. This value is also practiced within the activity of co curriculum and this is an addition to the lesson in classroom. Hence, it is able to increase the level of environmental awareness among the students in fulfilling the aspiration of National Philosophy of Education (NPE).

This involvement of the students physically and spiritually towards the environmental protection and conservation develops the holistic individuals and the solidarity of this country.

On the other hand, it is widely known that the main characteristic of National Philosophy of Education is holistic and it is an integrated approach. This universal knowledge is taught by the educator and learned by the students (Chong, 2008). The objective of National Philosophy of Education is to produce such individual who is intellectually, spiritually, emotionally, and physically balanced, as well as able to contribute towards the harmony and betterment of family, society and nation. It should correlate to the individual who has a balanced deliberation and able to contribute towards the stability of environment. Because the tranquility of environment, that include the stability of the ecosystem, contributes towards the healthy society with values and also

produce the generation which is able to increase the productivity of the nation. Therefore, as school and the educators have become the societal agents towards students, the educators should present the good attitude in shaping element of environmental awareness among the students. The educators should develop holistic appreciation towards moral oriented subject through the teaching and learning process because they are the role model to the students. For instance, the aspects of environment should be applied within the process of teaching and learning, so that, the students will realize their responsibility to care the environment.

In addition, the application of teaching media by teachers should include the elements of environment. Students should be provided with the knowledge of environment at their childhood. As the belief of Confucianism, the National Philosophy of Education also aspires to produce the competent and moral individual (Choong Lean Keow, 2008). Thus, it is needed to focus on the implementation of environmental awareness in order to produce the generation that has praise-worthy personality and appreciation of creation of God. Besides, the appearance and the manifestation of the educator are very important in realizing the objective of school management to implement the element of environmental awareness (Yahya Don, 2005).

However, the element of awareness is not sufficient without knowledge, understanding, the change of attitude and physical participation. According to Abdul Fatah Hassan (2001), no matter how much knowledge has been gathered by someone, it is still can not be assumed as perfect since he/she applies the knowledge in his life to differentiate between the right and wrong.

Moreover, he believes that an appreciation is an important concept within man's life, because the concept without the sense of gratitude and appreciation is worthless and the sense of gratitude without concept is blind. For instance, by looking at the context of environmental issues, there are many individuals who gain knowledge and awareness regarding environment, but still show

irresponsible attitude towards their surrounding. They fail to interpret the environmental awareness as mutual commitment (Starke, 1990).

Moreover, according to Thapa, B. (1999) there are only a limited students who understand the relation between environmental attitudes and environmentally responsible behaviours. Due to the intensive environmental awareness promoted by the environmentalists, it is critical to observe if the leaders of tomorrow which means students uphold positive environmental attitudes and practices of the environmentally responsible behaviors. Hence, it can be said that the level of students' awareness towards environment and the values of humanism within their self are still low.

Concerning this issue, each individual especially student should have an awareness and responsibility towards environment in them. As stated by the philosophy of metaphysic, the connection between human and nature with the creator is an abstract elements, which can not be discover without examine and believe it. Thus, we need to recognize and care for this universe and preserve the harmonious relation with this nature. Besides, the appreciation towards the gift of God needs a responsibility and realization from every human being. Furthermore, apart from fulfill the aspiration of

National Philosophy of Education, the student themselves are able to improve their weakness from the aspects of physical, spiritual, emotion, as well as intellectual. The level of environmental awareness among students to fulfill the aspiration of National Philosophy of Education. Every creation of God, has their own significance and function. Environment is the habitat for all living things, including human, animal as well as plant. It is very important to know and appreciate the existence of this nature, and realize its existence which is closely related to human's life.

On the other hand, human's activity is an act or manner that is based on emotion and his own nature. The emotion and the nature emerge differently according to his education and economical, social and spiritual aspect.

Therefore education is very important in shaping the moral values and consciousness towards their surrounding. Thus, the awareness towards the protection and conservation should be developed within each human self, so that they can prevent themselves. Besides, they will make an effort to protect and conserve this nature once he realizes his responsibility towards his surrounding.

Within the context of students, their awareness regarding the importance of environment is able to protect this earth from the entire pollution. The environmental awareness among students since they were at school can be realized through the implementation of the main objective of National Philosophy of Education (NPE) within the teaching and learning process i.e. to produce an individual who is intellectually, physically, emotionally and spiritually balanced. The whole society, especially the students should realize that the stability of the environment is the main element within human's life. Each of them should know and believe that the concern towards the environment will bring harmony in human's life, society and the nation itself that parallel with the aim of National Philosophy of Education, which is to experience the nation's stability. Besides, the appreciation there should be a responsibility and realization towards the gift of the god in every human being.

Meaning and Nature of Consciousness reflected through Environmental Education :

As defined in the dictionary, 'Consciousness is awareness or person's conscious thoughts and feelings as a whole'. Consciousness means the sum all experiences that are known to a person at a given time.

The present study is concerned about level or consciousness regarding ecology as well as biodiversity. The researcher, here tried to investigate how much the different groups of people, having different levels of education are conscious about the necessity of conservation of biodiversity.

Meaning of Conservation of Biodiversity :

Biodiversity covers all forms of life and all the habitats that support life – savannahs, tundras, swamps as well as tropical forests. We must preserve these for the sake of our existence in this world. The number of living species known to man are only a fraction of what actually exists. Approximately 1.4 million species of plants, animals and micro organisms have been identified so far. The actual number is anticipated to be over 100 millions.

But owing to various reasons there is constant loss of biodiversity. For years the progressive loss of biodiversity largely escaped the attention of planners and ecologists, chiefly because the visible effects were not obvious or immediate. But recently ‘ozone hole’, ‘green house effect’, ‘acid rain’ entered into the public consciousness.

There is a thin girdle of ozone gas in the stratosphere round the earth. It protects the life on earth from hazardous effects of sun's ultra violet rays. These rays can cause skin cancer in human beings and suppress the body immune system. Recently it has been discovered that a big hole has developed in this layer over the South pole. It is caused by various gases evolving out of the industries of the earth. The gas C. F. C which is used in refrigerator and computer industries is the main culprit in this respect. This hole is gradually increasing in size. As a result ultraviolet rays coming down in greater quantity, causing skin cancer in people on the southern part of the earth (including South India) and harming the animals and plants in various ways.

Greenhouse effect is another great ecological problem, facing by us. The relative amount of carbon dioxide has been gradually and constantly increasing in the atmosphere, since the industrial revolution. The pace has been accelerated since scientific and technological revolution. Large scale destruction of tropical forests causes the increase of carbon dioxide and other harmful gases in the atmosphere, which in turn is gradually increasing the temperature of atmosphere. As a result the sea water is warming and its level is increasing and

other natural atmospheric disturbances are occurring. If the temperature of the atmosphere goes above certain level entire life will be totally extinct from the surface of the earth.

It is therefore obvious that mass consciousness must be raised to higher level in order to preserve Biodiversity and other ecological conditions essential for sustenance of life on earth.

Biodiversity is a very recent topic and scientists have only a very rudimentary knowledge of biodiversity. Issue of research on Biodiversity and conservation figured prominently in the United Nations Conference on Environment and Development (1992) at Rio-de-Janeiro in Brazil.

Some studies regarding conservation of biodiversity and such other related problems are given below –

1. “Biodiversity on Education : An Approach to Sustainable Development” was presented by Ann Danaiya Usher in April 1992. It will be published by OECD in Paris. The paper describes an alternative approach to environmental education based primarily on the experiences of the Project for Ecological Recovery within the Thai Environmental movement. It explains what these systems are, how they evolved and how they can be ‘tapped’ to cope with modern environmental problems. This paper concludes by outlining some lessons about raising public awareness and widening the circle of public involvement through both a “strategic approach” and “holistic analysis”.
2. The International Union of Biological Sciences, the Scientific Committee on Problems of the Environment (SCOPE) and the Man and the Biosphere programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO) recently joined forces to develop a scientific programme to study the role of biodiversity in the function of eco-systems. One of the goals of this programme is to develop scientific hypotheses

regarding biodiversity that has been discussed at three meetings. A workshop at Harvard University at the end of June 1992, an international symposium sponsored by SCOPE held in Bayreuth, Germany, in October, 1992 and later in October, 1992 an international symposium on biodiversity sponsored by UNESCO and the United Nations Environment Programme which took place in Nalchik USSR.

3. Jeffery A. McNeely's study – "Economic and Biological Diversity : Developing and Using Economic Incentives to Conserve Biological Resources", published by International Union for Conservation of Nature and Natural Resources, in Gland, Switzerland in 1988.
4. Jay D. Hair's paper – "The Economics of Conserving Wetlands : A Widening Circle" presented at World Conservation Union General Assembly, Costa Rica, in February, 1988.
5. E. O Wilson's paper – "Success and Dominance in Ecosystem : The Case of the Social Insects" published by Ecology Institute, Oldendorf-Luhe, Germany, 1990.
6. Stephen H. Schneider's study – "The Greenhouse Effect : Science and Policy" Published in 1989.
7. Norman Myers's paper – "Threatened Biota : Hot Spots in Tropical Forests" published in 1988.
8. Russell. A. Mittermeier's study – "Primate Diversity and the Tropical forest : Case Studies from Brazil and Madagascar and the Importance of Mega diversity countries" published in 1988.

9. Michael A. Huston's research study include the use of computer simulation models to address issues in population, community and ecosystem ecology, with field work in tropical and temperate forests, coral reefs and temperate grasslands. His paper was published in 1922.
10. Dr. Kalyan Chakraborty carried out a study of inter dependant relationship of man, plant and animal. The field work was done in three parts of West Bengal. The study not only included forest resources but also faunal diversity of the Sundarban's littoral and swamp forests. He was awarded a Ph. D. for this ecological research in 1988

CHAPTER - III

BIODIVERSITY AND ENVIRONMENTAL EDUCATION

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BIODIVERSITY AND ENVIRONMENTAL EDUCATION

3.1 Introduction

It is now well realised that due to some natural and unnatural factors, the biological resources of this earth are under varying degree of threat. Today mankind faces a critical ecological situation, so critical that unless some urgent steps are taken within a decade or two, life will be extinct from the surface of earth. There are various aspects of the ecological crisis, for example, rapid destruction of forests, depletion of oxygen and increase of carbon dioxide in the atmosphere, thereby warming up the continents and oceans, creation of holes in the protective layer of ozone in the stratosphere etc. Of all these ecological problems, one of the most important is destruction of biodiversity.

Biodiversity is the new international buzzword. Perhaps it has not attracted as much attention as global warming and ozone depletion, but it has certainly been catapulted into the centre stage of worldwide environmental politics in the last handful of years. Not surprising this, for the conservation and wise management of biodiversity is likely to be critical to the very survival of humanity. Control over such a basic survival resource as biodiversity automatically translates into control over people's lives and consequently over communities and nations.

Biodiversity may be defined as existence of various forms of life on the earth both in plant and animal kingdom. Biodiversity is the result of evolution over the long geological ages. The entire living organism, including man, is inter-related and interdependent. They have each evolved out of another in certain conditions with certain structures. Each has a definite biomass, number of varieties and geographical spread. One species depends on another for its survival. In fact all the living beings including plants have acquired an ecological balance against themselves.

Biomass is the weight of living organism on the earth. The biomass of marine organisms is only 0.13% of total biomass of the planet, the remaining 99.87% is contributed by the organism living on the continents. Of this again 99.2% is contributed by green plants. The earth is a body of finite size which has only limited resources essential for life. If these resources were only consumed and not replenished then life would have long ceased to exist. But that has not yet happened only because life has adopted the method of recycling the limited resources within a circle, thus making them ever inexhaustible. Each species, animal or plant is a link in this biotic cycle. Each has to release to the environmental materials which will be used by others.

The human species entered the industrial age with a population of about one billion and with biological diversity possibly at an all time high. Biological resources were freely available for exploitation to support development. But, in the late 20th century, people began to realise, that biological resources have limits. That limits are being exceeded and that over exploitation results in substantial loss of biological diversity.

But unfortunately, excepts scientists and naturalists, most of the common people of our country are ignorant about this problem.

Though environment has become a component in education and awareness programme and concept and practices of biodiversity conservation are included into education, only a handful of people are pressing for recognition of the problem and urgent steps for its solution.

To convince the people that it is in their own interest that biodiversity and other natural resources should be maintained, education about ecology among common people should be increased. An attitude of kindness and sympathy from the point of human consideration should be inculcated in their mind from their childhood.

No government or single agency can possibly achieve the task of conserving biological diversity in as complex a society as India's. The

participation of people at all levels, in the task of managing the country's resources, should be considered their fundamental right, as also a pre-requisite for successful conservation.

It is unfortunate that as we have entered a new century, much of the success that we have achieved is in jeopardy. Future generations have the right to breathe healthy air, drink pure water and have an eco-friendly environment to dwell in, we have to prevent ecological disasters coupled with restoring the wasted natural resources.

3.2 Introduction from Encyclopedia of Environmental Biology, Vol. 1 (A – E) Biodiversity G. T. Prance p. 183

Biodiversity is an all-inclusive term to describe the total variation that occurs among living organisms of our planet, and it includes three main components –

1. The diversity of species that occurs in the world, from the familiar plants and animals to the less conspicuous fungi, bacteria, protozoans and viruses.
2. The genetic variation that occurs within individual species that causes them to vary in their appearance (phenotype) or their ecological responses and allows them to react to the process of evolutionary selection and
3. The diversity of habitats or ecological complexes in which species occur together whether they be such well-known ones as rainforest, tundra and coral reefs, or the complex of bacteria that inhabit the human body or a gram of soil.

“Biodiversity” is a relatively recent term that has now become familiar because it has entered into the political arena especially through its use in the biodiversity convention that was much debated and agreed on by the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. The word “biodiversity” coined by Walter G. Rosen in 1965 for the National Forum on Biodiversity held in Washington D. C. in 1986. The

proceedings of that forum were edited by sociobiologist Edward O. Wilson under the little “Biodiversity” which is a contraction of biological diversity. It is a useful term because of the interrelatedness among species, genes and habitats. To preserve life on Earth, it is important to consider the interaction among all three aspects and so it is not surprising that the term “biodiversity” was developed at a time when the conservation of living organisms became a major concern of biologists. The interference with any part of biodiversity has an effect on the other components, therefore an adequate conservation policy take into account all three aspects of biodiversity and internal structures would all be used to illustrate interrelationships, interdependence, similarities and differences. Students will be introduced to the features that systems and will be taught why these classifications are made.

Benchmarks suggest that students in this group should know the following.

- One of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich food. Some kinds of organisms, many of them microscopic, cannot be neatly classified as either plants or animals.
- Animals and plants have a great variety of body plans and internal structures that contribute to their being able to make or find food and reproduce.
- Similarities among organisms are found in internal anatomical features, which can be used to infer the degree of relatedness among organisms. In classifying organisms, biologists consider details of internal and external structures to be more important than behavior or general appearance.
- For sexually reproducing organisms, a species comprises all organisms that can mate with another to produce fertile offspring.
- All organisms, including the human species, are part of and depend on two main interconnected global food webs. One includes microscopic ocean plants, the animals that feed on them, and finally the animals that feed on

those animals. The other web includes land plants, the animals that feed on them, and so forth. The cycles continue indefinitely because organisms decompose after death to return food material to the environment.

For students at the secondary level, curricular objectives lead to understanding diversity within and among species by looking at “same and different” features at a molecular level. Students would learn the following :

- The variation of organisms within a species increases the likelihood that at least some members of the species will survive under changed environmental conditions, and a great diversity of species increases the chance that at least some living things will survive in the face of large changes in the environment.
- The degrees of kinship between organisms or species can be estimated from the similarity of their DNA sequences, which often closely matches their classification based on anatomical similarities.

Understanding built up over this period of study would lead students to comprehend the diversity of ecosystems, diversity of species, and the genetic diversity within species.

While Benchmarks sets out a recommended sequence of learning goals to help students come to an understanding of biodiversity as a complex idea, it is not clear that most students have access to the education, ideas, concepts, and learning experiences needed to achieve such understandings. Therefore it would be necessary to explore what students are taught or expected to learn over time during their schooling.

3.3 Biodiversity and School Science

Formal education in science is an important contributor to students’ fundamental understandings about science. While self-directed study-books, articles, the internet, museum visits, and field experiences augment science learning for many students, the quality of the curriculum, textbooks and other

instructional materials, the preparation of teachers, the school-mediated experiences provided to students both inside and outside of the classroom all interact to shape what students take away from school science. Understandings of biodiversity would be based on accumulated experiences and knowledge. These would include the early school focus on “natural study” and development of an “intuitive” understanding of biological diversity and the relationships among living organisms (National Research Council, 1990). Students’ out-of-school experiences, where such are available, would reinforce school learning. The curriculum focus shifts in lower and upper secondary levels (grades 6–12) to more formal, taxonomic instruction.

This pattern of topic coverage for life sciences concepts is present in the curriculum of other countries around the world and was prevalent among the majority of the 50 educational systems of countries that participated in the Third Mathematics and Science Study (or TIMSS). Data were collected in 1993 and results presented in 1996.

In the United States, according to statistics provided by the U. S. Department of Education, biology is the most frequently taken high school science course, with over 93% of 1994 graduates of public high schools reporting have completed such a class. Over 97% of graduates from nonpublic high schools reported completing biology. Analysis of content core is not available to determine the extent to which the ideas critical to a student’s understanding of biodiversity are actually taught. It is also not clear if earlier foundational ideas are provided to students as a part of instruction at primary and lower secondary levels.

There has been considerable discussion about the adequacy, pacing and structure of curriculum, and, especially, of textbooks in middle and high school biology. Researchers have criticized their “encyclopedic” nature, with too many ideas covered too superficially, and too much focus on vocabulary at the expense of big ideas. A recent study that evaluated the science textbooks used in

middle grades against three concepts from Benchmarks and Standards, one each from the earth, physical, and life sciences, led AAAS Project 2061 to conclude that all nine titles examined were inadequate to help students achieve understanding of the ideas that they were attempting to explain.

Efforts to actually measure what students know about science are undertaken through the regularly administered National Assessment of Educational Progress and recently have been internationally benchmarked through TIMSS.

3.4 Environmental Education

In 1977 the world's first intergovernmental conference on environmental education was organized by the United Nations Education, Science and Cultural Organization (UNESCO) in cooperation with the United Nations Environment Programme and held in Tbilisi, Georgia (Soviet Union). The Tbilisi Declaration, adopted at the conference, stressed the importance of environmental education in the preservation and improvement of the world's environment. Agenda 21, Chapter 36, outlines issues related to formal education, public awareness and training to promote sustainable development and emphasizes environmental and development education as an essential aspect of all education. There were also calls for linking to environmental education in recommendations from the World Conference on Education for All (held in Jomtien, Thailand in 1990) that urged a move toward universal access to basic education for girls and boys.

The recommendations include calls for better informal education, promotion of environmentally sound leisure and tourism activities, programs to involve young people and children, as well as respect for and support of efforts to promote dissemination of traditional and socially learned knowledge through mechanisms based in local cultures.

Environmental education was called "nature study" when it got its start in the 1920s with Junior Audubon Clubs teaching children to appreciate nature.

According to Karen Schmidt in a December 13, 1996 article in *Science*, the movement was transformed into conservation education in the 1930s when the Dust Bowl environmental tragedy led to incorporation of ideas into some schools about the management of natural resources.

With the initiation of Earth Day in 1970 and passage of the National Environmental Education Act of 1970, teachers received supplemental training in environmental education. Many states enacted their own environmental education laws, and schools began incorporating these topics into science classes. On the 20th anniversary of Earth Day, President Bush signed the National Environmental Education Act of 1990, which created an Office of Environmental Education at the Environmental Protection Agency and supported curriculum development and teacher training in the states.

In the United States concern has been expressed about the place of environmental education, as currently configured into the curriculum, and especially about the quality of programs sometimes offered in lower secondary schools. This has included concerns about an advocacy orientation in instruction, about the need for and balance in materials used and instruction provided.

Teaming with Life makes a strong recommendation that environmental education have a stronger base in science, using scientifically grounded curricula. Innovative programs such as GLOBE that depend on student-scientist partnerships and collection of real data may point the way to science education based around environmental and biodiversity concerns.

3.5 Learning in the Informal Education Sector

A. Overview :

A wide range of informal education experiences are available for adults and children to extend their knowledge about biodiversity. These include organizations that incorporate biodiversity education and exhibition within their

missions, such as the following :

- Zoos
- Botanical gardens
- Aquariums
- Museums
- National parks

Depending on their size, these “places of science” might also incorporate research, collections, conservation, or other functions important to biodiversity. Signage and docent-led and audio tours provide additional information to visitors. Classes, lectures, and workshops (including those for teachers) are also often provided to extend the learning experience. Increasingly, materials and websites incorporate aspects of a visit, bringing resources to audiences at a distance to make some part of the visitor experience remotely available.

Informal education also includes more intensive immersion experiences such as where it is incorporated into visits to natural preserves such as parks (including those within national park systems) and forests, or that provided through ecotourism.

Interpretive programs using volunteers, staff, and written and video materials provide enhanced learning experiences by bringing the science, the issues, and the concerns into sharp focus as a part of the overall environmental experience. Programs such as Earth-watch have biodiversity-focused visits that involve the participants in the research as data collector. Other informal learning opportunities are available through television and IMAX programs, websites and books.

Youth-serving groups provide a broad range of activities and experiences that can support education around concepts of biodiversity. Many may involve long-term projects of environmental monitoring, animal and plant breeding, habitat restoration, and other activities undertaken individually or in groups.

1. Botanical Gardens : In 1989 the World Resources Institute estimated that 150 million persons visited some 1500 botanical gardens around the world. In addition to visits and guided tours, gardens offered continuing education for adults, workshops and hands-on experiences for children and families, and professional education courses and seminars for K-12 teachers. The New York Botanical Garden and Missouri Botanical Garden are examples of two of 21 member gardens of the American Association of Botanical Gardens and Arboreta offering graduate studies programs, usually in collaboration with universities in their area.

2. Museums : Through collections, education programs, exhibitions, and graduate-level, museums have been very active in promoting biodiversity in both the formal and informal sectors. Exhibition. The 11,000-square foot Hall of Biodiversity is the newest permanent exhibit of AMNH and uses collections, interactive technologies, and an immersive environmental replica of a portion of the rain forest of the Central African Republic, complete with sound, smell, movement, and running water to provide a unique visitor experience.

- Graduate and continuing education. The Center for Biodiversity and Conservation collaborates within and outside the museum in the development of courses and programs. AMNH is home to the oldest and largest doctoral and postdoctoral training program of any scientific museum in the world, collaborating with Yale, Columbia, Cornell, and City University of New York.
- Education. The National Centre for Science Literacy, Education and Technology supported by the National Aeronautics and Space Administration (NASA) has developed a number of projects related to the theme of Biodiversity Counts : A Student Inventory Project, a program for middle school students across the United States to inventory plant and animal life in their communities and to share their findings through publications and on-line field journals.

B. Biodiversity “Experiences” and Resources

Overview :

For most adults, biodiversity education will take place in the informal sector as they read books, visit zoos, museum, and national parks, listen to lectures; and watch programs on the increasing number of science- and nature-based cable channels, public television, or the increased coverage of science on the news or news magazines. Others will visit the World Wide Web, where an increasing number of excellent sites developed by universities, museums, federal agencies, and non-profit organizations provide high-quality information. Several examples of resources for biodiversity education available to the adult public follow.

1. Earthwatch : Earthwatch Institute is an international nonprofit organization founded in 1971 that supports scientific field research worldwide. Volunteers participate in actual field research, assisting scientists in gathering data. Since its beginnings it has “mobilized 150 projects around the glob, resulting in the discovery of 2000 species, the establishment of 12 national parks, and the founding of eight museums”. The Earthwatch website lists active projects that volunteers can join in seven topical areas including Endangered Ecosystems and Biodiversity. The site <http://www.earthwatch.org>. also includes virtual field trips.

2. National Biological Information Infrastructure (NBII) : The NBII attempts to organize the disparate sources of information available through agencies, departments, museums, and other organizations, providing a source of links to sites. A “Biodiversity, Systematics and Collections” section connects to other web sites, many of which have education or “for kids” sections

3. Non-profit Environmental and Biodiversity Groups :

A number of organizations produce materials to support education about

environmental and biodiversity issues. These include groups such as the World Wildlife Fund, the Sierra Club and the Audubon Society. These groups develop a wide variety of public information and educational materials.

While most mainstream advocacy groups are conscious of the need to “get the science right” and to present balanced viewpoints concerns are sometimes expressed about school use of materials that emanate from an “advocacy position”. Guidelines have been developed by NAAEE to assist educators to assessing the scientific accuracy of such materials.

Public Awareness :

How much does the public understand about environmental issues in general and biodiversity in particular, and what are the attitudes toward these issues ? Surveys from a number of sources indicate that there is strong public interest in and support for issues related to the environment. The National Science Board’s Science and Engineering Indicators (1998) suggested strong interest and “informedness” of the public around environment and health topics, especially when compared with other science and technology areas, and interest and support were stronger among women than men. The National Environmental Report card, an attitudinal and knowledge survey of American adults conducted by the National Environmental Education and Training Foundation and Roper Starch Worldwide, concluded that there was “an alarming lack of knowledge about some of our most critical environmental problems”. With regard to biodiversity, however, 73% of adults surveyed correctly responded about the direct relationship between species loss and habitat destruction.

In 1995 the Consultative Group on Biological Diversity initiated the Biodiversity Project, a public education effort by a nonprofit grant makers’ forum to “assess public opinion on biodiversity, to develop collaborative strategies to increase public awareness and engagement, and lay the groundwork

to implement those strategies”. In June 1998 a “Summit” on biodiversity and environmental education was convened at the American Museum of Natural History as a Biodiversity Educators Summit. The summit was supported by evidence from focus groups and surveys and co-convened by The Project, AMNH, and World Wildlife Fund. The 1996 Biodiversity Poll, conducted by the public opinion research firms Belden & Russonello and R/S/M and reported at the Summit, revealed the following about the environment and biodiversity :

- People care about the environment, but it isn’t in the top tier of public concerns.
- Of environmental concerns, the public considers the most serious problems to be toxic waste, destruction of the rain forest, loss of places in nature, and air and water quality.
- Extinction is a concern, but it is not high on the list.
- People understand that nature is connected and interdependent, but most people do not recognize or use the word biodiversity. Only 2 in 10 said they had heard about the “loss of biological diversity”.
- The public understands that species are declining and that human activity is largely responsible. But the public does not understand much about specific reasons or about the seriousness of the rate of loss.
- Public support for biodiversity conservation (once biodiversity is explained) is wide – 87%. But this support is shallow.
- Countervailing pressures (values) can peel support away from biodiversity protection. These include concerns about jobs, individual property rights, comfort and convenience, and preservation of “unattractive” species. However, 51% of Americans agrees that the world would suffer if such “unattractive species” (e.g. mosquitoes) are eliminated.

The reasons Americans think biodiversity should be conserved included personal and family issues (79%), responsibility to future generations (71%),

and spiritual concerns of stewardship (67%) (i.e. Nature is God's work).

Another survey of biological scientists, science educators, and the general public conducted by the AMNH in April 1998 revealed that most scientists believe we are in the middle of a mass extinction largely caused by human activity. While 70% of the scientists surveyed rated loss of biodiversity as major and urgent, the general public was generally unaware of species loss and the threats this posed. Even science teachers, who are aware of the biodiversity crisis, did not believe that there was mass extinction, and only, 38% of teachers rated themselves as being very familiar with the concept of biodiversity. Both 1996 and 1998 polls revealed a large gap between scientists' perception and the public's awareness and concern about biodiversity, this in spite of the public's perceived attentiveness and informedness about environmental issues in general.

Ref. : <http://www.biodiversityproject.org /eesummit.htm>.

The gap may relate to the following :

- A general lack of attention to biodiversity and its consequences by the media.
- The way that the public message about biodiversity is conveyed.
- The biological understandings that members of the public bring to the discussion.

Interestingly, the spottiness of adult knowledge and concepts (some individual ideas understood, but not the overall concepts nor the consequences that flow from them) tracks with observations made about the K-12 student understanding of life sciences ideas. For most members of the public, high school is the last time for a formal course in the life sciences. After that, they generally rely on the informal sector for additional information and updates to their knowledge.

Colleges and Universities :

According to Science and Engineering Indicators, persons taking college-level science courses are more likely to be informed about, supportive of, and interested in science and technology topics. College level courses in biology influence knowledge and attitudes of the public. Beyond Biology 101, produced by the Howard Hughes Medical Institute, describes efforts to transform college-level courses in biology for both majors and nonmajors, moving away from vocabulary-driven courses to ones that are more integrative and that include meaningful laboratory and field experiences. A number of programs are described at <http://www.hhmi.org/BeyondBio101>. These include an innovative program in human biology developed and in place since the 1960s at Stanford University. The program, taught by faculty from biology, education, anthropology, psychology, and other disciplines, focuses on the relationship between human biology and human behavior including human interactions with environment. It is a major course of interdisciplinary study and provides introduction to integrative biology for nonmajors.

The program for majors involves students in a range of activities designed to get them to think like scientists. Biodiversity and human impacts on the environment are explicit foci of instruction, and in the late 1980s and 1990s the college program was “translated” into a middle grades life sciences project (HumBio). Biodiversity concepts and activities are explicitly included among the curriculum materials in the ecology theme.

Other countries that have evidence of strong interest in collegiate and university studies in biodiversity include the following categories :

- Soil and water management : soil fertility restoration and maintenance.
- Conservation of biodiversity : Genetic improvement and increased utilization of Africa’s indigenous food crops and useful plants.
- Conservation and management of mineral resources.

Education and training are key areas of interest to develop curriculum and

contributes to training in areas such as ecological economics, natural resource economics and environmental accounting, germplasm and biodiversity conservation, wildlife management, and taxonomy. Gender and Natural Resources is a major cross-cutting theme in the work of the institute.

Systematics Research and Training :

While the demand for expertise in conservation, biodiversity, and systematics has been increasing, concern is being expressed about the human resources, especially in developing countries, available to manage and inform natural resources utilization around the globe. A 1995 workshop on Priorities in Systematics Research and Training organized by the United Kingdom Systematics Forum and held at the Linnaean Society of London raised issues about the adequacy of support for systematic biology, the declining interest in systematics among students, and the decline in the teaching in many universities.

A search for university departments worldwide that provide training in systematics and taxonomy revealed 24 institutions, 10 in the United States. This may be deceptive, however, in that a number of institutions provide graduate training in partnership with research-oriented museums and botanical gardens. New emphasises such as work in molecular systematics may exist in cellular, molecular, microbiology or biochemistry programs. BIO NET-INTERNATIONAL is a global network of people and institutions that develop biosystematics capacity in developing countries. Training at all levels (in service, short courses, distance courses, and joint graduate programs) is a major focus of the network's activities.

A combination of school-based learning and out of school experiences combine to provide young people with knowledge of and attitudes about biodiversity that they then take into adulthood. For those who pursue higher education, college-level courses are available in some institutions that integrate

biodiversity education into larger biological, environmental, or human impacts courses. Other adults must depend on the informal education sector, with experiences provided by a variety of different institutions and media. Biodiversity education may also, in some cultures, rely on community transmission of locally held knowledge of plants and animals of a region. Whatever the process for developing understanding, education and public awareness have been seen as crucial precursors to building support for biodiversity.

3.6 Education and Biodiversity

The convention on biological diversity articulates a case for nations of the world to come together to undertake activities to improve conservation of biodiversity sustainable use of biological resources. As of June 1997 more than 170 nations had ratified the convention. In addition to calls for better management, more research, and study and international regional cooperation, there was also recognition of the role of education, public participation, public information, and the devolution of a cadre of professionals to support the goals of the convention.

A recent report to President Clinton from the President's Committee of Advisors on Science and Technology (PCAST) makes recommendations to strengthen the understanding and management of biology resources (PCAST, 1998). Among the recommendations in *Teaming with Life : Investigating in Science to understand and use America's Living Capital* are calls for increased opportunities for formal and informal education centred on biodiversity and ecosystems, for interactions between scientists or students and for continuing professional education for K-12 teachers.

How do students learn about biodiversity ? What specific concepts must they learn and what ideas must they acquire to support that understanding ? What class work, materials, curriculum, set of courses and experiences would

provided an adequate background so that they come to an understanding of this concept.

Dictionary of Edu. by Carter V. Good, Editor McGraw Hill Book Company, Inc. New York, Toronto London :

Education :

1. The aggregate of all the processes by means of which a person develops abilities, attitudes, and other forms of behaviours or positive value in the society in which he lives;
2. The social process by which people are subjected to the influence of a selected and controlled environment (especially that of the school) so that they may attain social competence and optimum individual development;
3. Ordinarily, a general term for the so-called “technical” or more specifically classified professional courses offered in higher institution for the preparation of teachers and relating directly to educational psychology, philosophy, and history of education, curriculum, special and general methods, instruction, administration, supervision, etc.; broadly, the total pattern of preparation, formal and informal, that results in the professional growth of teachers
4. The art of making available to each generation the organized knowledge of the past.

Ref. : The Gale Encyclopedia of Science. Third Edition, Vol. I by K. Lee Lerner and Brenda Wilmath Lerner, Editors Thomson Gale, p. 504

3.7 Environment Awareness

Environment has become the concern of all; the academicians, intellectuals, scientists, policy makers and govt. across the continents. Widespread and systematic concern for environmental issues has grown the world over particularly after the 1960s. The UN world conference on the

environment in Stockholm in 1972, the earth summit held in Rio De Janeiro in 1992, the global forum, 1992 and the activities organized by the International NGO forum show that environment is on the agenda of the International community. People have become more concerned about the environment. The environmental movement has focused attention on the quality of the air we breathe and the water we drink, on how new dam constructions harms wildlife and how strip mining devastates the landscapes and causes floods. We are beginning to realize that virtually all aspects of the world around us can have profound and potentially negative effects on our health and well-being.

There is an increasing realization that the human race now stands at the crossroads in choosing the options it has in the areas of environment and development. The industrial countries having enjoyed more than three of development, have achieved decent standard of living. This has given to the biosphere, pollution and ecodegradation, as a result of affluence and underlying greed. It has now become clear that such pattern of development, lifestyles and quality of life are unsustainable. On the contrary, the developing countries are still struggling to attain the minimum levels of sustenance. No doubt, that too have contributed to the ecodegradation and pollution, but this is essentially need and poverty based issue. Thus, both over development in the industrialized world and under-development in the developing countries pollute and ecodegrade the environment; former out of greed and increased luxury; and the latter out of the dire need to eke out an existence. The developing countries need abundant material growth to fulfill the basic needs of their people, but they can not afford to repeat the mistakes of industrial countries. Decades ago, when environment was not a buzz word, Mahatma Gandhi said, "The earth provides enough to satisfy everyman's needs, but not everyman's greed's" stated by Khoshoo (1995a). This is the statement with profound social, economic, cultural and ethical ramifications.

The relationship between environment and humankind is indeed deep and

has been recognized from the Vedic period. Furthermore, non- violence towards both animate and inanimate components of biosphere has been ingrained as a guiding principle in the Indian psyche. Therefore, awareness and education of environment is the paramount concern of all the citizens of society. Environment protection starts by creating awareness among the people so that it becomes part of their lifestyle. The key to achieving this goal lies in environmental education and its related programmes. The objective of environmental education includes awareness, knowledge, attitudes, skills and participation of people in protecting the environment.

Environment

Environment is defined as a surrounding or conditions influencing development of growth. It can be understood as a system which includes all living and non-living things; i.e., air, water, soil, vegetation, flora, and fauna. Man is a slave of environment. The child may have all kinds of abilities but they cannot be developed fully without a proper environment. Environment starts influencing the child from the stage of embryo. This influence has been called “Social Heredity”. The child when he/she comes to this world, finds surrounded by innumerable objects and circumstances which influence him/her. All these except the child form the environment. On the other hand there are two terms namely, ecology and ecosystem, which are to be acquainted with in this context.

Ecology

Ecology is the study of the total relations of the animal both to its organic environment including its friendly and inimical relations with those animals and plants with which it comes directly or indirectly in contact. In essence, ecology is the study of ecosystem.

Ecosystem

An ecosystem is a small segment of nature embracing the community of living things plus the physical environment. The basic and most important concept of an ecosystem is that everything is somehow related to everything else in nature. Major types of ecosystems are the seas, estuaries and seashores, fresh water system, deserts, tundra, grasslands and forests.

Man and Environmental Extremism

The environment which sustains life is in peril at present. Human actions are responsible for this. Rapid industrialization, further advancement in science and technology and the abuse of this advancement in an arbitrary way and the fast growth of urbanization have posed danger to man himself. Man's life, in terms of quality and sustainability, is dependent on the interrelationship among the natural environment, social environment and technological environment and the latter two being manmade. As proposed by the sociologist William Ogburn, a change in any one of the environments will lead to greater or lesser changes, as a result will have a tremendous impact of the very living of the man. The most threatening aspect is the uncertainty prevailing the fate of our future generations.

Generally, people are indifferent to their environment. Newton's third law states "every action has an equal and opposite reaction". This equally applies to man's relationship with nature as it relates to application of force on inanimate objects. While man sought domination over nature in five thousand years of recorded history, a has began to realize that his welfare and his very existence are deeply intertwined with the natural cycling system.

The uniqueness of man is his ability to subordinate nature and natural resources. So long as the requirements of his economics activities were small in relation to global stock of critical resources, he could count on improving his welfare. But his economic activities have increased at an exponential rate during

the past several decades with the results that the earth's resource base and life support system have become vastly depleted. The principal manifestations of those impacts are on the global climate, the intricate web of forest, ecology and diversity of living beings and increased transparency of the earth atmospheric protective shield to harmful ultraviolet radiation. All these are directly and indirectly to man's economic activities and to each other. They all have serious implications for his future well-being.

The various issues that have come to the fore are air, water and land pollution, deforestation, wildlife depletion, acid rains, ozone depletion, desertification, global warming, loss of biodiversity, tropical rainforest, biosphere management, green-house effect and others such issues. Of these climate change and biological diversity are described as the most urgent, requiring immediate attention. This is essentially because it is now well established the damage to environmental systems and natural resources has assumed massive proportion and the effects are manifesting themselves in very tangible detrimental forms.

Environmental Education and Awareness

Environment is a global concept today. Environmental education is an approach to learning. It endeavors to create a way of thinking requiring people to overcome prejudices. It helps in programming learning experiences ranging from the simple to complex. The principle of environmental education is that it makes the pupils' education problem related to understanding the environment and hazards of its pollutions. Environmental education is socially relevant as it helps us how unchecked and unplanned developments pollute air, water and soil and thereby threaten our subsistence and existence. Therefore, environmental education means the educational process dealing with man's relationship with his natural and man-made surroundings and includes the relations of population resource allocation and depletion, conservations,

transportation, technology, energy, urban and rural planning to the total biosphere.

On the other hand environmental awareness means to help social groups and individuals to acquire an awareness of and sensitive to the total environment and its allied problems.

The importance of environmental awareness can not be over emphasized. We must understand that to improve the environment is to improve the quality of life. It is not only a question of air and water pollution. It includes elimination of disease, hunger, malnutrition, and poverty, destruction of forests, extermination of wildlife, erosion of soil, and accumulation of waste. Hence there is an urgent need for proper management of the environment.

The main hurdle in protecting the environment in India today is that there is a lack of scientific knowledge and the will to act. In such a position society needs to be convinced of the importance of environment and we have to realize the fact that the way we live, will determine our future. As the problem is one, of the people, for the people, and by the people, a proper understanding and support of the people will go a long way in carrying out anti-pollution measures.

A number of environmental problems have just a local dimension both in rural and urban areas. People should be made aware of these. They relate to the use of water, electricity, detergents, chemicals, plastics, steel, wood etc. Above this level come to the localities, villages, and their common properties, and small towns. People should be encouraged in tree plantation and maintenance, social forestry, environment education, extension programs etc. In industrial towns the problems of industrial wastes and effluents on the one hand and growth of slums and related urbanization problems on the other, assume importance.

There is no doubt that attention to environment was overdue and it is time to commit ourselves to look after it with all possible means. It is a moral imperative and prerequisite for environment sustainability. Meaning thereby

that there is also a need of an environmental ethics because environment has gone beyond wildlife, pollution and man-made ugliness. It now extends to the very mind and spirit of human being. It touches on the question of need versus greed, and comfort versus luxury. What is enough for human being to fulfill needs and to live in the basic question ? There has to be a voluntary curb on the part of everyone to restrict his wants only to what is essential for human well-being. The rich nations and richer sections in a country need non-material growth, but poor nations and their poorer sections are entitled to material growth. Ethics has come in a major way in resource use like water, energy, food, goods and services. If we change as individuals, then society even govt. can change. After all a society or a govt. is only an extension of the individual. Here comes in the 'Dharma of paryavaran'. Every citizen of a welfare state like India has to obey and maintain the principle of "maximum of well-being with the minimum of consumption".

The present tool 'Environmental Awareness Ability Scale' purports to measure the extent and degree of awareness of people about environmental pollution and its protection. The scale explores the understanding of people about the importance of environment in which they live. And how far the efforts of govt. through various legislations, mass-awakening programmers of NGO and other agencies through mass-media, electronic media and print media could achieve their goals. Thus the present tools may prove itself very useful in assessing the knowledge of people and at the same time promoting their awareness; if they need so, about the environmental dimension of sustainable development.

Polluted environment endangers the human race by threatening its survival on planet earth. Boundaries of any nation can not limit these environmental problems to a particular country and region, but its impact is global one. This large scale environmental degradation has caused a global concern about the conservation and protection of the earth's environment.

Hence, efforts are being made for inculcating environmental consciousness or awareness among the masses. It is education which can make the human being conscious and knowledgeable about environment and environmental problems. Moreover, awareness is essential for the action. The main purpose of environmental education in schools is to acquaint and sensitize the young minds to the environmental problems and concerns, to inculcate in them healthy personal and social attitude and behaviour towards environment. Thus, students must have awareness about environment and the problems associated with it so that they can play their role very effectively. Hence, it is necessary to know how far the school students are aware about environment and environmental problems.

Variation in Environmental Awareness between Secondary and Senior Secondary School Students

Mean (M) score of environmental awareness of secondary school students was 88.62 and that of senior secondary school students was 87.58. Standard deviation (SD) score of secondary school students was 11.90 and that of senior secondary students was 11.95. Critical Ratio score (t-value) was 0.08 which was significant at 0.05 level of significance. Therefore, the hypothesis no. 1 that there might be no significant difference in environmental awareness of secondary and senior secondary school students was accepted. As it is concluded that both secondary and senior secondary students have almost equal environmental awareness shown by non significant value ($t = 0.08$). The main reason for non-significant differences in environmental awareness between secondary and senior secondary students is that these days environmental education is being taught as a compulsory subject in all schools throughout the India, after an order by the honourable Supreme Court was passed in this regard in the year 2005. The main aim of this order was to educate the people of India about the various environmental issues affecting our planet earth. As the

students at both the levels have studied environmental education in school so no significant difference in environmental awareness exists between them.

Variation in Environmental Awareness Gender wise

Mean (M) environmental awareness score of boys was 87.89 and that of girls was 88.43. Standard deviation (SD) score for boys was 12.25 and that for girls was 10.19 and the t-value was 0.428. Therefore, the hypothesis that no significance difference exist between male and female school students environmental awareness was retained at 0.05 level. It is concluded that gender is not a factor for affecting environmental awareness of school students. The main reason for almost equal environmental awareness of boys (M = 87.89) and girls (M = 88.43) is that they are studying together in the same teaching learning environment in the schools.

Difference in Environmental Awareness between Students of private and Government schools

Mean (M) environmental awareness score of students of private schools was 96.22 and that of students of Government schools was 78.78. Standard deviation (SD) scores of students of private schools was 9.57 and that of Government school students was 8.303. t-value was 14.53. Therefore, the hypothesis that there might be significant differences in environmental awareness of students of private schools and government schools was retained at 0.01 level. These findings reveal that students of private schools have more environmental awareness than government school students. The main reason for higher environmental awareness among students of private schools (96.22) than government school students (78.78) may be the family background and educational qualification of parents. Parents of students studying in private schools are graduates and are having well to do and affluent family background. Such parents are mainly concerned with inculcating environmental awareness in

their children as they are aware of the dangers and consequences of environmental degradation at global level. On the other hand, students staying in Government schools come from poor families and have less educated or illiterate parents. Their main priority is to fulfill the needs of their family members. They are not aware of environmental issues so they can't pass on these awareness measures to their children so the students of government schools do not get the learning environment in their homes because of which they score less than students of private schools.

Difference in Environmental Awareness between Students of Semi-government and Government Schools

Mean (M) environment awareness score for semi-government school students was 87.45 and that for government school students was 78.78. Standard deviation (SD) scores for semi-government School students was 9.036 and for government school students was 8.303. t-value was 7.41. Therefore, the hypothesis that there might be significant difference in environmental awareness between students of semi-government and government schools was retained at 0.01 level. These findings reveal that students of semi-government schools (87.45) have more environmental awareness than government school (78.78) students. The main reason for this difference is that the students in semi-government school have better educational environment than those in government schools. The teachers in semi-government schools make more efforts to provide better education and environmental awareness to their students than the teachers of the government schools who make little efforts in this regard.

Difference in Environmental Awareness in Students of Rural and Urban Areas (Rural Urban Variation)

Mean (M) environmental awareness score of students in rural areas was 80.17 and that in urban areas was 95.43. Standard deviation (SD) score of

school students in rural areas was 8.14 and that in urban areas was 9.17. t-value was 16.23. Therefore, the hypothesis that significant differences exist in environmental awareness of school students of rural and urban areas is retained at 0.01 level. Therefore, it is concluded that environmental awareness of urban areas school students is much higher than that of rural areas. The main reason for such differences is that school students in urban areas have more facilities in terms of education, entertainment, competitions etc. than students in rural areas. Urban areas school students have an easy access to internet which provides them information about various factors which are responsible for degrading the environment in different parts of the World. Their parents are educated and they got good learning environments at home, which increase their knowledge concerning environment. Various programmes like Van Mahautsav, World Environment Day, No Tobacco Day etc. helps in creating awareness about environment among school students. Whereas, rural school students do not have such facilities. Their home environments are also where they do not get any awareness about the environment. They are not aware about the various threats to the environment. They mostly study in government schools where very little efforts are made to provide them environmental awareness.

Difference in Environmental Awareness between Students Studying in Punjabi and English Medium Schools

Mean score of environmental awareness of Punjabi Medium students was 78.78 whereas the mean score of English medium students was 96.92. Standard deviation of Punjabi medium students was 8.303 whereas the standard deviation of English medium students was 9.576. The t-value comes out to be 14.53. Therefore, the hypothesis that there might be significant differences in environmental awareness of students studying in Punjabi and English medium is retained at 0.01 level. The main reason of this difference is that most of English medium schools and students are in Urban areas and Punjabi medium schools

are in rural areas. Students studying in English medium have more environmental awareness because most of the literature on environmental issues is available in English medium. On the other hand Punjabi medium students have limited access to world environmental problems and environmental awareness because they never leave their homes to know about the rest of the world and very limited literature is available in Punjabi medium related to environmental awareness.

All these findings urges us and the government to make efforts to provide the necessary infrastructure in the form of internet facilities, proper classrooms, library facilities, environment related books for the students studying in different schools run by the different types of school managements and specially in the government run schools.

Environmental Education is a process of recognising values and clarifying concepts in order to develop skills and added tools necessary to understand and appreciate the inter-relationship among man, his culture and his bio-physical surrounding. It creates an overall perspective, which acknowledges the fact that natural environment and man-made environment are interdependent. It should consider the environment in its totality and should be a continuous lifelong process beginning at the pre-school level and continuing through all stages. It should be inter-disciplinary and examine major environmental issues from local, national and international points of view. It should utilise various educational approaches to teach and learn about and from the environment with stress on practical activities and first-hand experience. It is through this process of education that people can be sensitized about the environmental issues.

To achieve the above objectives, the Ministry has been implementing several schemes and programmes. Some of the major schemes implemented for imparting environmental education and for creation of environmental awareness among the general public are as follows:

3.8 Environmental Education and Training

Objectives :

- Development of educational/teaching materials and aids in the formal education sector;
- To encourage non-governmental organisations, mass media and other concerned organisations for promoting awareness among the people at all levels;
- To promote environment education through existing educational / scientific / research institutions;
- To ensure training and manpower development in environment education;
- To mobilise people's awareness for the preservation and conservation of environment.
- The programmes conducted/initiatives launched as part of this scheme are categorised under Formal and Non-Formal sectors.
- Programmes under Formal Environmental Education are :
 - Environment Education in School System.
 - Environmental Appreciation Courses.
 - Environmental concepts in Management and Business Studies.
- Programmes under Non-Formal Environmental Education are :
 - National Environment Awareness Campaign (NEAC)
 - Eco-clubs (NGC)
 - GLOBE
 - Mass Awareness

Formal Environmental Education

Though formal education is the mandate of the Ministry of Human Resource Development (MHRD), the Ministry of Environment & Forests has been interacting with the MHRD, NCERT, State Departments of Education etc. to ensure that environmental components are adequately covered at the school

levels by infusion into the school curricula at various levels. The major initiatives taken by the Ministry in this direction recently are mentioned below :
Environment Education in School System.

Under this project, which was initiated in 1999, an exercise to strengthen environment education in the formal school curriculum has been undertaken. During the first phase of this project, a comprehensive study was conducted to assess the status of infusion of environment content in the school curriculum in the country and to assess the effectiveness of classroom teaching. The study was conducted in all the States / UTs of the country and textbooks of all the classes from standards I to XII were analysed. Based on the findings of the study, the textbooks in Science, Social Science and Languages of middle school level in eight States (100 schools in each State) are being modified to strengthen the infusion of environmental concepts. The modified textbooks would be used for one academic session (2002-2003) in the selected schools of the selected States on pilot basis. The concerned teachers of the selected schools would also be trained to effectively teach the modified textbooks. The States participating in this project are Andhra Pradesh, Assam, Goa, Jammu & Kashmir, Maharashtra, Orissa, Punjab and Uttaranchal. Depending upon the success of the pilot implementation, the revised curriculum may be taken up in the remaining schools. The findings of the Phase I study are also being shared with the States / UTs which are not participating in this project so that they can also environmentalise their textbooks.

Environmental Appreciation Course

Though there are several courses on environmental sciences at present in the formal system, there are no structured courses available outside the formal system for people who desire to learn about environmental issues. The Ministry has taken an initiative in this regard and it presently working out a frame work for environmental appreciation courses in consultation with IGNOU.

Environmental Concepts in Management & Business Studies

Realising that the industry Managers and leaders need to be sensitized towards environmental issues and concepts of Environmental Management so that they can play an important role in introducing environmentally sound practices in their operations, the Ministry has taken an initiative to introduce/enhance environmental concepts in the Business/Management Education. A committee comprising representatives from Management Institutions, AICTE, UGC, Industry and MoEF is already looking into various aspects like course content and syllabi of the existing courses so that gaps could be identified and suggestion could be given for enhancing/introducing the environmental content where necessary.

Non-formal Environment Education and Awareness

Environmental Education, Awareness and Training plays a significant role in encouraging and enhancing people's participation in activities aimed at conservation, protection and management of the environment, essential for achieving sustainable development. The Ministry, therefore, accords priority for the promotion of non-formal environment education and creation of awareness among all sections of the society through diverse activities using traditional and modern media of communication. Some of the major activities undertaken in this regard are as follows :

National Environment Awareness Campaign (NEAC)

The NEAC was launched in mid 1986 with the objective of creating environmental awareness at the national level. It is a multi-media campaign which utilises conventional and non-conventional methods of communication for disseminating environmental messages to a wide range of target groups. Under this campaign, nominal financial assistance is provided to registered NGOs, schools, colleges, universities, research institutions, women and youth

organisations, army units, State Government Departments etc. from all over the country for organising / conducting awareness raising activities. These activities which include seminars, workshops, training programmes, camps, padyatras, rallies, public meetings, exhibitions, essay/debate/painting/poster competitions, folk dances and songs, street theatre, puppet shows, preparation and distribution of environmental education resource materials etc., are followed by action like plantation of trees, management of household waste, cleaning of water bodies etc. Diverse target groups encompassing students, youth, teachers, tribals, farmers, other rural population, professionals and the general public are covered under NEAC.

Eco-clubs (National Green Corps)

The main objectives of this programme are to educate children about their immediate environment and impart knowledge about the eco-systems, their inter-dependence and their need for survival, through visits and demonstrations and to mobilise youngsters by instilling in them the spirit of scientific inquiry into environmental problems and involving them in the efforts of environmental preservation.

Global Learning and Observations to Benefit the Environment (GLOBE)

The GLOBE is an International Science and Education Programme, which stress on hands-on participatory approach. India joined this programme during the August, 2000. This programme, which unites students, teachers and scientists all over the world, is aimed at school children. The students of GLOBE schools are required to collect data about various basic environmental parameters under the supervision of a GLOBE trained teacher and use it for explaining hypothesis as well as to enhance their scientific understanding of the earth. This data is also used by the scientists in their research work. The GLOBE also provides an opportunity to the students to interact not only with

the GLOBE scientists but also with the students from GLOBE schools in other parts of the world. About 100 schools spread over different parts of the country have already joined this programme. The teachers of these schools have also been trained in various GLOBE protocols

Mass Awareness

Despite great efforts to spread environmental awareness by the Ministry through several schemes, it is felt that a large population especially in rural areas is still left out. The best way to reach out to them and make them aware of the environmental problems is through media, particularly the electronic media. "Mass Awareness" has therefore been identified as one of the thrust areas of the Ministry, not only to intensify the efforts already being made in this direction but also to launch new initiatives. The Doordarshan and few other television channels are proposed to be extensively used for telecasting environment based programmes and infomercials.

Other Awareness Programs

The Ministry also sponsors various programs which do not fit into straitjacketed programs like NEAC, NGC, etc., and are aimed at creating environmental awareness among children.

**GRAPHICAL PRESENTATION OF INFORMATION
REGARDING BIODIVERSITY**

Statement No. 1 : An overall knowledge about bio-diversity should be a part of education.

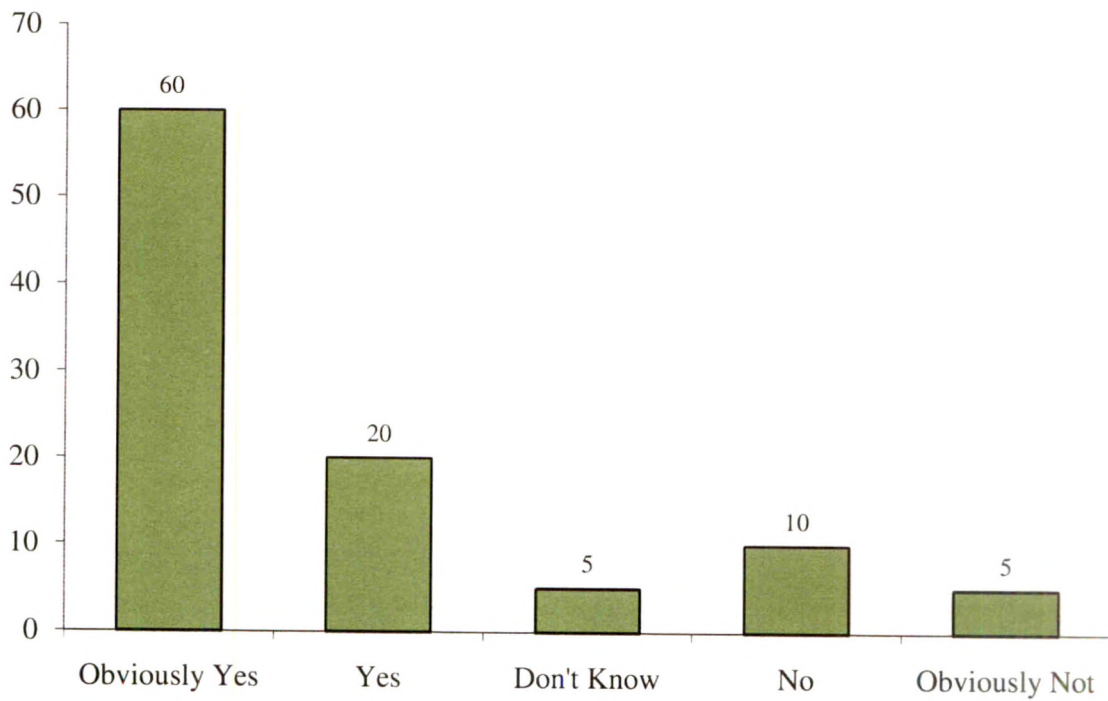


Fig. 1 : Biodiversity Curve for Statement 1

Statement No. 2 : India has a great role in conservation of biodiversity.

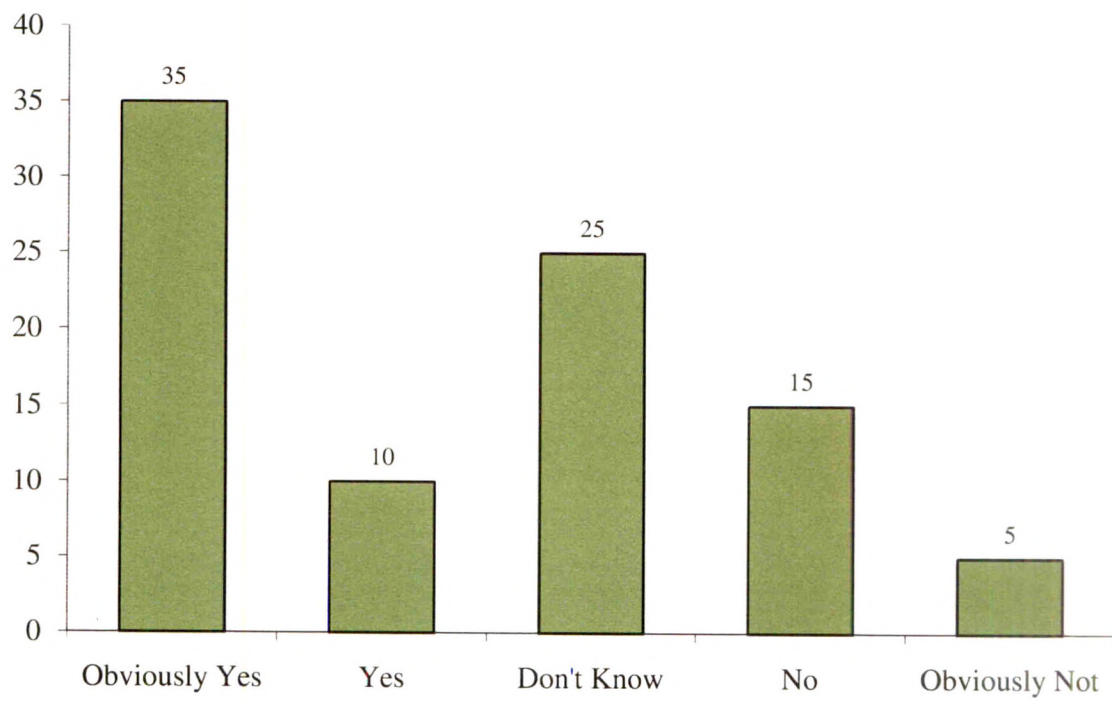


Fig. 2 : Biodiversity Curve for Statement 2

Statement No. 3 : Our animals and plants can be preserved only through conservation of biodiversity.

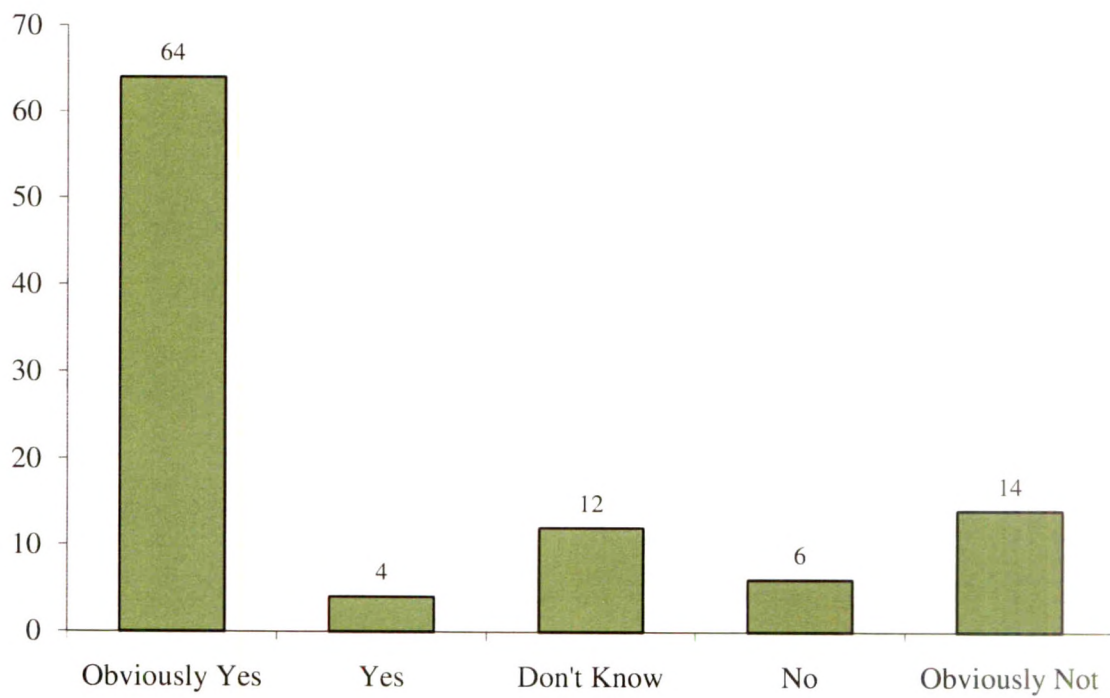


Fig. 3 : Biodiversity Curve for Statement 3

Statement No. 4 : Biodiversity plays no role in control of pollution caused by the smokes from industry, vehicle, wood or coal.

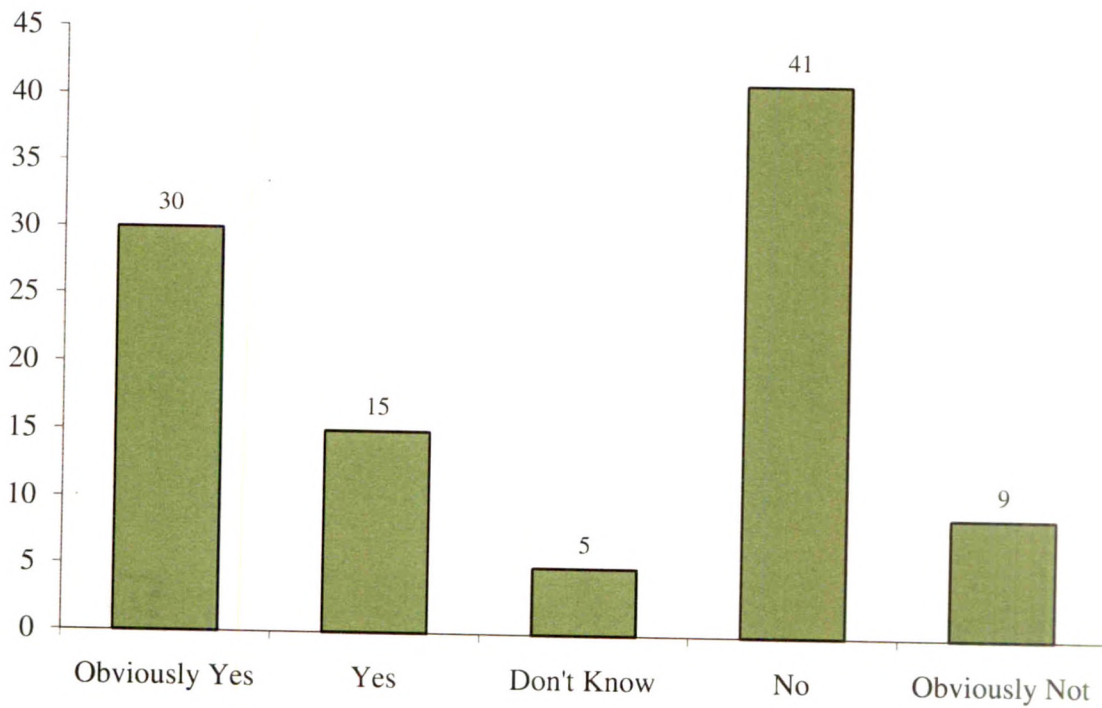


Fig. 4 : Biodiversity Curve for Statement 4

Statement No. 5 : Today many plants and animals have become endangered or extinct as the conservation of biodiversity have been neglected since.

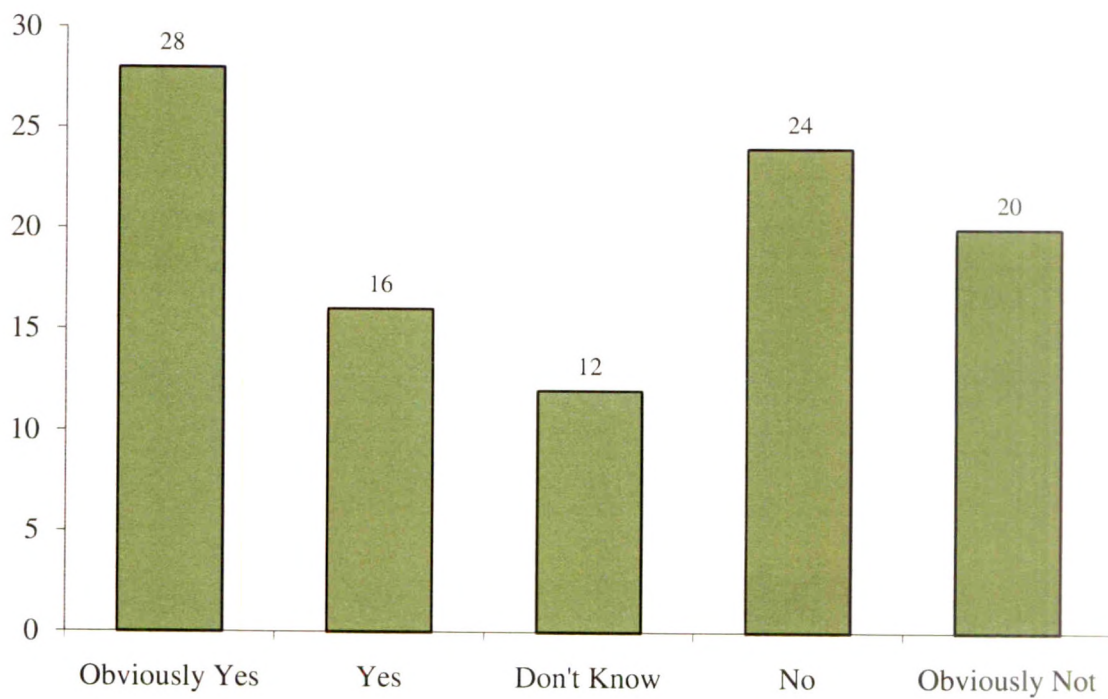


Fig. 5 : Biodiversity Curve for Statement 5

Statement No. 6 : Biodiversity is not directly or indirectly balancing the ecosystem.

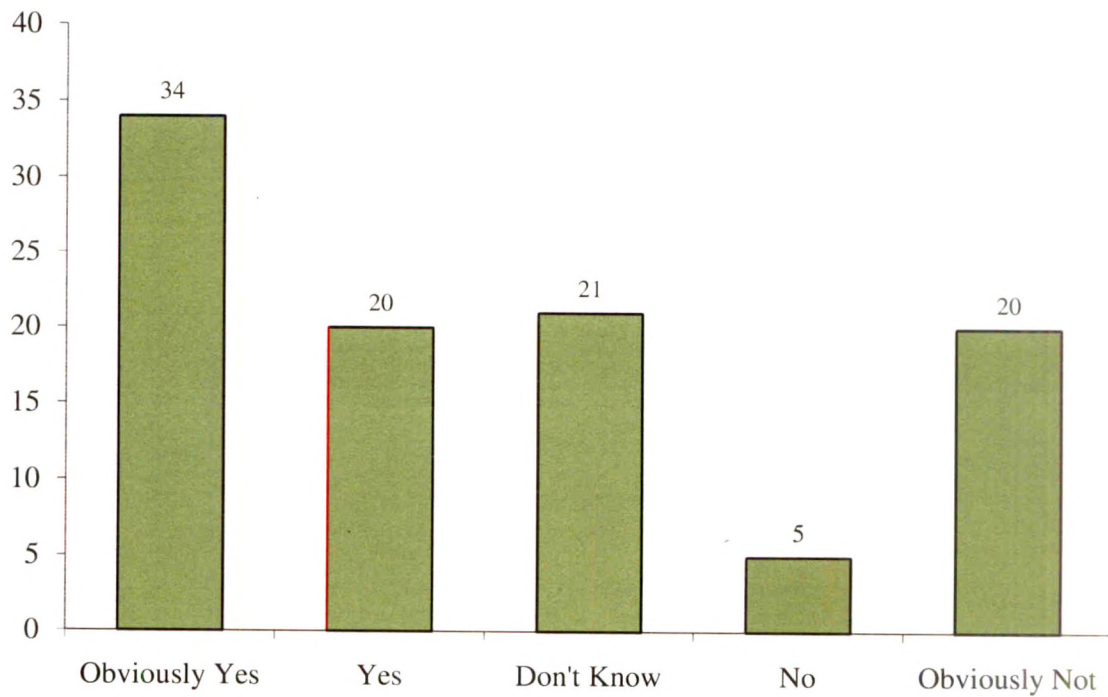


Fig. 6 : Biodiversity Curve for Statement 6

Statement No. 7 : Biodiversity is directly or indirectly balancing the ecosystem in participatory approach.

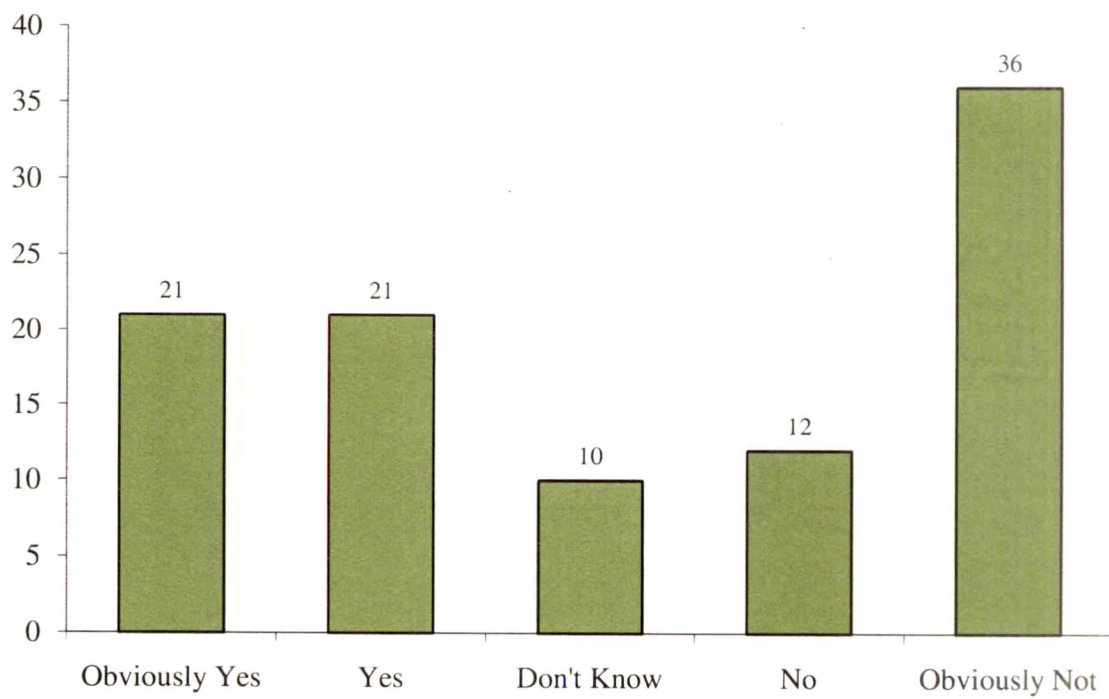


Fig. 7 : Biodiversity Curve for Statement 7

Statement No. 8 : The ecological balance is hampered due to the neverending need of mankind.

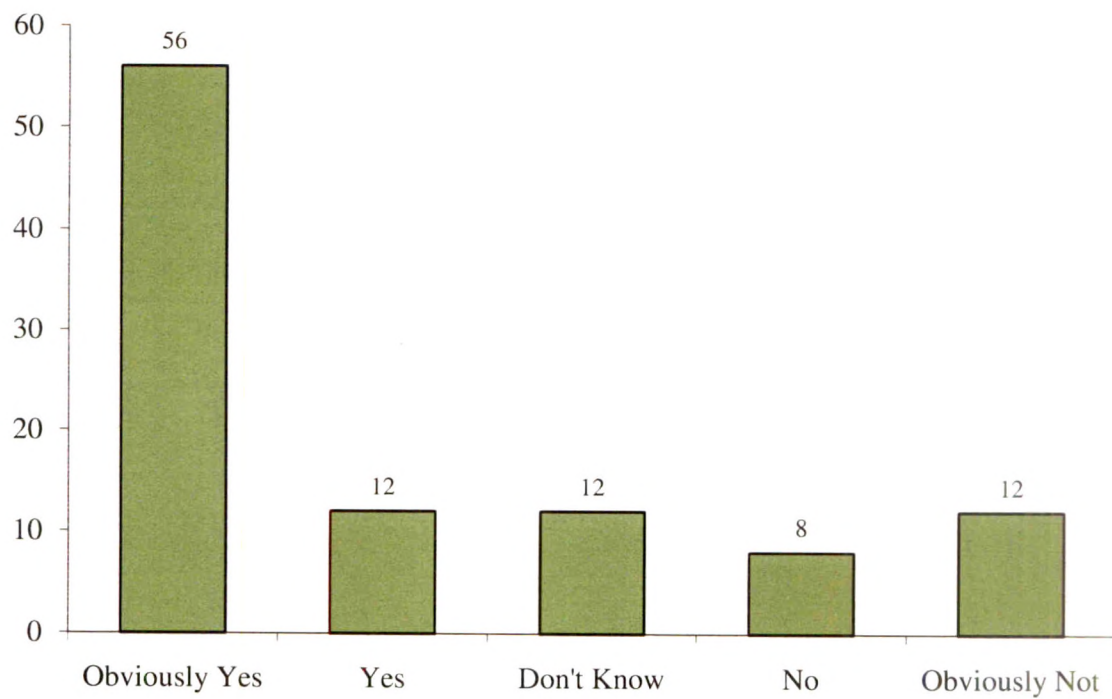


Fig. 8 : Biodiversity Curve for Statement 8

Statement No. 9 : The main cause behind the destruction of civilization is negligence of biodiversity.

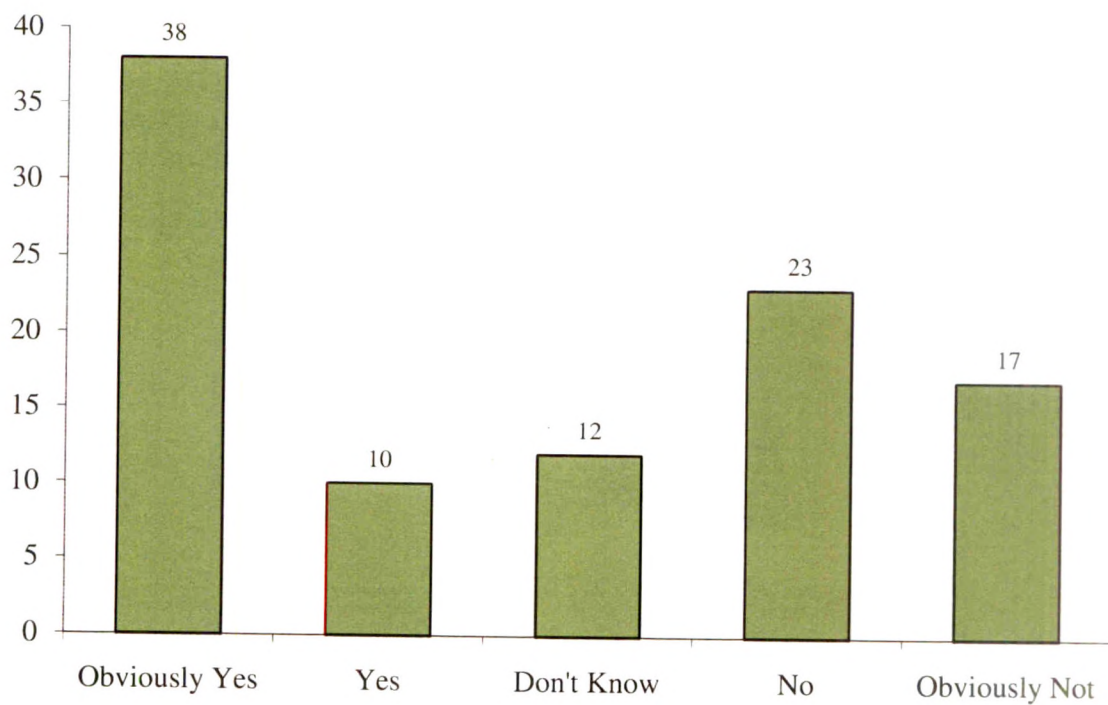


Fig. 9 : Biodiversity Curve for Statement 9

Statement No. 10 : Forest conservation is essential to prevent the extinction of animal and plant species.

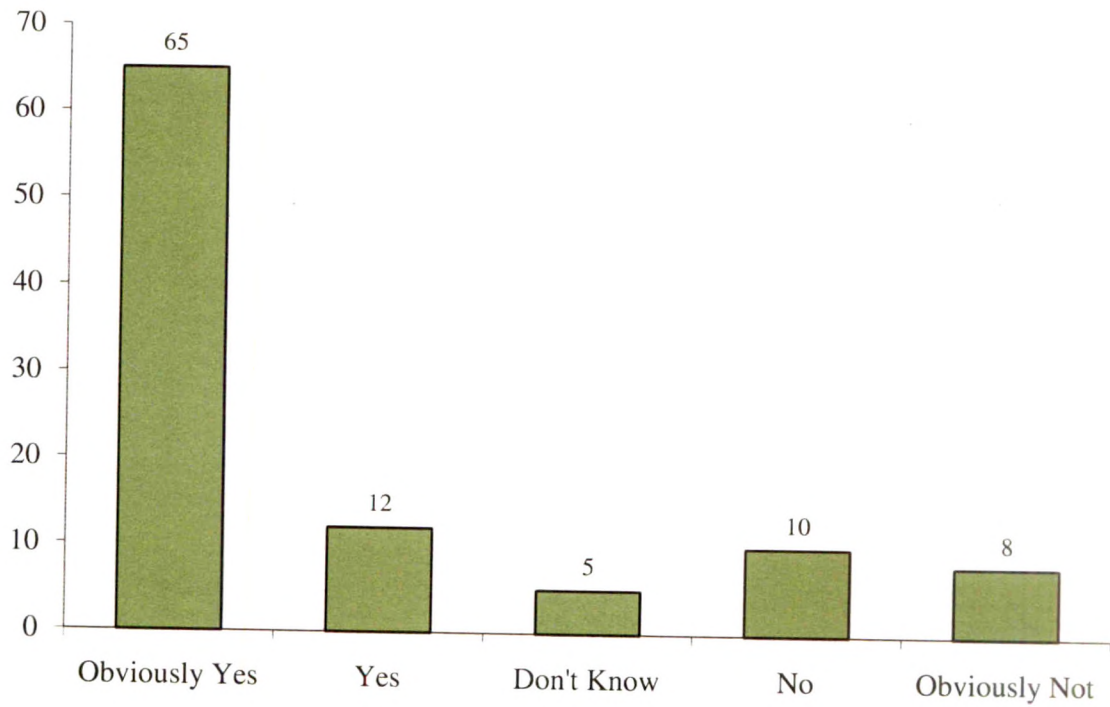


Fig. 10 : Biodiversity Curve for Statement 10

Statement No. 11 : The main source of biodiversity is tropical forest

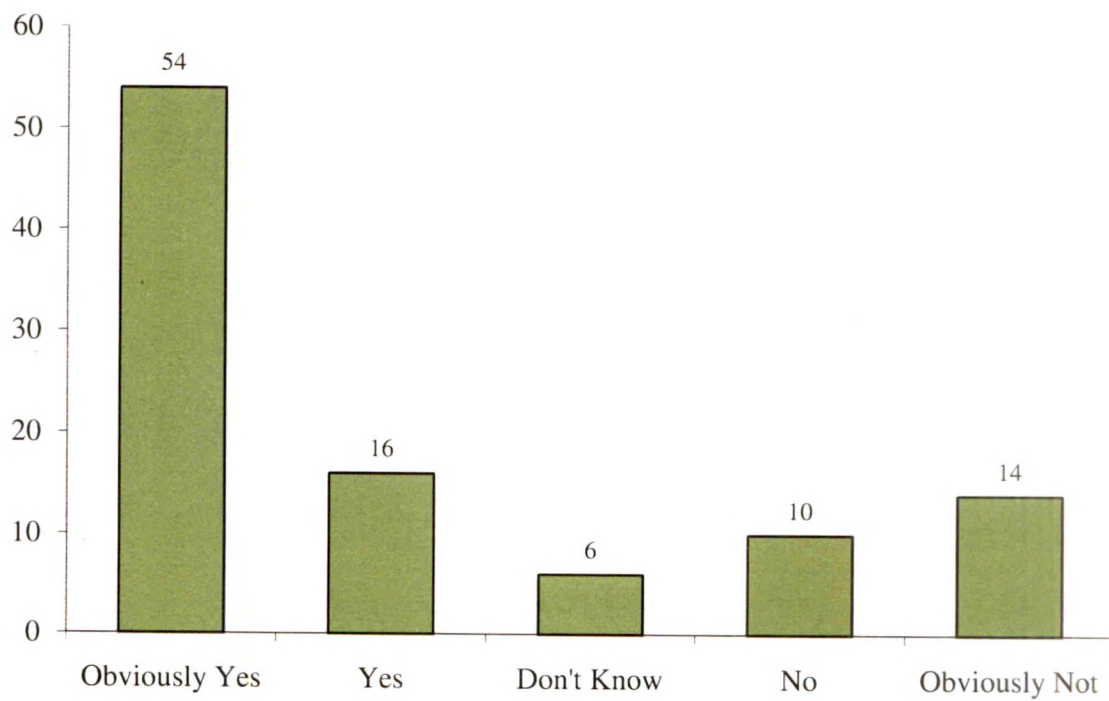


Fig. 11 : Biodiversity Curve for Statement 11

Statement No. 12 : Conservation of plant ecology and creation of national plant parks are necessary for conservation of ecological balance.

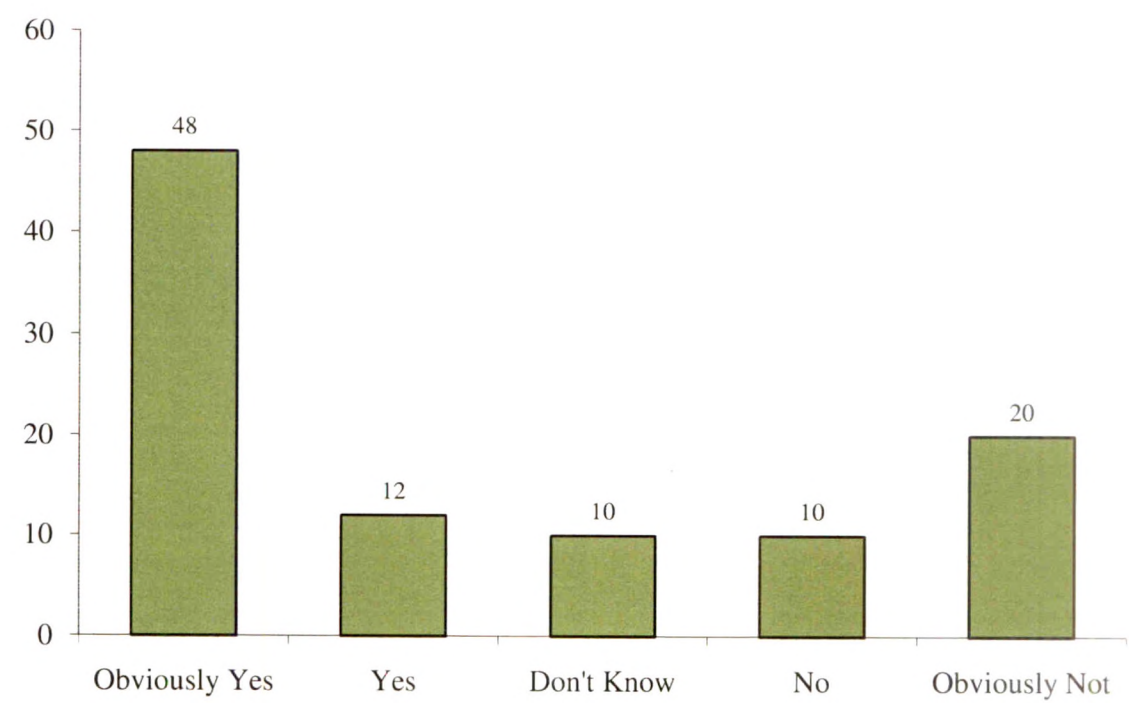


Fig. 12 : Biodiversity Curve for Statement 12

Statement No. 13 : There is no need to stop deforestation for timely monsoon and normal amount of rain.

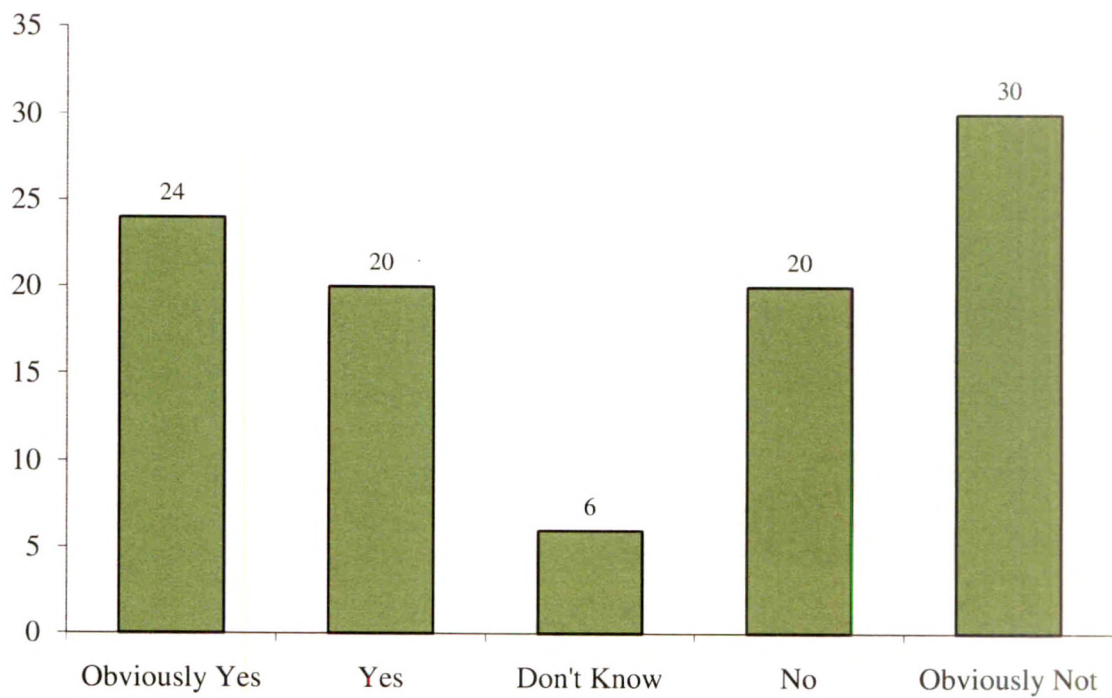


Fig. 13 : Biodiversity Curve for Statement 13

Statement No. 14 : Social afforestation is essential for pollution free environment.

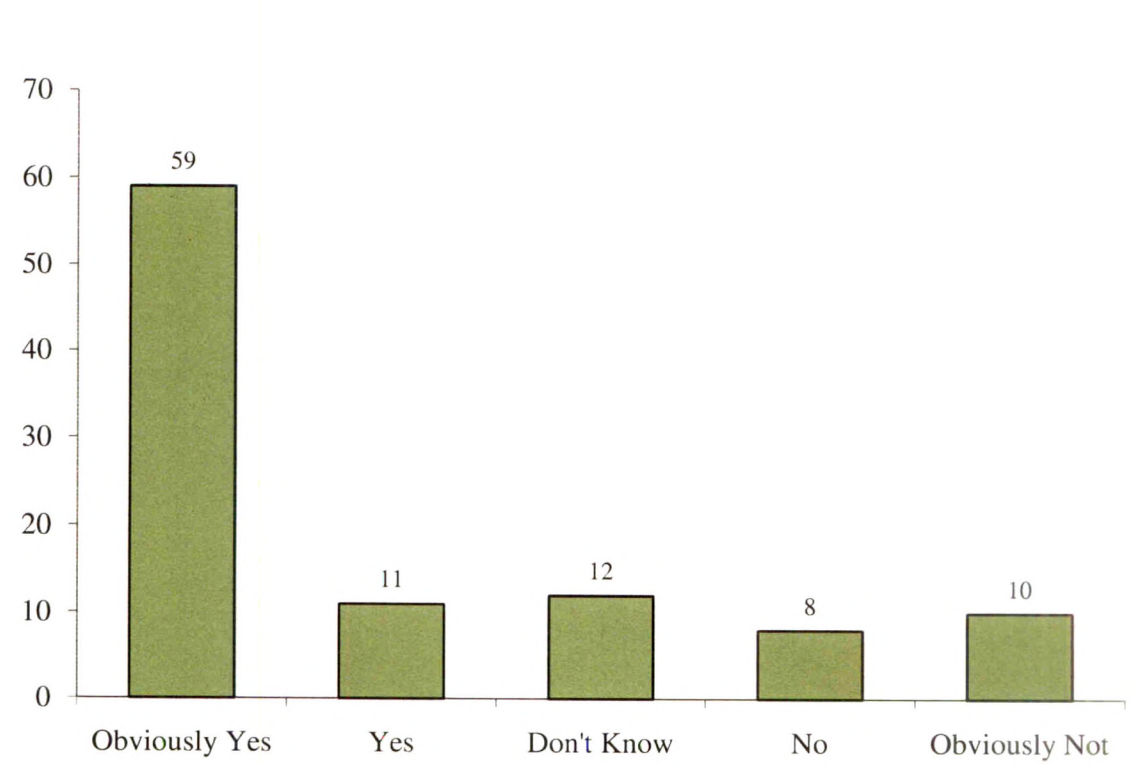


Fig. 14 : Biodiversity Curve for Statement 14

Statement No. 15 : Forest conservation and afforestation has no role in prevention of soil erosion.

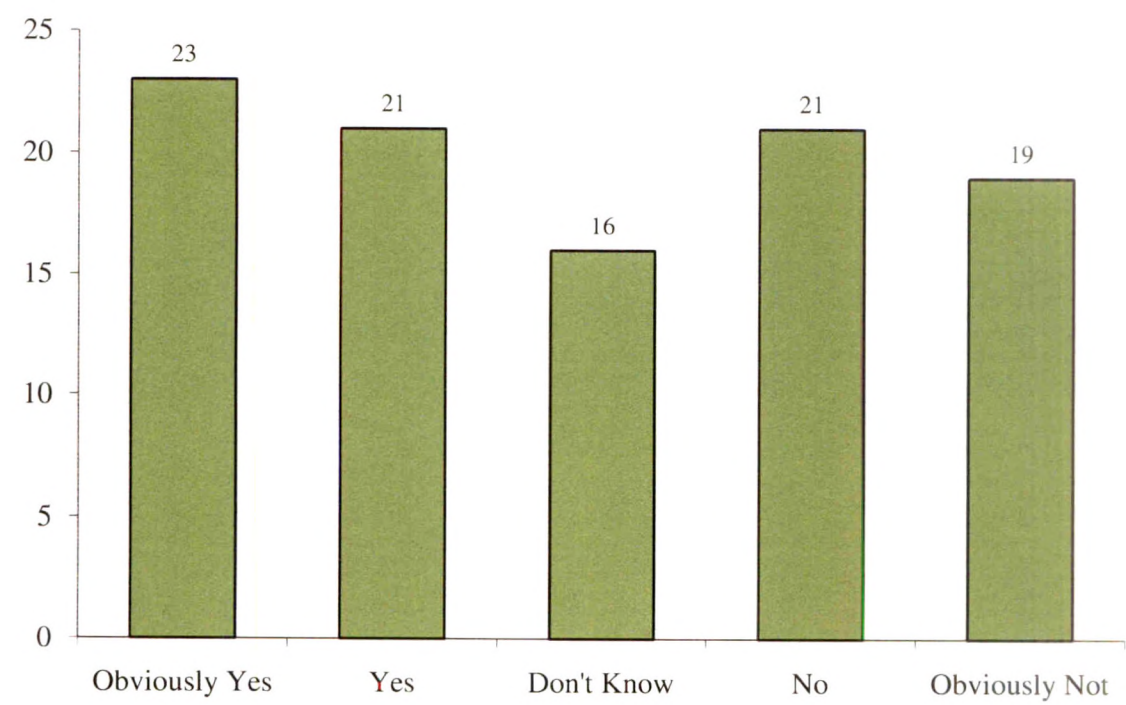


Fig. 15 : Biodiversity Curve for Statement 15

Statement No. 16 : Plant diversity has no role in prevention of drought and expansion of desert.

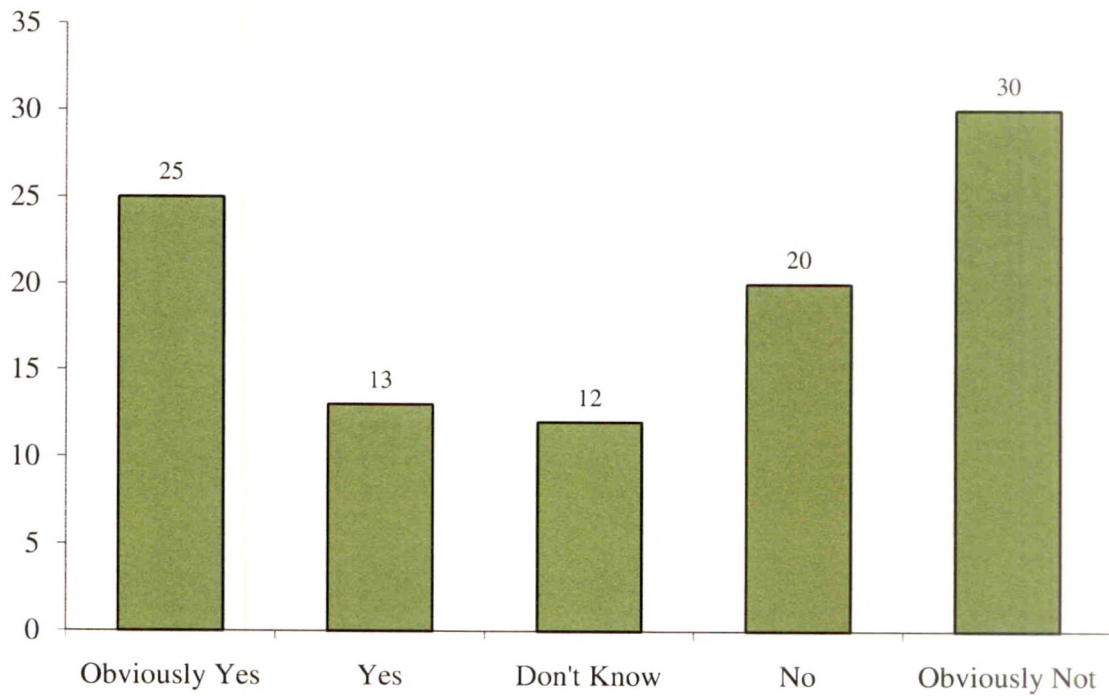


Fig. 16 : Biodiversity Curve for Statement 16

Statement No. 17 : By overuse of economical plant and destruction of unwanted species of plants, the overall plant diversity is declining.

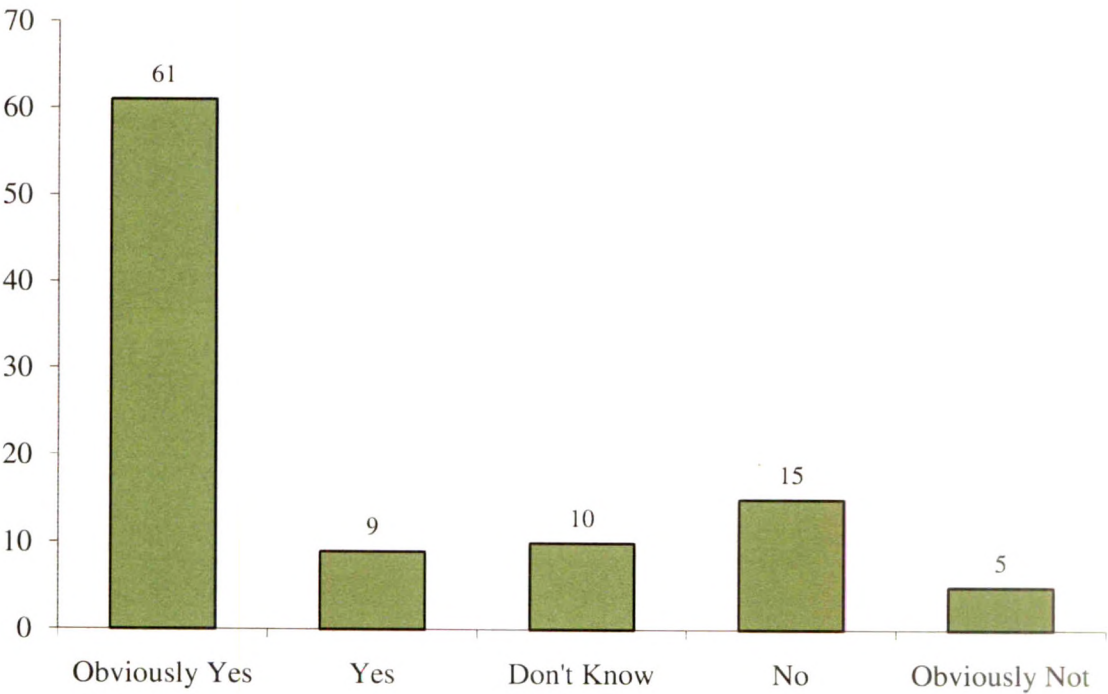


Fig. 17 : Biodiversity Curve for Statement 17

Statement No. 18 : Cutting few trees if required is not harmful.

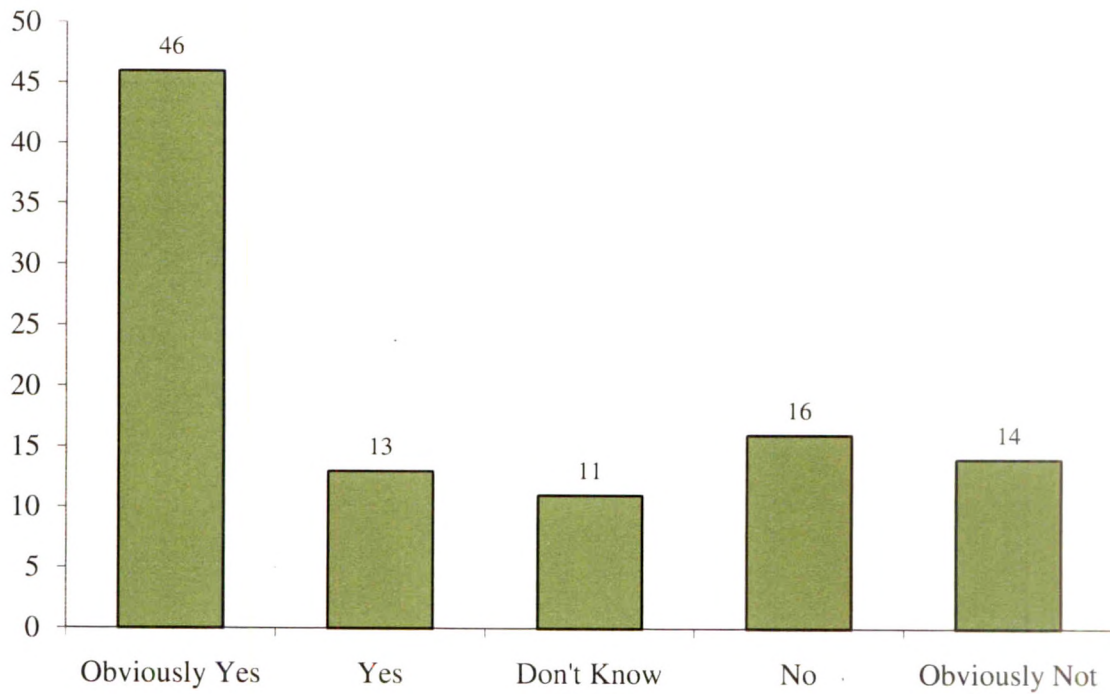


Fig. 18 : Biodiversity Curve for Statement 18

Statement No. 19 : Cutting some trees from a dense forest is not harmful.

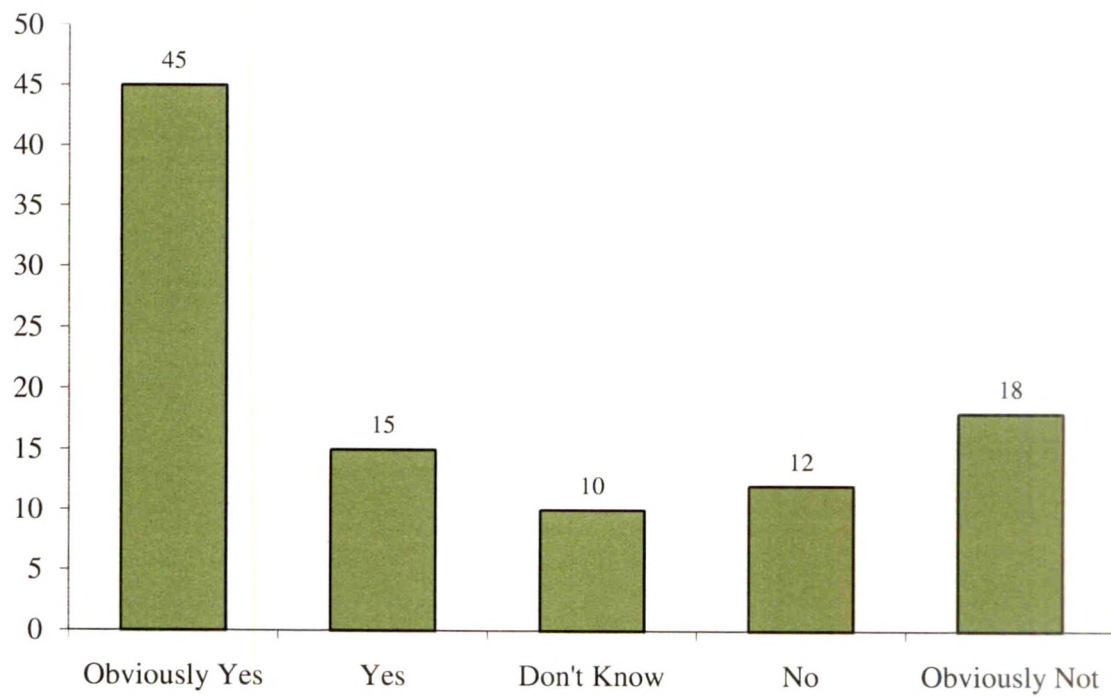


Fig. 19 : Biodiversity Curve for Statement 19

Statement No. 20 : Wild life conservation and creation of national park is not necessary for maintaining ecological balance.

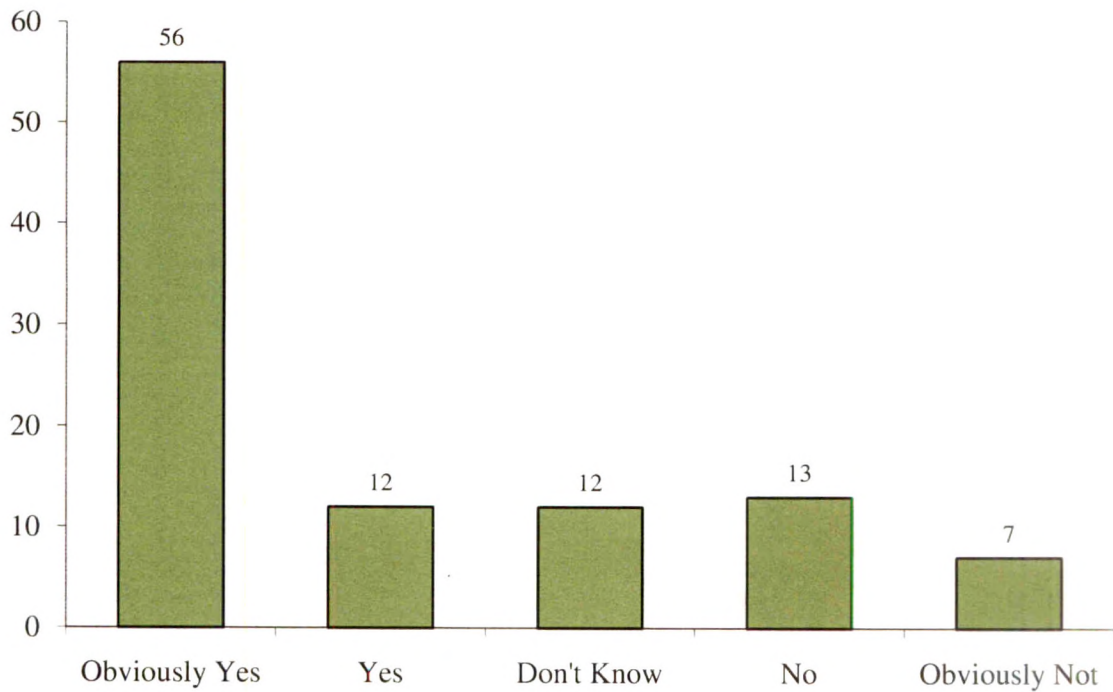


Fig. 20 : Biodiversity Curve for Statement 20

Statement No. 21 : Lack of awareness about conservation has caused extinction of golden toad, rhinoceros, different types of birds, eguana etc.

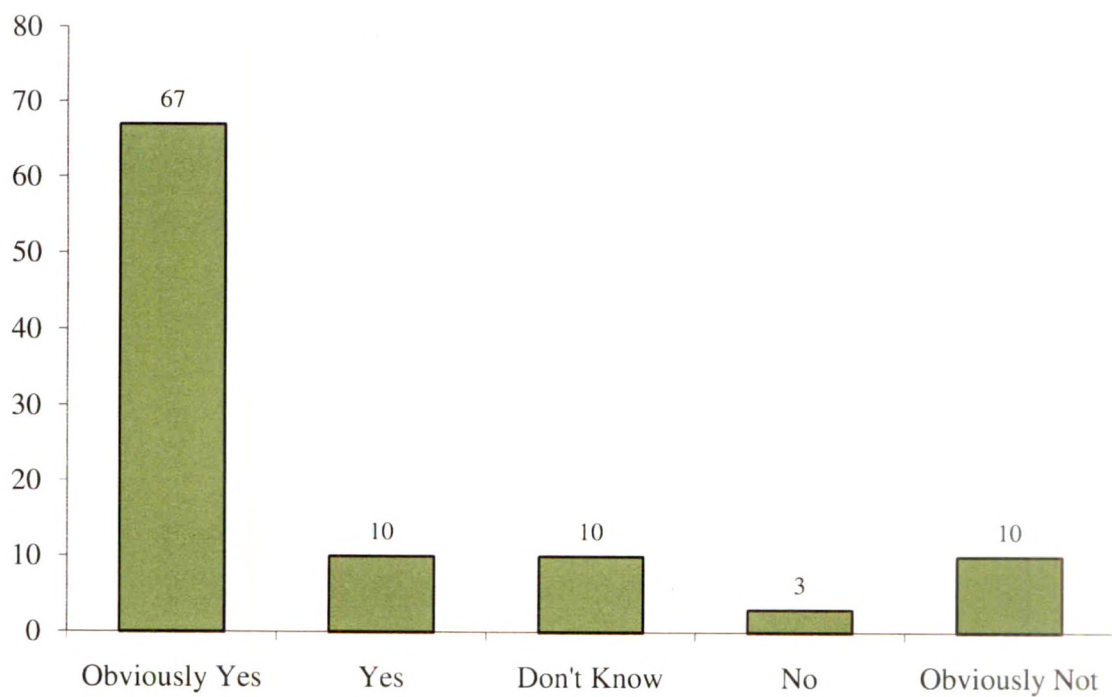


Fig. 21 : Biodiversity Curve for Statement 21

Statement No. 22 : The Act to prevent illegal killing of many rare genetic origin of biodiversity (like one-horned-rhino, spotted deer, King Cobra etc.) should strictly applied.

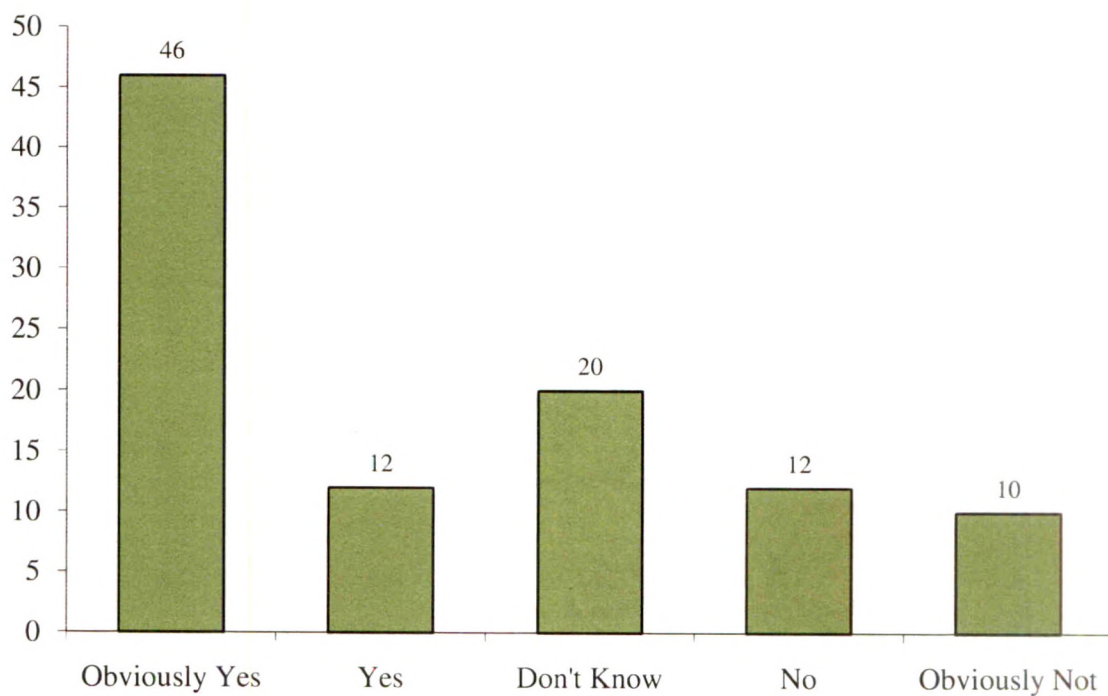


Fig. 22 : Biodiversity Curve for Statement 22

Statement No. 23 : Sympathetic attitudes towards wild animals should be developed among general people.

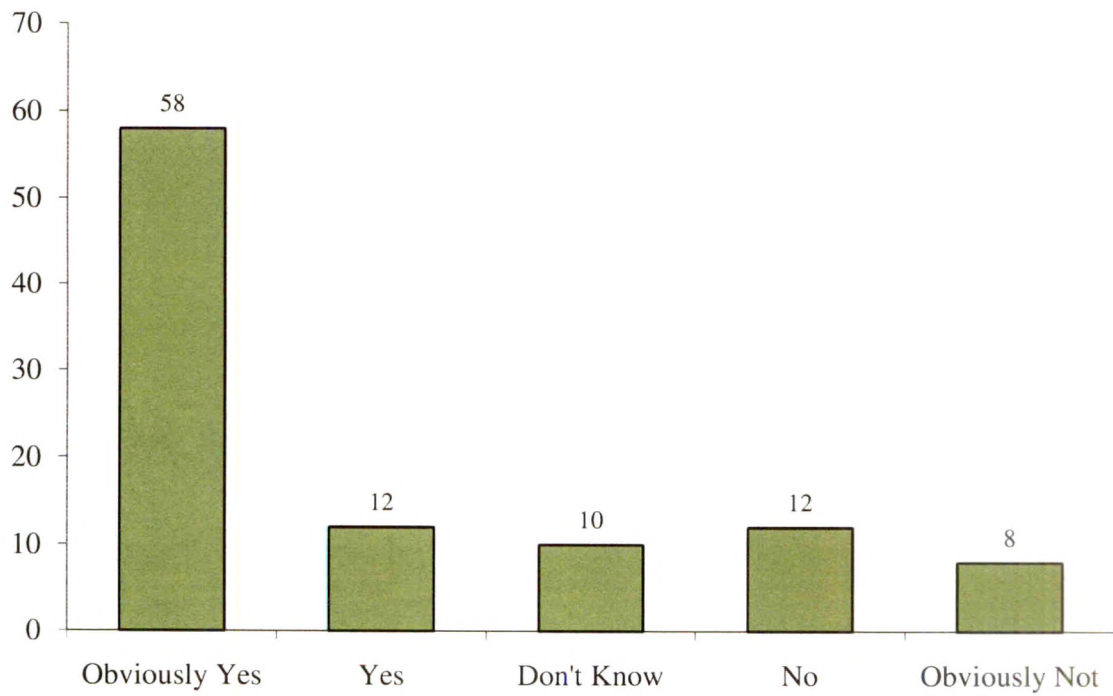


Fig. 23 : Biodiversity Curve for Statement 23

Statement No. 24 : For the lack of favourable environment and to protect bird diversity, artificial nests for birds should be built.

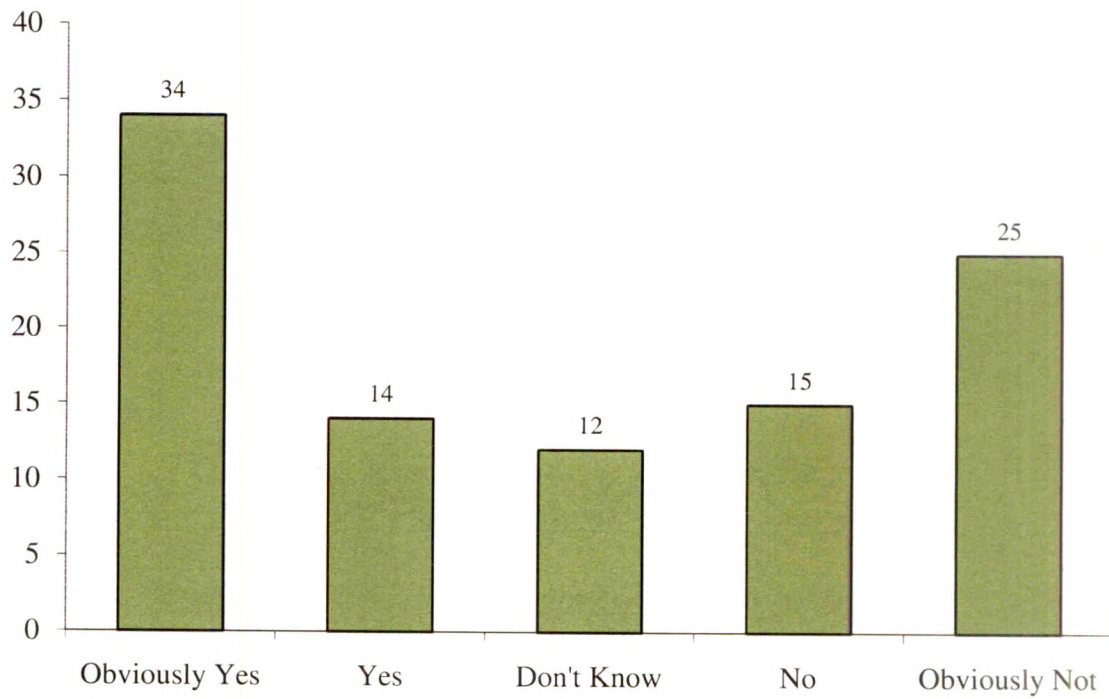


Fig. 24 : Biodiversity Curve for Statement 24

Statement No. 25 : The chemicals used to protect the crop from insect are not harmful for other animals of the field, like birds, frog, earthworm etc.

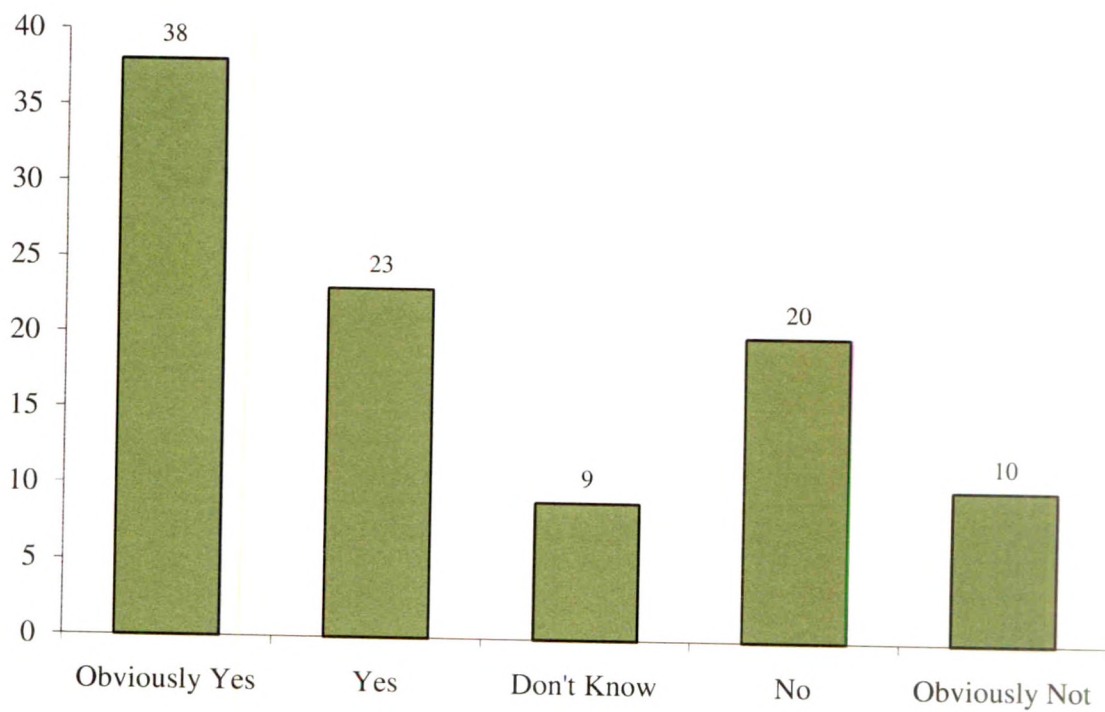


Fig. 25 : Biodiversity Curve for Statement 25

Statement No. 26 : Producing only required species of fish and destroying others fishes is scientific method.

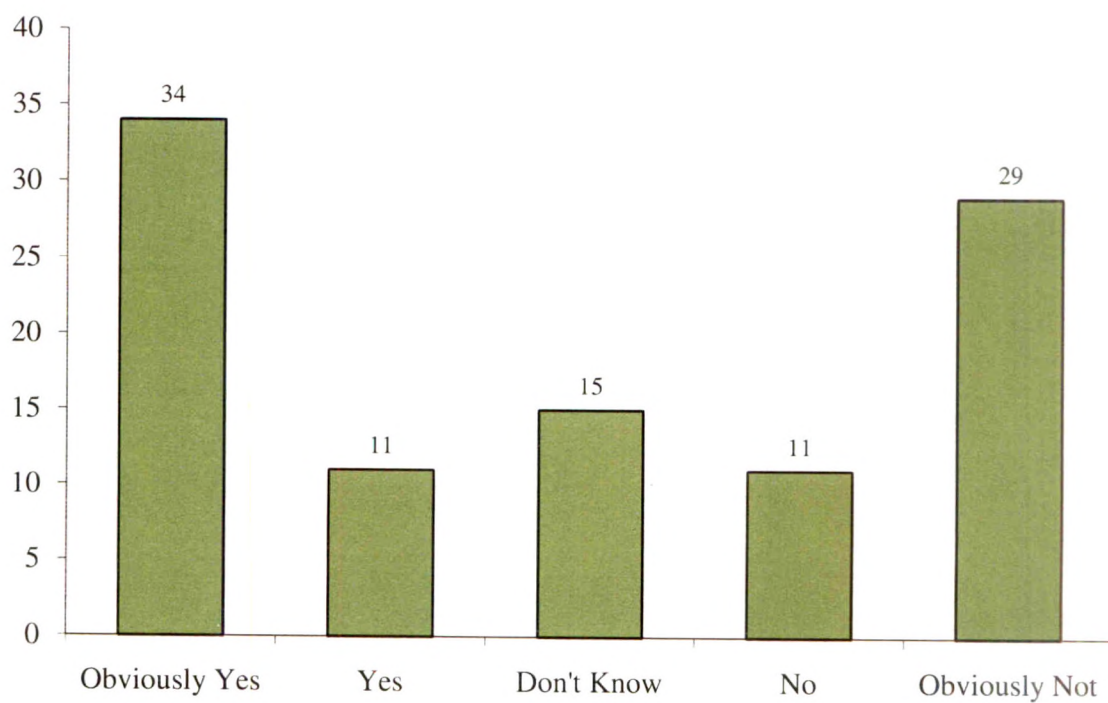


Fig. 26 : Biodiversity Curve for Statement 26

Statement No. 27 : Capturing and killing turtles for their flesh is not right.

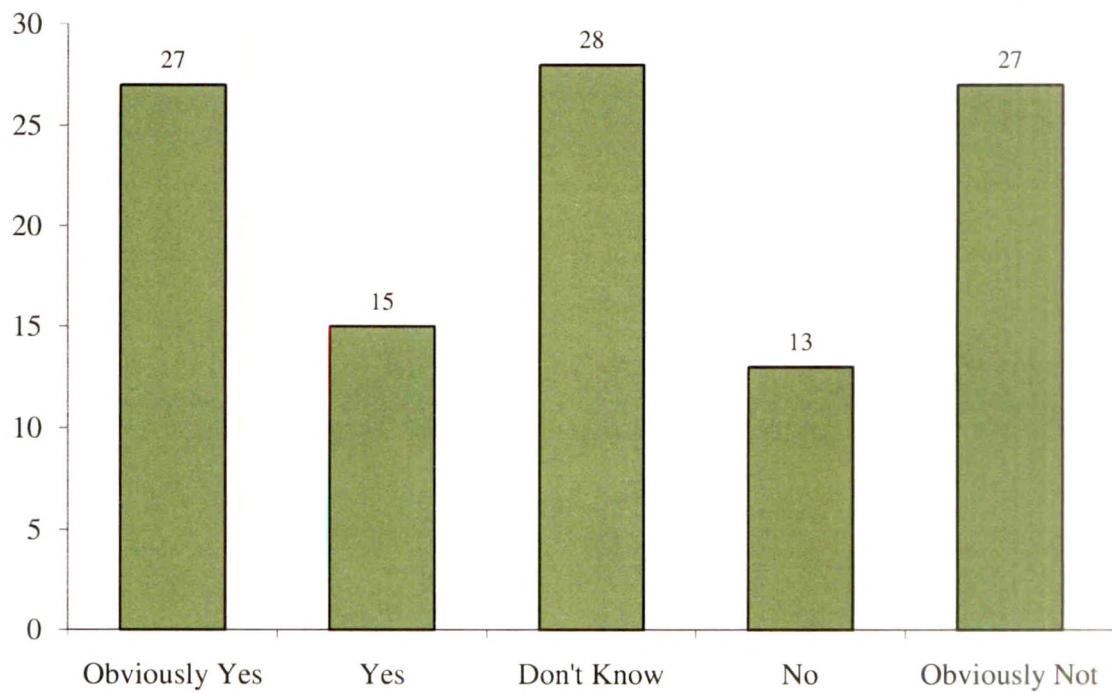


Fig. 27 : Biodiversity Curve for Statement 27

Statement No. 28 : Spending money in protection of wild animals like tiger and crocodile is not essential in a poor country like India.

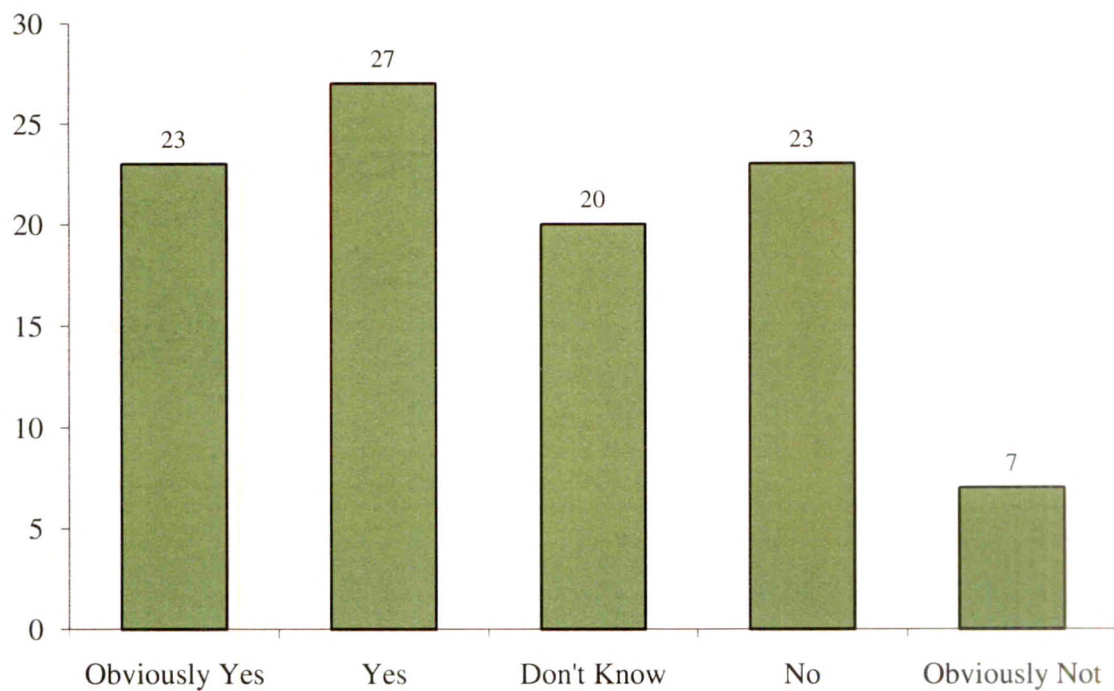


Fig. 28 : Biodiversity Curve for Statement 28

Statement No. 29 : The present economical condition of India is not favourable for spending money for animals in the sanctuaries.

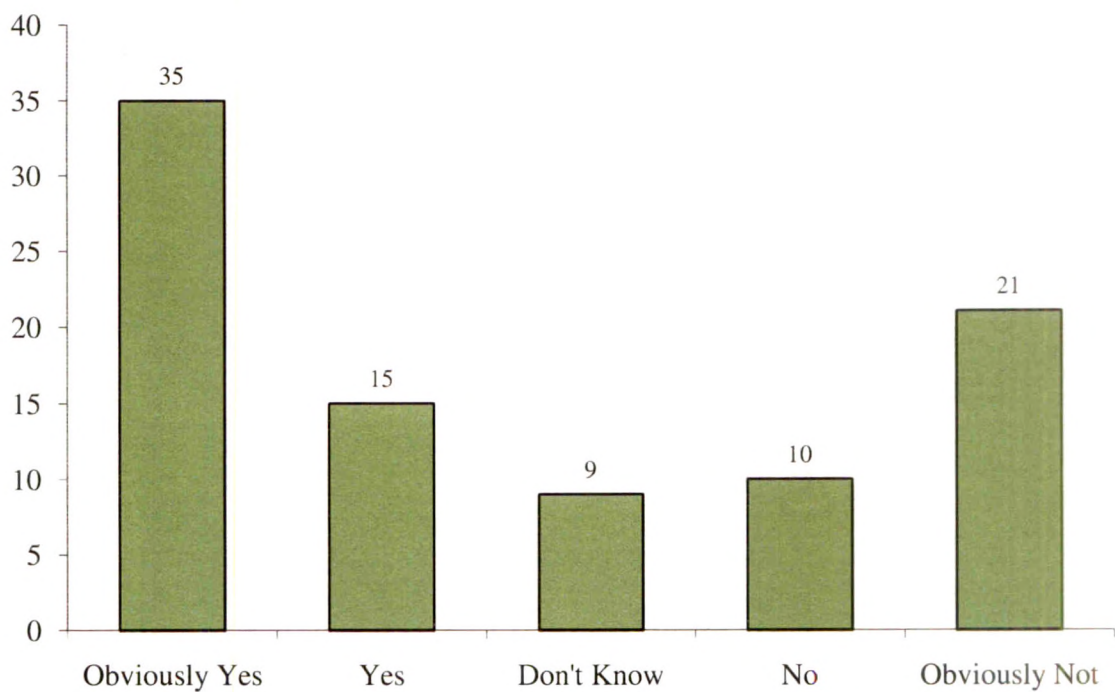


Fig. 29 : Biodiversity Curve for Statement 29

Statement No. 30 : Biodiversity has an extensive role in protection of diseases in the agriculture

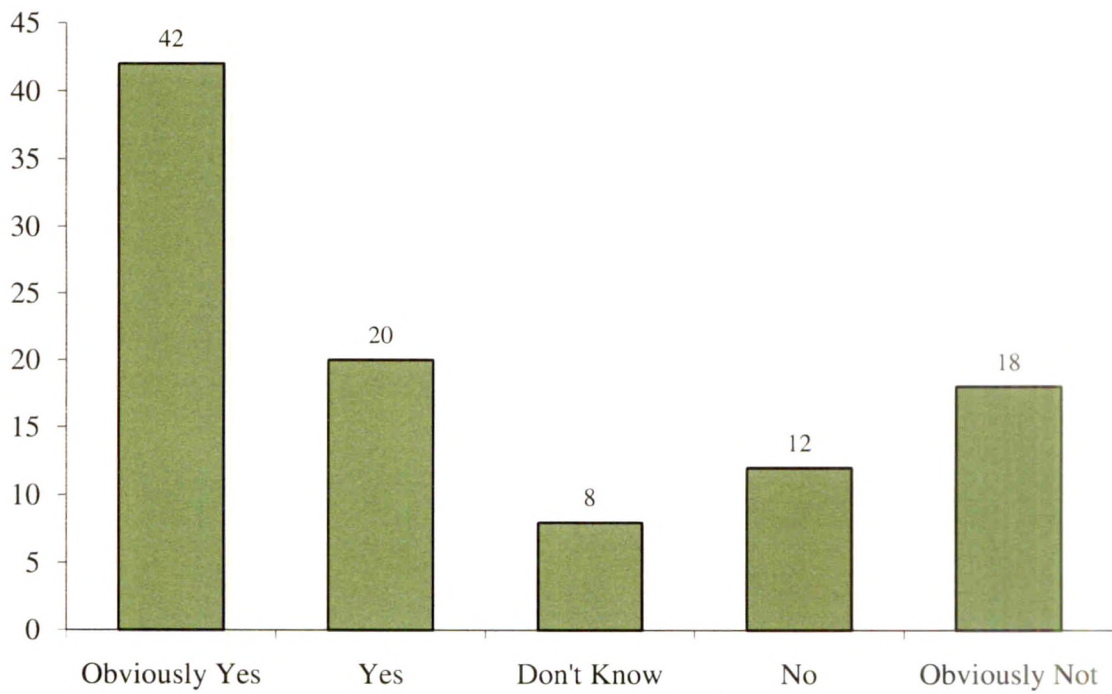


Fig. 30 : Biodiversity Curve for Statement 30

Statement No. 31 : Cultivation of only one type of crop will be the reason of obvious destruction in future.

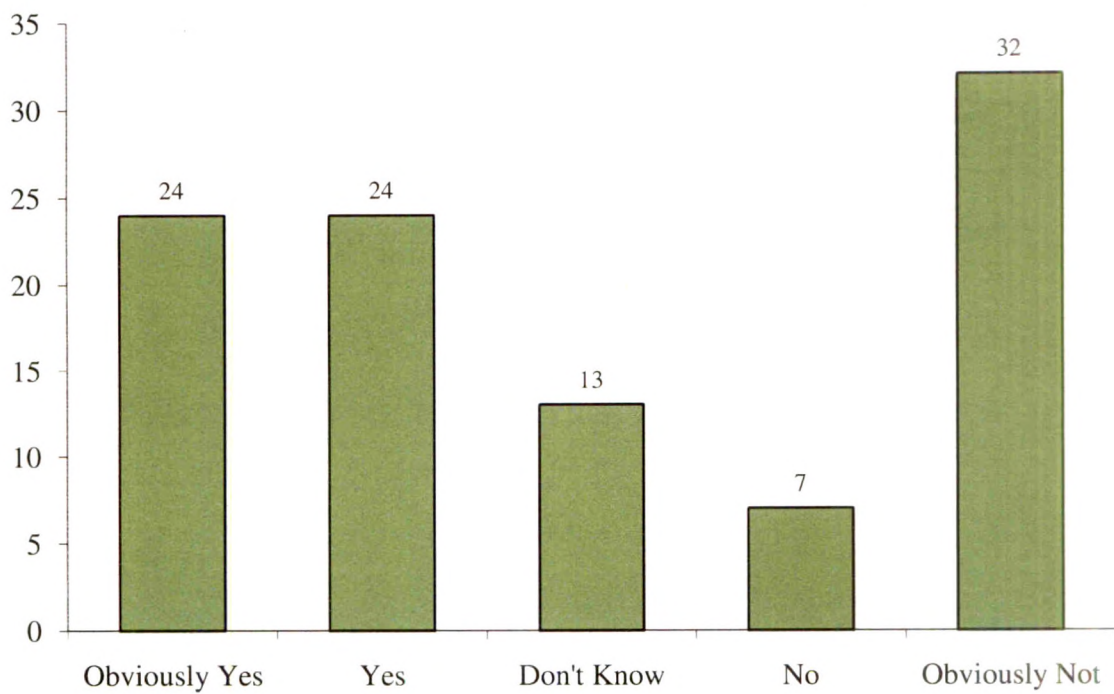


Fig. 31 : Biodiversity Curve for Statement 31

Statement No. 32 : The chemicals used in insecticides (like lead, mercury, fluorocarbon, chlorinated pesticides) are getting mixed with air, soil, river and ocean water and thus hampering the biodiversity.

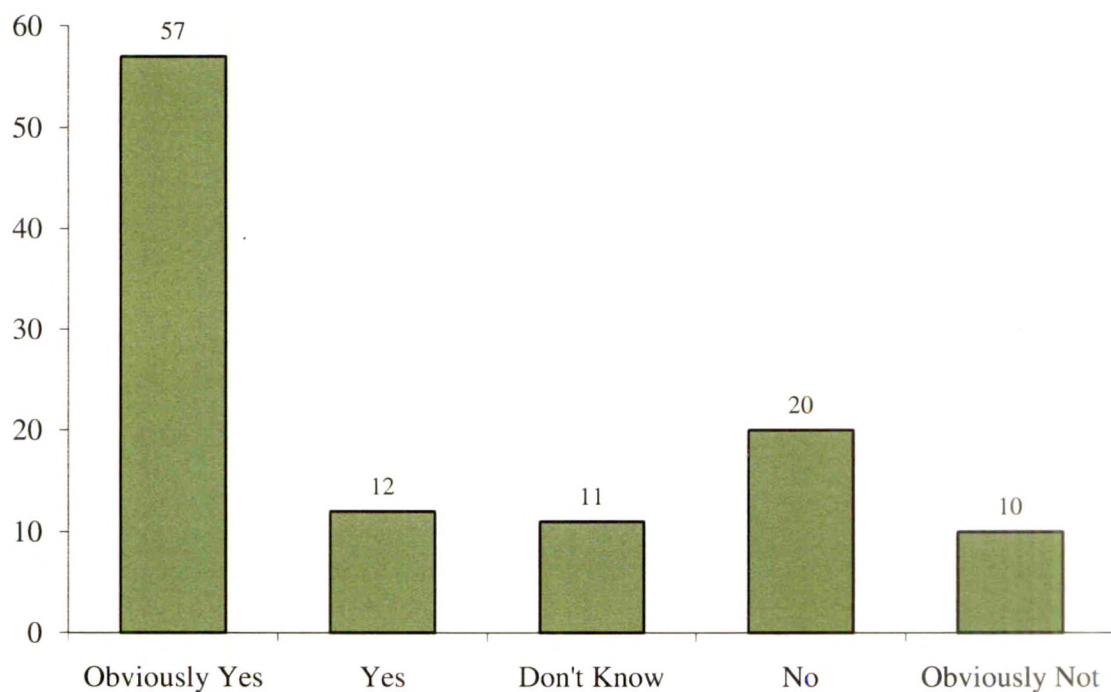


Fig. 32 : Biodiversity Curve for Statement 32

Statement No. 33 : Spending money for the research work to prevent the plants from insects and disease is not necessary.

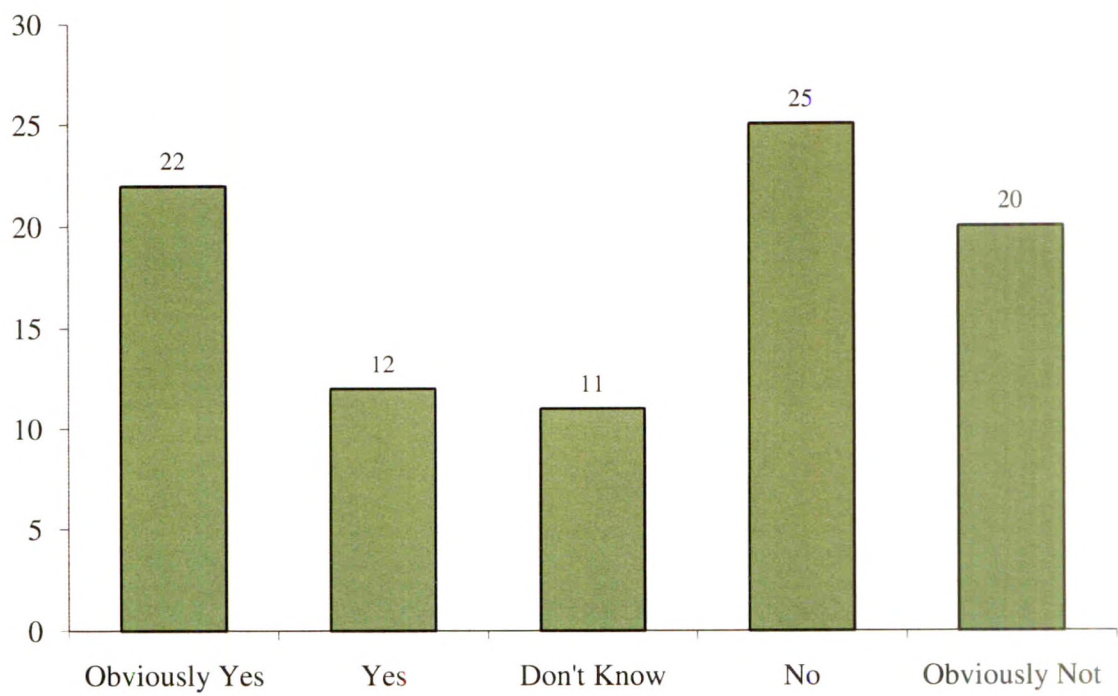


Fig. 33 : Biodiversity Curve for Statement 33

Statement No. 34 : There is no need to use the gene pool present in biodiversity for converting non-fertile land to fertile land.

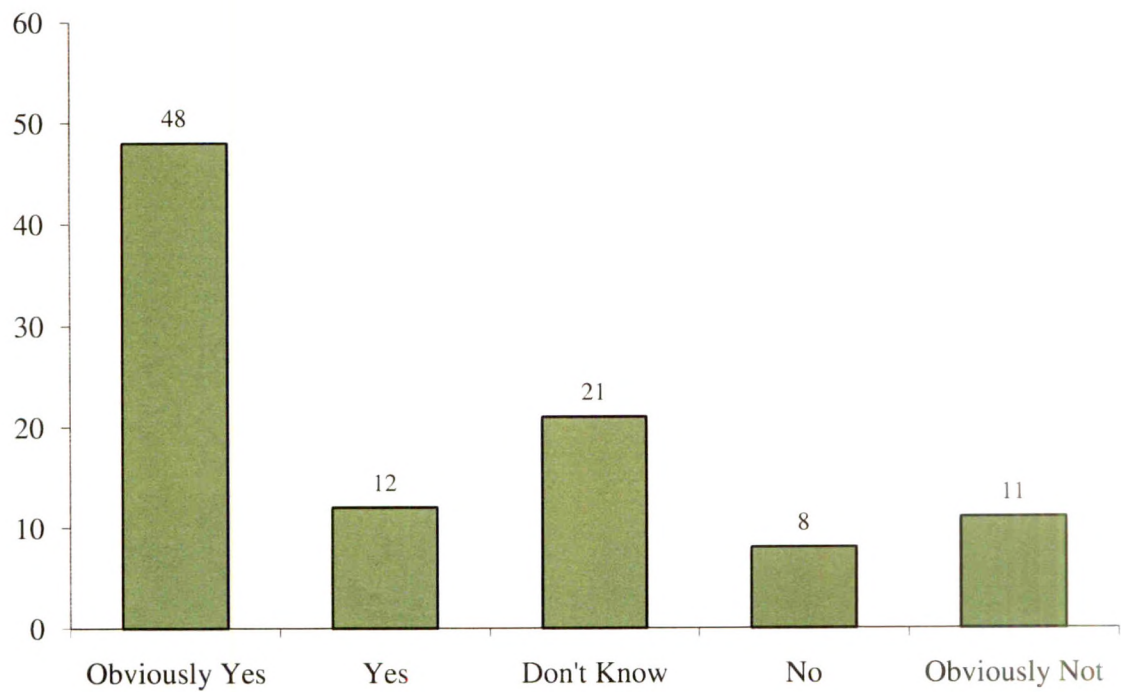


Fig. 34 : Biodiversity Curve for Statement 34

Statement No. 35 : To increase the number of essential plants, unwanted plants should be destroyed.

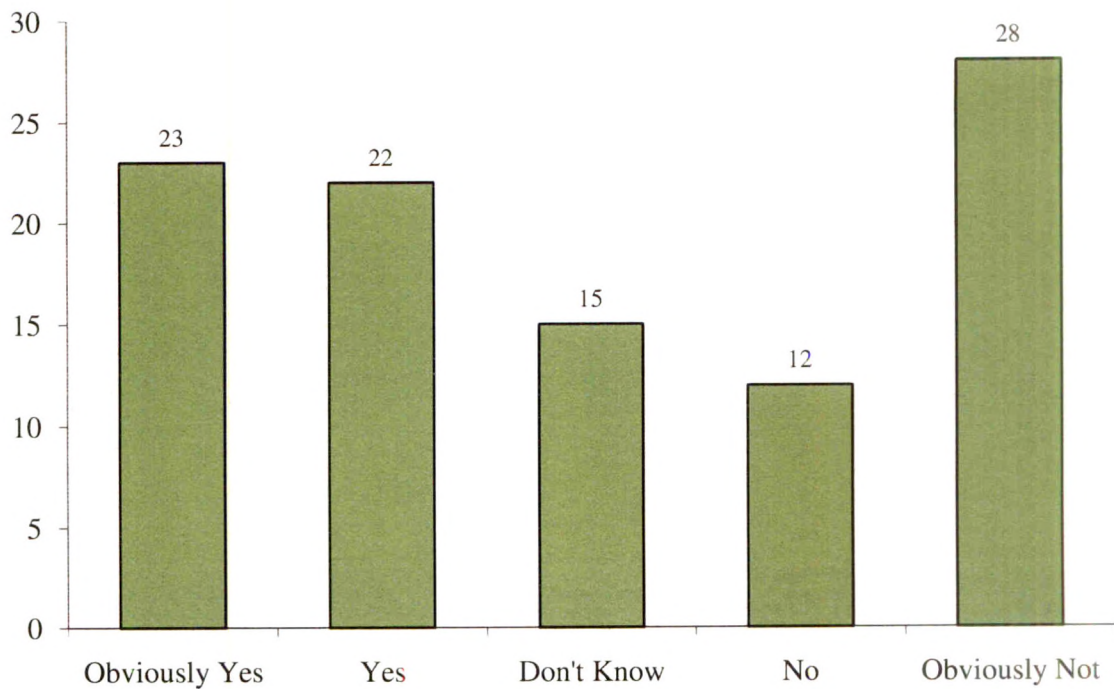


Fig. 35 : Biodiversity Curve for Statement 35

Statement No. 36 : Gene pool conservation is essential for hybrid species.

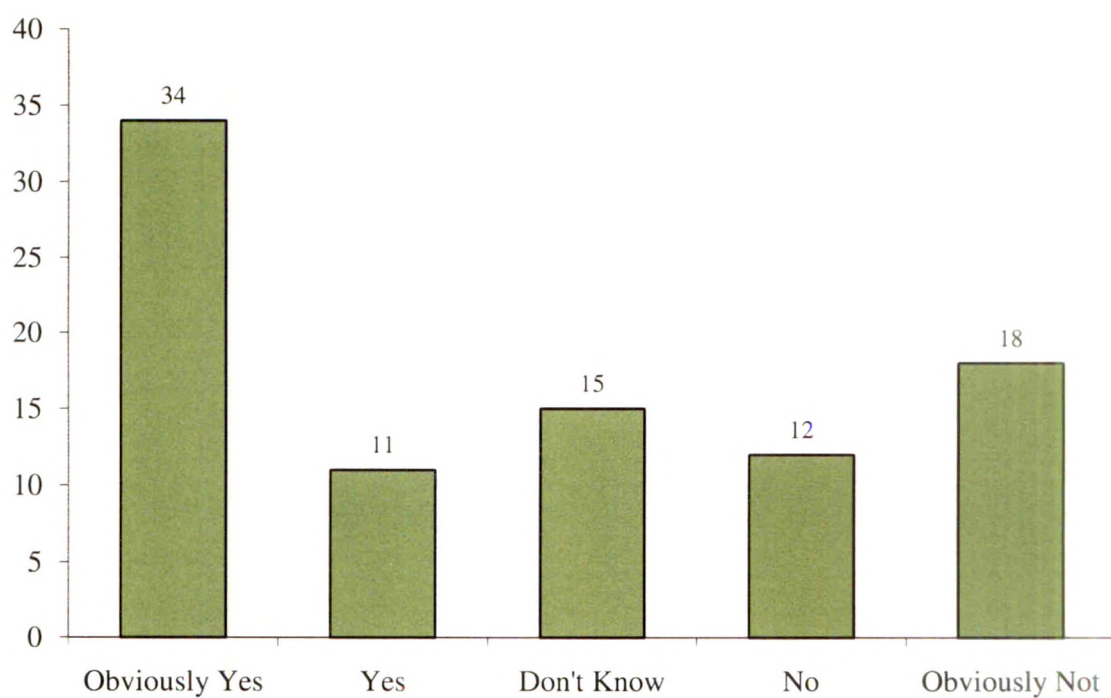


Fig. 36 : Biodiversity Curve for Statement 36

Statement No. 37 : Gene pool conservation is possible only by biodiversity of conservation.

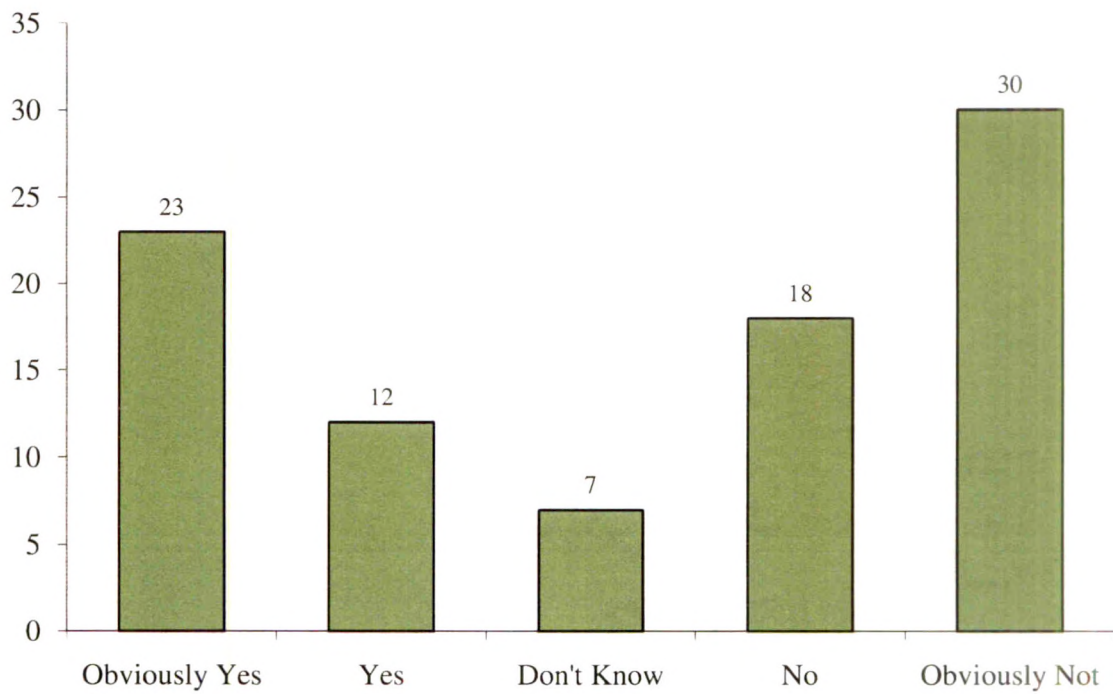


Fig. 37 : Biodiversity Curve for Statement 37

Statement No. 38 : No company or country should have sole right of biodiversity conservation, gene pool conservation and new hybrid species production.

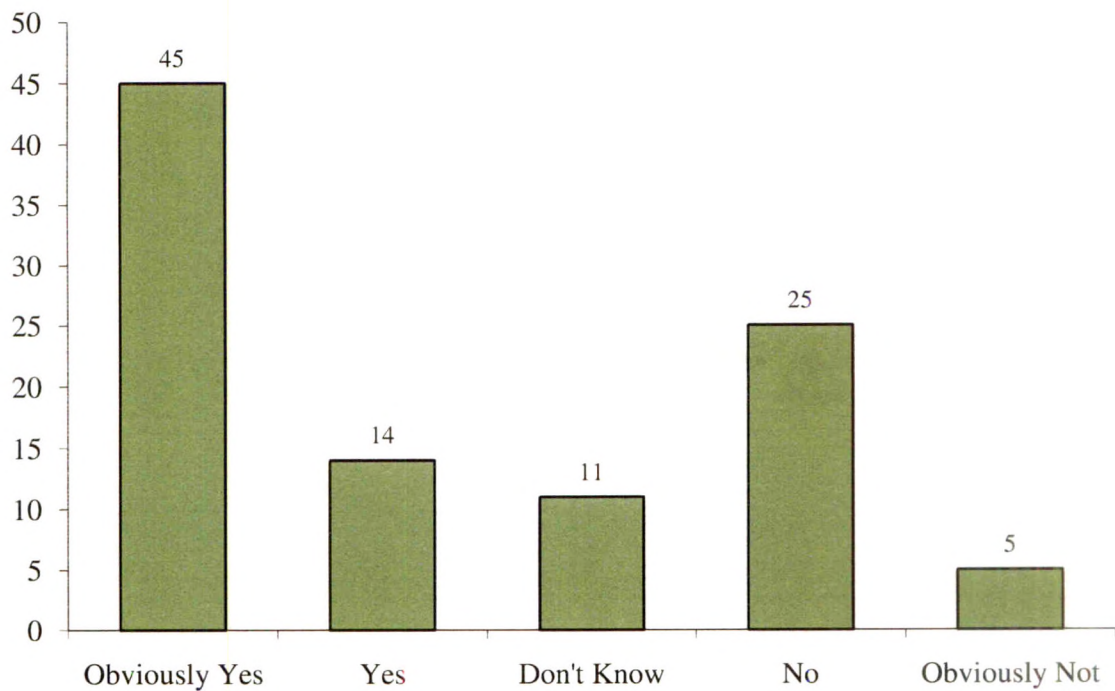


Fig. 38 : Biodiversity Curve for Statement 38

Statement No. 39 : Gene pool conservation of economical plants is possible only by seed conservation.

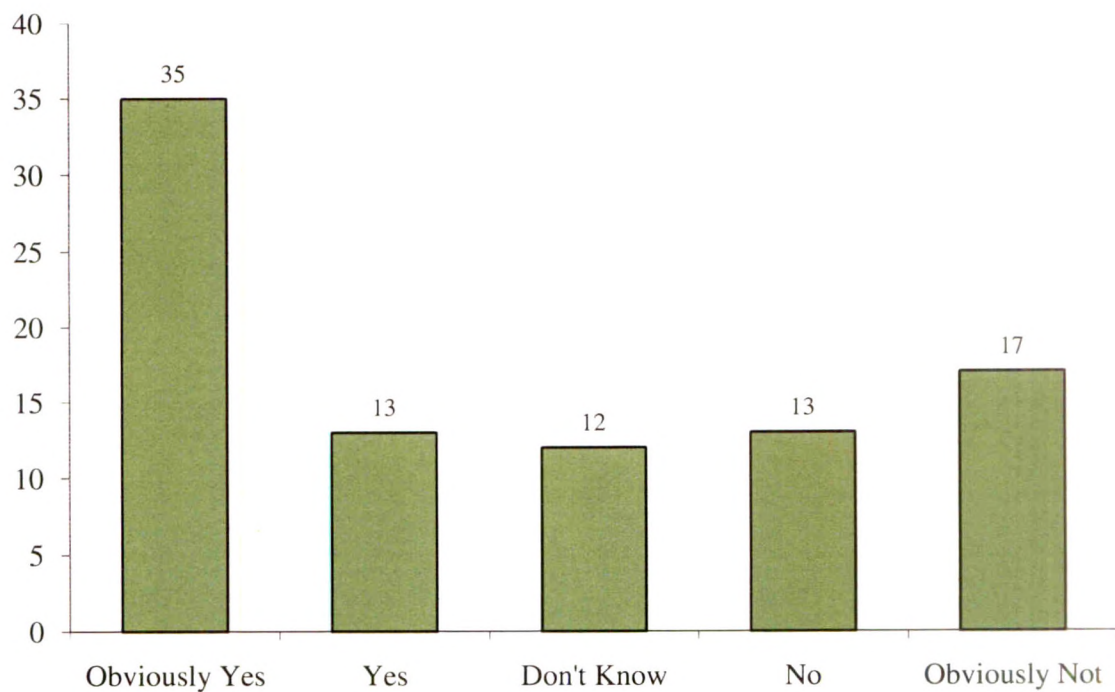


Fig. 39 : Biodiversity Curve for Statement 39

Statement No. 40 : There is no need for gene pool conservation of new herbal plants used for treatment of incurable diseases.

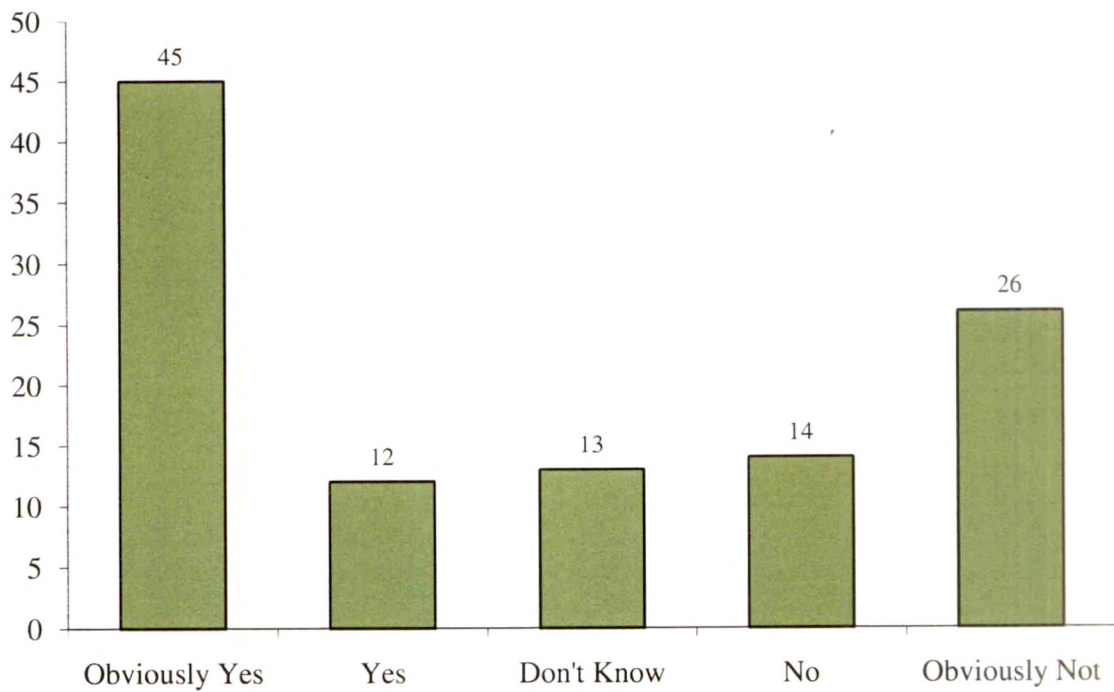


Fig. 40 : Biodiversity Curve for Statement 40

Statement No. 41 : Conservation of endangered genetic origin can be done using tissue culture.

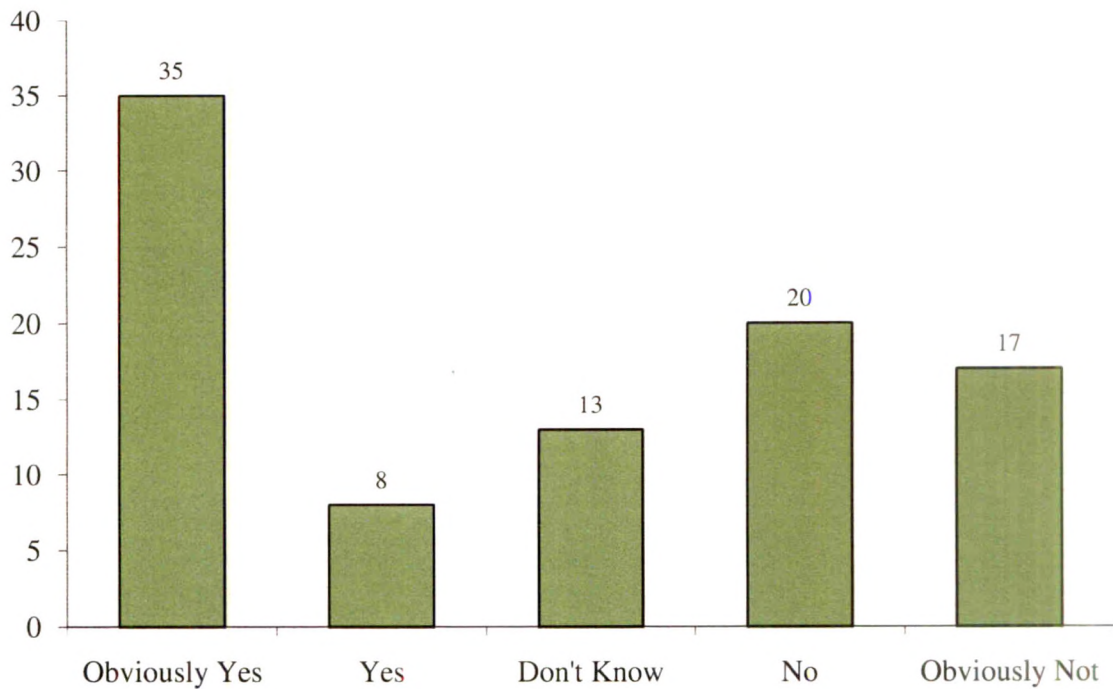


Fig. 41 : Biodiversity Curve for Statement 41

Statement No. 42 : The modern techniques of gene pool conservation are so costly that it is not possible in the poor country like India.

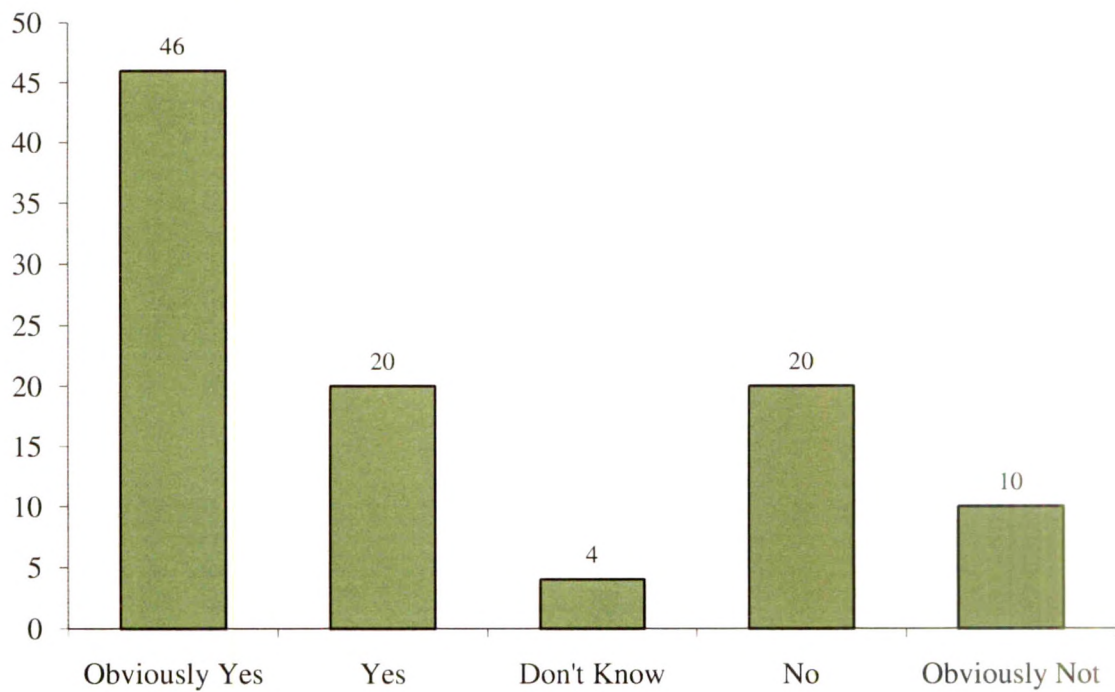


Fig. 42 : Biodiversity Curve for Statement 42

CHAPTER - IV

METHOD OF INVESTIGATION

CHAPTER – IV

METHOD OF INVESTIGATION

4.1 Dimension

The study was based upon five dimensions. These five dimensions covered the major aspects of biodiversity. The dimension are as follows :

1. Knowledge.
2. Attitude.
3. Awareness.
4. Participation.
5. Values.

4.2 Method of Controlling Variables

The independent variable 'age' was controlled by selecting subjects of a particular group from more or less same age group.

The independent variable 'sex' was controlled by selecting all female subjects.

Independent variable 'environment' was controlled by selecting all the urban subjects from a single area and again all the rural subjects from another single area.

4.3 Samples

In the study samples were of two groups – urban and rural. Total 600 samples were taken of which 300 samples were from urban area and 300 samples were taken from rural area.

As the investigator tried to study the impact of education on conservation of biodiversity, there categories of samples having different educational level were taken. Out of 300 samples of both urban and rural area, 100 subjects were teachers, 100 were pupils of twelfth grade and 100 subjects were illiterates.

4.4 Construction of the Tool

I. Item Collection :

Before the items were collected a blue print of the proposed tool was drawn from the study of relevant literatures and previous tools for the job satisfaction of the researcher, suggestions were also sought from the experts in this phase of tool preparation. It was accepted that this tool would include the following items – ecological balance, forest construction, wild life conservation, sustainable development.

In the process of selection of items the researcher took active help and guidance from a botanist, and other resource persons, in the subject.

These selected items were listed and submitted to the supervisor for his critical comments advice.

II. Item Writing :

The researcher considered that the tool must have a design of an attitude scale to serve the purpose of the study. She preferred Likert type as the suitable type of attitude scale for the following reasons :

- a) It is easy to construct and score.
- b) It gives valuable information.
- c) It does not require panel of judges and it takes less time to construct and to score.
- d) Moreover it produces the same reliable data as Thurstone's scale.

In this context it is noteworthy that “attitude scale provides us with one means of obtaining an assessment of the degree of affect that individuals may associate with some psychological object” (Edward, 69).

From the collected situations fifty attitude statements were framed expressing both positive and negative in orientation. Care was taken so that the statements were clear and specific. In the preparation of item writing four experts were consulted and their suggestions were duly incorporated.

In this way, the first draft of the scale was prepared.

Each item had to be endorsed by putting (✓) tick marks on any one of the five response alternatives like obviously, yes, don't know, no, obviously no.

The 50 items of first draft were included in the following groups of questions :

1. Environmental Knowledge – Total 10 Questions	–	positive – 6 negative – 4
2. Attitude – Total 11 Questions	–	positive – 6 negative – 5
3. Awareness – Total 13 Questions	–	positive – 8 negative – 5
4. Participation – Total 9 Questions		positive – 5 negative – 4
5. Environmental values – Total 7 Questions	–	positive – 5 negative – 2

III. Item Analysis :

The first draft consisting 50 items, was administered to 200 subjects, for items analysis. The test was administered in group situations. Next for items analysis scoring was done. For negative items reversed scoring was done.

After scoring all 200 papers two extreme groups were formed – Top 27% and Bottom 27% (i.e. 41 respondents in each group). On the basis of obtained summated scores. Responses of each items were analysed according to the principles suggested by Edwards (1969, P 154). However no t-values were estimated. For the selection of items mean differences of scores between high and low groups for each items considered. It was thought that a scale with 41 or 42 items (20 to 25 suggested by Edwards) with more or less equal weight to the

5 dimensions would serve purpose. By inspection of mean differences of 1.02 may include 42 items in the test. This procedure of item analysis is suggested by Murphy and Likert (1937). According to them – ‘upon the basis of magnitude of the difference between the means of a high and low group agreed very well with the ordering of some statements in terms of the magnitude of the correlation between the items response and total score’.

The table shows the mean difference of each item –

Table – I : Presentation of Mean Difference

Item No.	Means for		Mean Difference	Remark
	High Group	Low Group		
1	4.780	3.243	1.537	Accepted
2	4.146	2.731	1.415	Accepted
3	4.024	2.951	1.075	Accepted
4	4.390	2.292	2.098	Accepted
5	4.414	2.805	1.610	Accepted
6	4.634	3.243	1.391	Accepted
7	4.439	2.707	1.732	Accepted
8	4.634	2.902	1.732	Accepted
9	3.756	2.804	0.952	Rejected
10	4.512	2.390	2.122	Accepted
11	4.731	3.439	1.292	Accepted
12	4.024	2.365	1.659	Accepted
13	4.463	2.975	1.488	Accepted
14	4.463	2.536	1.927	Accepted
15	4.707	3.317	1.390	Accepted
16	4.512	3.390	1.122	Accepted
17	4.780	3.097	1.683	Accepted
18	4.341	3.414	0.927	Rejected

Item No.	Means for		Mean Difference	Remark
	High Group	Low Group		
19	4.658	3.439	1.219	Accepted
20	3.219	1.292	1.927	Accepted
21	3.195	1.341	1.854	Accepted
22	4.585	2.902	1.683	Accepted
23	4.780	3.512	1.268	Accepted
24	4.707	3.609	1.098	Accepted
25	4.560	3.390	1.098	Accepted
26	4.536	3.975	0.561	Rejected
27	4.073	3.341	0.732	Rejected
28	4.073	2.658	1.415	Accepted
29	4.560	2.731	1.829	Accepted
30	4.097	2.853	1.244	Accepted
31	4.317	3.000	1.317	Accepted
32	4.292	2.439	1.853	Accepted
33	4.390	3.439	0.951	Rejected
34	4.268	2.512	1.756	Accepted
35	4.000	2.951	1.049	Accepted
36	3.024	2.780	0.244	Rejected
37	4.219	2.756	1.463	Accepted
38	4.804	3.195	1.609	Accepted
39	3.975	3.024	0.951	Rejected
40	4.609	2.439	2.170	Accepted
41	3.853	2.829	1.024	Accepted
42	4.609	4.024	0.585	Rejected
43	3.048	1.243	1.805	Accepted
44	4.609	2.804	1.805	Accepted

Item No.	Means for		Mean Difference	Remark
	High Group	Low Group		
45	4.268	2.975	1.293	Accepted
46	4.170	2.756	1.414	Accepted
47	4.390	2.951	1.439	Accepted
48	4.512	2.780	1.732	Accepted
49	4.097	2.951	1.146	Accepted
50	3.536	1.951	1.585	Accepted

IV. Standardised Form of the Test :

The final form of the test contains 42 items. Each item has to be endorsed in 5 point scale from obviously yes to obviously no with the neutral point of undecided.

4.5 Reliability of the Test

A test is called reliable when there are reasons for believing the test to be stable and trustworthy. The correlation of the test with itself is called the reliability coefficient of the test.

There are 4 producers in common use for computing the reliability coefficient of a test. These are –

1. Test re-test (repetition).
2. Alternate or parallel forms.
3. Split-half technique.
4. Rational equivalence.

The investigator followed the test retest method for computing the reliability of the test, constructed by her.

After 50 days of the first administration of the test, the retest was administered to reduce the memory effect to minimum. The retest was administered on 36 subjects, randomly selected from the total 150 samples of

these 36 subjects 12 were highly educated (6 urban teachers and 6 rural teachers), 12 were medium educated (6 urban students, 6 rural students), 12 were illiterate (6 urban and 5 rural) peoples.

The reliability coefficient was computed between the test and retest scores of those 36 selected subjects. For this the researcher followed the product moment method. The formula to compute correlation by this method –

$$r = \frac{N\sum XY - \sum X \times \sum Y}{\sqrt{[N\sum X^2 - (\sum X)^2] [N\sum Y^2 - (\sum Y)^2]}}$$

But, as the raw scores were expressed in 3 digits they were reduced by subtracting a constant quantity from each of the original X and Y scores (Garrett, 1966).

So the formula applied finally, was –

$$r = \frac{N\sum X'Y' - \sum X' \times \sum Y'}{\sqrt{[N\sum X'^2 - (\sum X')^2] [N\sum Y'^2 - (\sum Y')^2]}}$$

where

X' = reduced test score

Y' = reduced retest score

N = number of subjects

By applying this formula the researcher get the reliability of the test.77. The data and computation recorded in the following tables. The co-efficient is also computed there. The reliability coefficient is significant at.01 level.

Table – II : Reliability Test by Test Retest Method

Test Scores X	Reduced Test Scores X'=(X-M ₁)	X' ²	Retest Scores Y	Reduced Retest Scores Y' (=Y-M ₂)	Y' ²	X'Y'
162	– 8	64	168	8	64	–64
151	– 19	361	178	18	324	–342
146	– 24	576	160	0	0	0

Test Scores X	Reduced Test Scores $X'=(X-M_1)$	X'^2	Retest Scores Y	Reduced Retest Scores $Y' (=Y-M_2)$	Y'^2	$X'Y'$
178	8	64	151	-9	81	-72
184	14	196	149	-11	121	-154
174	4	16	157	-3	9	-12
175	5	25	167	7	49	35
189	19	361	175	15	225	285
190	20	400	170	10	100	200
172	2	4	164	4	16	8
182	12	144	169	9	81	108
172	2	4	166	6	36	12
165	-5	25	150	-10	100	50
154	-16	256	145	-15	225	240
149	21	441	135	-25	625	-525
171	1	1	161	1	1	1
160	-10	100	148	-12	144	120
150	-20	400	142	-18	324	360
180	10	100	172	12	144	120
174	4	16	163	3	9	12
170	0	0	146	-14	196	0
154	-16	256	143	-17	289	272
195	25	625	134	26	676	650
128	-42	1764	120	-40	1600	1680
132	-38	1444	123	-37	1369	1406
136	-34	1156	127	-33	1089	1122
141	-29	841	131	-29	841	841
142	-28	784	132	-28	784	784

Test Scores X	Reduced Test Scores $X'=(X-M_1)$	X'^2	Retest Scores Y	Reduced Retest Scores $Y' (=Y-M_2)$	Y'^2	$X'Y'$
134	-36	1296	125	-35	1225	1260
126	-44	1936	128	-32	1024	1408
134	-36	1296	135	-25	625	900
136	-34	1156	137	-23	629	782
152	-18	324	150	-10	100	180
148	-22	484	139	-21	441	462
131	-39	1521	126	-34	1156	1326
	-368	18446		-359	14631	13464

Here $M_1 = 170$ which is the constant quantity subtracted from each X and $M_2 = 160$, which is the constant quantity subtracted from each Y . $N = 36$, $X' = -368$, $Y = -359$.

$$X'^2 = 18446, \quad Y'^2 = 14631, \quad X'Y' = 13464$$

Therefore,

$$\begin{aligned}
 r &= \frac{N \Sigma X'Y' - \Sigma X' \times \Sigma Y'}{\sqrt{[N \Sigma X'^2 - (\Sigma X')^2] [N \Sigma Y'^2 - (\Sigma Y')^2]}} \\
 &= \frac{36 \times 13464 - (-368)(-359)}{\sqrt{[36 \times 18446 - (-368)^2] [36 \times 14631 - (-359)^2]}} \\
 &= \frac{484704 - 123112}{\sqrt{(664056 - 135424)(526716 - 128881)}} \\
 &= \frac{352592}{\sqrt{528632 \times 397835}} \\
 &= \frac{352592}{458593.84} = 0.7689
 \end{aligned}$$

4.6 Validity of the Test

The validity of a test depends upon the efficiency with which it measures, what it purports to measure. To say more actually a test is valid in proportion as it measures well, what it desires to measure.

Validity of a test are of two types from the point of its determination. They are logical validity and imperial validity. Logical validity are of two types –

1. Content validity,
2. Construct validity,

On the other hand the empirical validity are of two types –

1. Predictive validity,
2. Concurrent validity.

In the present study, the questionnaire included 50 items at the initial stage. The it was placed to four experts After careful examinations, they eliminated and added some items. In the final form there were altogether 42 items.

4.7 Mode of Collection of Data and its Interpretation

The researcher, considering the nature of the problem, thought that the present study would be conducted by survey method of research, because the survey method of research, because the survey method is generally used for that type of research which propose to as certain what is normal or typical condition or practice at the present time and no data was created by the investigator, she just collected them and interpreted them.

I. Area of Investigation :

The investigator collected half of the samples from urban area of South Calcutta and the other half of the samples from the rural are.

II. Administration of the Tool and Collection of Data :

The test was applied primarily to the samples. The tools were administered on there different groups of people – highly educated females i.e. school teachers, medium educated or school girls, and illiterate females.

At first, the investigator went to a locality of rural area of Ashoknagar and introduced herself to illiterate peoples. After that she spent some time there to establish rapport with them through informal talks. The situation then became pleasant and subjects became cooperative and they were then ready to give their free opinion. In this way the researcher also collected the opinions of urban illiterate females from a selected area of Rash Behari Avenue of South Calcutta.

For the opinions of the medium educated and school teachers the researcher went to the schools with Letters to the Headmistresses seeking their permission to meet the teachers and students of the schools. The teachers and students of the schools were very much cooperative and helped her as far as possible.

The investigator with due permission went to the selected classes and introduced herself. Then she established rapport with them by some informal. The investigator then convinced the students that the questionnaires had no connection with their school examinations and their answers would not at all influence their results. So they could answer freely without taking any unfair means. Thus the situation became favourable and pleasant, and the students became cooperative. Thus the directions for answering the questions are discussed with them.

After making clear the methods of answering the questions the researcher distributed the questionnaire i.e. the test to them. After 20–25 minutes she collected the answered questionnaire from the students. The same method was followed in the schools of both urban and rural areas.

The investigator distributed the tests to the selected groups of teachers of both urban and rural areas. Then the researcher gave necessary instructions to

answer the questionnaire. After about half an hour she collected the answered tests from the teachers.

III. Scoring and Interpretation of the Data :

To score the questionnaire the investigator followed the 5 point scale of Likert method. Thus method is explained briefly in Article 3. 4 (III). Here it is described more vividly.

The test, constructed by the researcher consisted of 50 items 30 were positive questions, the answers of which should be of positive type and 20 of them were negative questions, the answer of which should be negative type. So the highest number one could get was 250.

As the tool was a Likert type–5 point scale the questions were scored as follows :

For Positive Questions –

Obviously Yes	–	5
Yes	–	4
Not decided	–	3
No	–	2
Obviously No	–	1

For Negative Questions –

Obviously No	–	5
No	–	4
Not decided	–	3
Yes	–	2
Obviously Yes	–	1

After items analysis 8 questions were rejected from the final form of the test. The marks of those 8 items were excluded from the total score to obtain the final score with which further statistical calculations were done.

Interpretation of Results

Particulars Showing the Statistics of the Subjects :

Measures	Teachers		Students of Twelfth Grade		Illiterates		Teachers	Illiterates
	Rural	Urban	Rural	Urban	Rural	Urban		
M	179	168.72	163.6	158.76	145.2	143.4	171.26	142.4
Mdn	182	164.62	163.94	160.12	150.28	153.77	173.5	143.91
SD	11.92	15.04	12.92	10.79	7.83	9.15	16.28	8.5
Q	9.01	11.22	8.75	7.96	5.93	4.025	11.38	6.35
Sk	-0.75	0.82	-0.078	-0.38	-1.99	-1.13	-0.412	-0.53
Ku	0.27	0.27	0.28	0.31	0.27	0.15	0.29	0.26

4.8 Testing the Hypotheses

The hypotheses are tested by t test. As the same test is administered on educated and illiterate group a two tailed test is applied.

c1. Hypothesis – 1 :

The adult educated subjects and adult illiterate subjects will differ significantly in their knowledge about conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 1

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	171.26	16.28	100	142.40	8.50	198	15.71	**

Therefore, the obtained t value is 15.71 and the degree of freedom for use is 99 + 99 or 198. This is a two tailed test.

For 198 df, the t critical value at 0.01 level is 2.60. Hence the obtained t-value is highly significant at 0.01 level.

Therefore the hypothesis is retained.

2. Hypothesis – 2 :

The urban teachers and rural teachers will differ significantly in their knowledge regarding conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 2

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

3. Hypothesis – 3 :

The urban students and rural students will differ significantly in their knowledge about conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 3

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	163.60	6.87	100	158.76	5.20	198	5.59	**

Hence, the obtained t value is 5.59 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

4. Hypothesis – 4 :

The urban illiterates and rural illiterates will differ significantly in their knowledge regarding conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table - 4

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	145.20	4.55	100	143.40	4.46	198	2.81	**

Hence, the obtained t value is 2.81 and the degrees of freedom for use in testing the t value is 198.

For 198 degrees of freedom the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

5. Hypothesis -5 :

The adult educated subjects and adult illiterate subjects will differ significantly in their attitude about conservation biodiversity

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 5

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	171.26	16.28	100	142.40	8.50	198	15.71	**

Therefore, the obtained t value is 15.71 and the degree of freedom for use is 198. This is a two tailed test.

For 198 df, the t critical value at 0.01 level is 2.60. Hence the obtained t-value is highly significant at 0.01 level.

Therefore the hypothesis is retained.

6. Hypothesis – 6 :

The urban teachers and rural teachers will differ significantly in their attitude regarding conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.
 M_2 = Mean for illiterate subjects.
 σ_1 = Standard deviation of educated subjects
 σ_2 = Standard deviation of educated subjects
 N_1 and N_2 = Sizes of the samples.

Table – 6

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	181.52	6.11	100	158.88	7.23	198	23.78	**

Hence obtained t value is 23.78 and the degrees of freedom for use in testing the t-value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

7. Hypothesis – 7 :

The urban students and rural students will differ significantly in their attitude about conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.
 M_2 = Mean for illiterate subjects.
 σ_1 = Standard deviation of educated subjects
 σ_2 = Standard deviation of educated subjects
 N_1 and N_2 = Sizes of the samples.

Table – 7

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	173.60	5.98	100	148.76	7.00	198	26.85	**

Hence, the obtained t value is 26.85 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$

For 48 df the t critical value for two tailed test at 0.05 level is 2.01.

Therefore, the obtained t value is significant at 0.05 level and hence the hypothesis is retained.

8. Hypothesis – 8 :

The urban illiterates and rural illiterates will differ significantly in their attitude regarding conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 8

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	155.20	5.65	100	133.40	6.63	198	24.90	**

Hence, the obtained t value is 24.90 and the degrees of freedom for use in testing the t value is 198.

For 198 degrees of freedom the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

9. Hypothesis – 9 :

The adult educated subjects and adult illiterate subjects will differ significantly in their awareness about conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 9

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	175.56	6.01	100	158.88	7.23	198	17.64	**

Hence obtained t value is 17.64 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

10. Hypothesis – 10 :

The urban teachers and rural teachers will differ significantly in their awareness regarding conservation of biodiversity

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 10

N_1	M_1	SD_1	N_2	M_2	SD_2	N_1	t-value	Significance
100	186.56	6.20	100	169.58	7.47	198	17.40	**

Hence obtained t value is 17.40 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

11. Hypothesis – 11 :

The urban students and rural students will differ significantly in their awareness about conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 11

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	189.66	6.25	100	178.55	7.67	198	11.17	**

Hence obtained t value is 11.17 and the degrees of freedom for use in testing the t value is 198.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

12. Hypothesis – 12 :

The urban illiterates and rural illiterates will differ significantly in their awareness regarding conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of educated subjects

N_1 and N_2 = Sizes of the samples.

Table – 12

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	189.56	6.25	100	178.88	7.68	198	10.74	**

Hence obtained t value is 10.74 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

13. Hypothesis – 13 :

The adult educated subjects and adult illiterate subjects will differ significantly in their participation in conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of educated subjects

N_1 and N_2 = Sizes of the samples.

Table – 13

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

14. Hypothesis –14 :

The urban teachers and rural teachers will differ significantly in their participation in conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 14

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	165.56	5.84	100	158.81	7.23	198	7.23	**

Hence obtained t value is 7.23 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

15. Hypothesis – 15 :

The urban students and rural students will differ significantly in their participation in conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 15

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	181.56	6.11	100	166.88	7.41	198	15.20	**

Hence obtained t value is 15.20 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

16. Hypothesis – 16 :

The urban illiterates and rural illiterates will differ significantly in their participation in conservation of biodiversity

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 16

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	169.44	5.91	100	156.92	7.19	198	13.39	**

Hence obtained t value is 13.39 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

17. Hypothesis – 17 :

The adult educated subjects and adult illiterate subjects will differ significantly in their values regarding conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.
 M_2 = Mean for illiterate subjects.
 σ_1 = Standard deviation of educated subjects
 σ_2 = Standard deviation of illiterate subjects
 N_1 and N_2 = Sizes of the samples.

Table – 17

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

18. Hypothesis – 18 :

The urban teachers and rural teachers will differ significantly in their values about conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.
 M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of educated subjects

N_1 and N_2 = Sizes of the samples.

Table – 18

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is 198

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

19. Hypothesis – 19 :

The urban students and rural students will differ significantly in their values about conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of educated subjects

N_1 and N_2 = Sizes of the samples.

Table – 19

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	177.16	6.04	100	165.78	7.39	198	11.86	**

Hence obtained t value is 11.86 and the degrees of freedom for use in testing the t value is 198.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

20. Hypothesis – 20 :

The urban illiterates and rural illiterates will differ significantly in their values regarding conservation of biodiversity.

Here the samples are large and independent and kurtosis is approximately normal. So the following formula was applied.

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

where, M_1 = Mean for educated subjects.

M_2 = Mean for illiterate subjects.

σ_1 = Standard deviation of educated subjects

σ_2 = Standard deviation of illiterate subjects

N_1 and N_2 = Sizes of the samples.

Table – 20

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	177.16	6.04	100	165.78	7.39	198	11.86	**

Hence obtained t value is 11.86 and the degrees of freedom for use in testing the t value is 198.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

CHAPTER – V

DISCUSSION AND SUMMARY OF THE STUDY

CHAPTER – V

DISCUSSION AND SUMMARY OF THE STUDY

5.1 Biodiversity

Biodiversity is the total richness of biological variation. The scope of biodiversity is usually considered to range from the genetic variation of individual organisms within and among populations of a species, to different species occurring together in ecological communities. Some definitions of biodiversity also includes the spatial patterns and temporal dynamics of population communities on the landscape. The geographical scales at which biodiversity can be considered range from local to regional, state or provincial, national, continental and ultimately to global.

Biodiversity at all scales is severely threatened by human activities; this is one of the most important aspects of the global environmental crisis. Humans have already casual permanent losses of biodiversity through the extinction of many species and extensive losses of distinctive, natural ecosystems. Ecologist predicts that unless there are substantial changes in the ways that human affect ecosystems, there will be much longer losses of biodiversity in the near future.

The purpose of the study was to determine the role of education in educated and illiterate groups of people in conservation of biodiversity. The present study also reveals the difference in the attitude of urban and rural people. For the study three different groups of people were taken. These are teachers, twelfth grade students and illiterates.

From the study, it was clear that education has a role in building up consciousness regarding conservation of biodiversity. The study also reveals that the environment in human beings are brought up also influences their attitude towards ecological subjects.

The present study reveals that the rural people are more conscious about conservation of biodiversity than the urban people. So it can be concluded that

as the rural people are more close to the nature than the urban people, they are more aware of necessity of preservation of natural resources.

To determine the level of consciousness the researcher used an attitude test constructed and standardised by her, which is shown in Appendix.

The test was administered on three different groups of females. They were teachers, students of twelfth grade and illiterates.

The study was carried out in urban and rural areas. So a comparative picture about impact of conservation of biodiversity of rural and urban females is revealed in the study.

The hypotheses, which were framed, were tested by t-test at 0.01 & 0.05 level of significance.

5.2 Limitations of the Study

The study had some limitations. They are as follows :

1. The study was confined to the school teachers, twelfth grade students and some illiterate people.
2. The study was carried out only on female subjects.
3. The size of the sample was only six hundred.
4. The sample was selected from selected parts of West Bengal.
5. The attitude scale was a five point (Likert method)

I. Title of the Study :

“Impact of Education on Conservation of Biodiversity”.

II. Aim of the Study :

The study was carried out with some aims. These are –

1. to find out if education has any role in building up consciousness regarding conservation of biodiversity.
2. to undertake a comparative study of the level of consciousness about conservation of biodiversity between rural and urban people.

III Methods :

The present research was conducted by survey method. The attitude test was constructed by the researcher and then standardised.

The study was carried out on urban and rural females.

IV. Administration of the Tool :

The test was administered under normal conditions. At the time of administration of the test the instructions were given clearly to the subjects. The test situation was controlled by every possible means. The list was administered to teachers, twelfth grade students and illiterates. They were asked to give tick (✓) marks to their chosen answers, to every statement without leaving any statement unanswered.

V. Scoring :

The test was a Likert type attitude scale. The scoring was carried out by following the five point scale.

VI. Statistical Procedure and Interpretation :

In chapter IV the researcher calculated the mean, median, standard deviation (Q), Skeweness, Kurtosis of different groups. Reliability was also computed following test-retest method. Item analysis was done for standardisation of the test. The hypotheses were tested by the two tailed test of t-test.

After completing necessary calculations, the investigator interpreted the result. From the results of testing of hypotheses, it is clear that the consciousness about conservation of biodiversity increases with the level of education. Also it is revealed that the rural females are more conscious than the urban females regarding conservation of biodiversity.

5.3 Scope for Further Research

Biodiversity is a very recent chapter added in ecology. The investigator is a pioneer in the study of relationship of education with consciousness about conservation of biodiversity. So there is wide scope for further studies in this field.

Biodiversity and conservation figured prominently in the agenda for the 1992 United Nations Conference on Environment and Development in Rio-de-Janeiro, Brazil, where conference planners sought a substantial increase in financial support for research in biodiversity. It is imperative that the scientists in the concerned field and its role in ecosystem function. Both governmental agencies and non-governmental organisations should collaborate to advance research studies in the field and to create mass awareness amongst all section of people.

5.4 Findings

Findings :

c1. Hypothesis – 1 :

The adult educated subjects and adult illiterate subjects will differ significantly in their knowledge about conservation of biodiversity

Table – 1

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	171.26	16.28	100	142.40	8.50	198	15.71	**

Therefore, the obtained t value is 15.71 and the degree of freedom for use is 99 + 99 or 198. This is a two tailed test.

For 198 df, the t critical value at 0.01 level is 2.60. Hence the obtained t-value is highly significant at 0.01 level.

Therefore the hypothesis is retained.

2. Hypothesis – 2 :

The urban teachers and rural teachers will differ significantly in their knowledge regarding conservation of biodiversity.

Table – 2

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

3. Hypothesis – 3 :

The urban students and rural students will differ significantly in their knowledge about conservation of biodiversity.

Table – 3

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	163.60	6.87	100	158.76	5.20	198	5.59	**

Hence, the obtained t value is 5.59 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

4. Hypothesis – 4 :

The urban illiterates and rural illiterates will differ significantly in their knowledge regarding conservation of biodiversity.

Table – 4

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	145.20	4.55	100	143.40	4.46	198	2.81	**

Hence, the obtained t value is 2.81 and the degrees of freedom for use in testing the t value is 198.

For 198 degrees of freedom the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

5. Hypothesis – 5 :

The adult educated subjects and adult illiterate subjects will differ significantly in their attitude about conservation biodiversity

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	171.26	16.28	100	142.40	8.50	198	15.71	**

Therefore, the obtained t value is 15.71 and the degree of freedom for use is 198. This is a two tailed test.

For 198 df, the t critical value at 0.01 level is 2.60. Hence the obtained t-value is highly significant at 0.01 level.

Therefore the hypothesis is retained.

6. Hypothesis – 6 :

The urban teachers and rural teachers will differ significantly in their attitude regarding conservation of biodiversity.

Table – 6

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	181.52	6.11	100	158.88	7.23	198	23.78	**

Hence obtained t value is 23.78 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

7. Hypothesis – 7 :

The urban students and rural students will differ significantly in their attitude about conservation of biodiversity.

Table – 7

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	173.60	5.98	100	148.76	7.00	198	26.85	**

Hence, the obtained t value is 26.85 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$

For 48 df the t critical value for two tailed test at 0.05 level is 2.01.

Therefore, the obtained t value is significant at 0.05 level and hence the hypothesis is retained.

8. Hypothesis – 8 :

The urban illiterates and rural illiterates will differ significantly in their attitude regarding conservation of biodiversity.

Table – 8

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	155.20	5.65	100	133.40	6.63	198	24.90	**

Hence, the obtained t value is 24.90 and the degrees of freedom for use in testing the t value is 198.

For 198 degrees of freedom the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

9. Hypothesis – 9 :

The adult educated subjects and adult illiterate subjects will differ significantly in their awareness about conservation of biodiversity.

Table – 9

N_1	M_1	SD_1	N_2	M_2	SD_2	df	t-value	Significance
100	175.56	6.01	100	158.88	7.23	198	17.64	**

Hence obtained t value is 17.64 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

10. Hypothesis – 10 :

The urban teachers and rural teachers will differ significantly in their awareness regarding conservation of biodiversity.

Table – 10

N_1	M_1	SD_1	N_2	M_2	SD_2	N_1	t-value	Significance
100	186.56	6.20	100	169.58	7.47	198	17.40	**

Hence obtained t value is 17.40 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

11. Hypothesis – 11 :

The urban students and rural students will differ significantly in their awareness about conservation of biodiversity.

Table – 11

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	189.66	6.25	100	178.55	7.67	198	11.17	**

Hence obtained t value is 11.17 and the degrees of freedom for use in testing the t value is 198.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

12. Hypothesis – 12 :

The urban illiterates and rural illiterates will differ significantly in their awareness regarding conservation of biodiversity.

Table – 12

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	189.56	6.25	100	178.88	7.68	198	10.74	**

Hence obtained t value is 10.74 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

13. Hypothesis – 13 :

The adult educated subjects and adult illiterate subjects will differ significantly in their participation in conservation of biodiversity.

Table – 13

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

14. Hypothesis – 14 :

The urban teachers and rural teachers will differ significantly in their participation in conservation of biodiversity.

Table – 14

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	165.56	5.84	100	158.81	7.23	198	7.23	**

Hence obtained t value is 7.23 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

15. Hypothesis – 15 :

The urban students and rural students will differ significantly in their participation in conservation of biodiversity.

Table – 15

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	181.56	6.11	100	166.88	7.41	198	15.20	**

Hence obtained t value is 15.20 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

Hypothesis – 16 :

The urban illiterates and rural illiterates will differ significantly in their participation in conservation of biodiversity

Table – 16

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	169.44	5.91	100	156.92	7.19	198	13.39	**

Hence obtained t value is 13.39 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

17. Hypothesis – 17 :

The adult educated subjects and adult illiterate subjects will differ significantly in their values regarding conservation of biodiversity.

Table – 17

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is $100 + 100 - 2 = 198$.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

18. Hypothesis – 18 :

The urban teachers and rural teachers will differ significantly in their values about conservation of biodiversity.

Table – 18

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	179.56	6.08	100	168.88	7.46	198	11.04	**

Hence obtained t value is 11.04 and the degrees of freedom for use in testing the t value is 198

For 198 df the t critical value for two tailed test at 0.01 level is 2.60.

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

19. Hypothesis – 19 :

The urban students and rural students will differ significantly in their values about conservation of biodiversity.

Table – 19

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	177.16	6.04	100	165.78	7.39	198	11.86	**

Hence obtained t value is 11.86 and the degrees of freedom for use in testing the t value is 198.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

20. Hypothesis – 20 :

The urban illiterates and rural illiterates will differ significantly in their values regarding conservation of biodiversity.

Table – 20

N₁	M₁	SD₁	N₂	M₂	SD₂	df	t-value	Significance
100	177.16	6.04	100	165.78	7.39	198	11.86	**

Hence obtained t value is 11.86 and the degrees of freedom for use in testing the t value is 198.

For 198 df the t critical value for two tailed test at 0.01 level is 2.60

Therefore, the obtained t value is significant at 0.01 level and hence the hypothesis is retained.

5.5 Conclusion

Biodiversity is the natural exposure of our existence. Destruction of any kinds of biodiversity affecting ultimately mankind. Conditions of balance in nature have been caused by man's deeds and since nature is not used to bear with a state of imbalance for long, it must seek to restore its balance even at the cost of causing large scale human misery. So the time has come to think about the way out of this endangered condition of mankind. The study of nature, therefore has become very essential for man so that they can take urgent preventive measures before the entire situation goes out of hand. From the present study the following decisions can be found :

Findings 1 :

The adult educated subjects and adult illiterate subjects will differ significantly in their knowledge about conservation of biodiversity

Findings 2 :

The urban teachers and rural teachers will differ significantly in their knowledge regarding conservation of biodiversity.

Findings 3 :

The urban students and rural students will differ significantly in their knowledge about conservation of biodiversity.

Findings 4 :

The urban illiterates and rural illiterates will differ significantly in their knowledge regarding conservation of biodiversity.

Findings 5 :

The adult educated subjects and adult illiterate subjects will differ significantly in their attitude about conservation biodiversity

Findings 6 :

The urban teachers and rural teachers will differ significantly in their attitude regarding conservation of biodiversity.

Findings 7 :

The urban students and rural students will differ significantly in their attitude about conservation of biodiversity.

Findings 8 :

The urban illiterates and rural illiterates will differ significantly in their attitude regarding conservation of biodiversity.

Findings 9 :

The adult educated subjects and adult illiterate subjects will differ significantly in their awareness about conservation of biodiversity.

Findings 10 :

The urban teachers and rural teachers will differ significantly in their Awareness regarding conservation of biodiversity

Findings 11 :

The urban students and rural students will differ significantly in their awareness about conservation of biodiversity.

Findings 12 :

The urban illiterates and rural illiterates will differ significantly in their awareness regarding conservation of biodiversity.

Findings 13 :

The adult educated subjects and adult illiterate subjects will differ significantly in their participation in conservation of biodiversity.

Findings 14 :

The urban teachers and rural teachers will differ significantly in their participation in conservation of biodiversity.

Findings 15 :

The urban students and rural students will differ significantly in their participation in conservation of biodiversity.

Findings 16 :

The urban illiterates and rural illiterates will differ significantly in their participation in conservation of biodiversity.

Findings 17 :

The adult educated subjects and adult illiterate subjects will differ significantly in their values regarding conservation of biodiversity.

Findings 18 :

The urban teachers and rural teachers will differ significantly in their values about conservation of biodiversity.

Findings 19 :

The urban students and rural students will differ significantly in their values about conservation of biodiversity.

Findings 20 :

The urban illiterates and rural illiterates will differ significantly in their values regarding conservation of biodiversity.

The study of biodiversity has assumed immediate importance because we must know what constitutes ecological balance and how this balance can be maintained. The study of biodiversity is included in the curriculum of secondary education but from the present study it is clear that the illiterate are not very much aware about the present ecological conditions. So it is essential to make the illiterate also aware about the conservation of biodiversity which is an important factor for maintaining ecological balance. As majority of the people of our country are illiterate and have little scope of having formal education, so to them knowledge of biodiversity including its affect should be imparted through informal education and mass media.

Therefore, from the present study we can infer that, impact of biodiversity depends on several dimensions regarding conservation of biodiversity with its knowledge, awareness, participation, attitude and values leading to education for sustainable development.

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A P P E N D I C E S

APPENDIX – I

A STUDY ON IMPACT OF CONSERVATION OF BIODIVERSITY ON EDUCATION QUESTIONNAIRE : PILOT STUDY

Name : _____

Class : _____ Roll No. : _____ Occupation : _____

Name of School : _____

	Obviously Yes	Yes	Don't Know	No	Obviously Not
1. An overall knowledge about bio-diversity should be a part of education.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. India has a great role in conservation of biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Our animals and plants can be preserved only through conservation of biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Biodiversity plays no role in control of pollution caused by the smokes from industry, vehicle, wood or coal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Today many plants and animals have become endangered or extinct as the conservation of biodiversity have been neglected since.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
6. Biodiversity is not directly or indirectly balancing the ecosystem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Biodiversity is directly or indirectly balancing the ecosystem in participatory approach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The ecological balance is hampered due to the neverending need of mankind.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. The main cause behind the destruction of civilization is negligence of biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Spending money for conservation of biodiversity is not necessary for a poor country like India.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Forest conservation is essential to prevent the extinction of animal and plant species.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
12. The main source of biodiversity is tropical forest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Conservation of plant ecology and creation of national plant parks are necessary for conservation of ecological balance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. There is no need to stop deforestation for timely monsoon and normal amount of rain.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Social afforestation is essential for pollution free environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Forest conservation and afforestation has no role in prevention of soil erosion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Plant diversity has no role in prevention of drought and expansion of desert.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
18. By overuse of economical plant and destruction of unwanted species of plants, the overall plant diversity is declining.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. To prepare and invent new life-saving drugs forest conservation is most essential.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Cutting few trees if required is not harmful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Cutting some trees from a dense forest is not harmful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Wild life conservation and creation of national park is not necessary for maintaining ecological balance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Lack of awareness about conservation has caused extinction of golden toad, rhinoceros, different types of birds, iguanas etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
24. The Act to prevent illegal killing of many rare genetic origin of biodiversity (like one-horned-rhino, spotted deer, King Cobra etc.) should strictly applied.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. The Act to prevent killing wild animals and capturing wild birds in cages should strictly be followed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Sympathetic attitudes towards wild animals should be developed among general people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. The birds, by engulfing the insects and pupa of insects – protect the crops from insects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. For the lack of favourable environment and to protect bird diversity, artificial nests for birds should be built.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
29. The chemicals used to protect the crop from insect are not harmful for other animals of the field, like birds, frog, earthworm etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Producing only required species of fish and destroying others fishes is scientific method.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Capturing and killing turtles for their flesh is not right.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Spending money in protection of wild animals like tiger and crocodile is not essential in a poor country like India.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Excess production of animals that are used as food other human requirements and neglecting other species of animals are harmful for biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
34. The present economical condition of India is not favourable for spending money for animals in the sanctuaries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Biodiversity has an extensive role in protection of diseases in the agriculture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Sustainable agriculture is not the only factor of conservation of biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Cultivation of only one type of crop will be the reason of obvious destruction in future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. The chemicals used in insecticides (like lead, mercury, fluorocarbon, chlorinated pesticides) are getting mixed with air, soil, river and ocean water and thus hampering the biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
39. Non-fertile land can be made fertile only by sustainable agriculture.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Spending money for the research work to prevent the plants from insects and disease is not necessary.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. There is no need to use the gene pool present in biodiversity for converting non-fertile land to fertile land.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Grass should be planted in the land which are not suitable for cultivation, to prevent soil erosion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. To increase the number of essential plants, unwanted plants should be destroyed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Gene pool conservation is essential for hybrid species.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
45. Gene pool conservation is possible only by biodiversity of conservation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. No company or country should have sole right of biodiversity conservation, gene pool conservation and new hybrid species production.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Gene pool conservation of economical plants is possible only by seed conservation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. There is no need for gene pool conservation of new herbal plants used for treatment of incurable diseases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Conservation of endangered genetic origin can be done using tissue culture.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. The modern techniques of gene pool conservation is so costly that it is not possible in the poor country like India.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX – II

A STUDY ON IMPACT OF CONSERVATION OF BIODIVERSITY ON EDUCATION QUESTIONNAIRE : FINAL DRAFT

Name : _____

Class : _____ Roll No. : _____ Occupation : _____

Name of School : _____

	Obviously Yes	Yes	Don't Know	No	Obviously Not
1. An overall knowledge about bio-diversity should be a part of education.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. India has a great role in conservation of biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Our animals and plants can be preserved only through conservation of biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Biodiversity plays no role in control of pollution caused by the smokes from industry, vehicle, wood or coal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Today many plants and animals have become endangered or extinct as the conservation of biodiversity have been neglected since.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
6. Biodiversity is not directly or indirectly balancing the ecosystem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Biodiversity is directly or indirectly balancing the ecosystem in participatory approach	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The ecological balance is hampered due to the neverending need of mankind.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. The main cause behind the destruction of civilization is negligence of biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Forest conservation is essential to prevent the extinction of animal and plant species.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. The main source of biodiversity is tropical forest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
12. Conservation of plant ecology and creation of national plant parks are necessary for conservation of ecological balance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. There is no need to stop deforestation for timely monsoon and normal amount of rain.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Social afforestation is essential for pollution free environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Forest conservation and afforestation has no role in prevention of soil erosion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Plant diversity has no role in prevention of drought and expansion of desert.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. By overuse of economical plant and destruction of unwanted species of plants, the overall plant diversity is declining.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
18. Cutting few trees if required is not harmful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Cutting some trees from a dense forest is not harmful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Wild life conservation and creation of national park is not necessary for maintaining ecological balance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Lack of awareness about conservation has caused extinction of golden toad, rhinoceros, different types of birds, iguanas etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. The Act to prevent illegal killing of many rare genetic origin of biodiversity (like one-horned-rhino, spotted deer, King Cobra etc.) should strictly applied.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Sympathetic attitudes towards wild animals should be developed among general people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
24. For the lack of favourable environment and to protect bird diversity, artificial nests for birds should be built.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. The chemicals used to protect the crop from insect are not harmful for other animals of the field, like birds, frog, earthworm etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Producing only required species of fish and destroying others fishes is scientific method.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Capturing and killing turtles for their flesh is not right.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Spending money in protection of wild animals like tiger and crocodile is not essential in a poor country like India.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
29. The present economical condition of India is not favourable for spending money for animals in the sanctuaries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Biodiversity has an extensive role in protection of diseases in the agriculture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Cultivation of only one type of crop will be the reason of obvious destruction in future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. The chemicals used in insecticides (like lead, mercury, fluorocarbon, chlorinated pesticides) are getting mixed with air, soil, river and ocean water and thus hampering the biodiversity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Spending money for the research work to prevent the plants from insects and disease is not necessary.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
34. There is no need to use the gene pool present in biodiversity for converting non-fertile land to fertile land.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. To increase the number of essential plants, unwanted plants should be destroyed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Gene pool conservation is essential for hybrid species.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Gene pool conservation is possible only by biodiversity of conservation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. No company or country should have sole right of biodiversity conservation, gene pool conservation and new hybrid species production.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Gene pool conservation of economical plants is possible only by seed conservation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Obviously Yes	Yes	Don't Know	No	Obviously Not
40. There is no need for gene pool conservation of new herbal plants used for treatment of incurable diseases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Conservation of endangered genetic origin can be done using tissue culture.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. The modern techniques of gene pool conservation are so costly that it is not possible in the poor country like India.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX – III

জৈব বৈচিত্র্য সংরক্ষণে শিক্ষার প্রভাবের প্রশ্নাবলী

নাম

শ্রেণী রোল নং

বিদ্যালয়ের নাম

	অবশ্যই হ্যাঁ	হ্যাঁ	জানিনা	না	অবশ্যই না
১. জৈব বৈচিত্র্য সম্পর্কে সার্বিক জ্ঞান শিক্ষার অঙ্গ হওয়া একান্ত প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২. জৈব বৈচিত্র্য রক্ষার ক্ষেত্রে ভারতবর্ষের গুরুত্ব অপরিসীম।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩. কেবলমাত্র জৈব বৈচিত্র্য সংরক্ষণের মাধ্যমে আমাদের প্রাণী উদ্ভিদ সম্পদ সংরক্ষিত হতে পারে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৪. মানুষের অস্তিত্ব জৈব বৈচিত্র্য উপর প্রত্যক্ষভাবে আদৌ নির্ভরশীল নয়।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৫. কাঠ ও কয়লার ধোঁয়া, কলকারখানার ও যানবাহনের ধোঁয়ার কারণে যে দূষণ হয় তা প্রতিরোধে জৈব বৈচিত্র্যর কোন ভূমিকা নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৬. জৈব বৈচিত্র্য সংরক্ষণ না করার ফলে বহু উদ্ভিদ ও প্রাণী সম্পদ আজ অবলুপ্ত এবং অনেকগুলি আজ অবলুপ্তির পথে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	অবশ্যই হ্যাঁ	হ্যাঁ	জানিনা	না	অবশ্যই না
৭. জৈব বৈচিত্র্য পরীক্ষা ও প্রত্যক্ষভাবে বাস্তুতন্ত্রের ভারসাম্য রক্ষা করেছে না	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৮. মানুষের অপরিসীম চাহিদার জন্য বাস্তুতন্ত্রের ভারসাম্য বিঘ্নিত হচ্ছে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৯. ভারতের মতো দরিদ্র দেশে জৈব বৈচিত্র্য সংরক্ষণে অর্থব্যয় প্রয়োজন	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১০. উদ্ভিদ ও প্রাণী প্রজাতির অবলুপ্তিরোধে বনসংরক্ষণ একান্ত প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১১. বনভূমিই জৈব বৈচিত্র্যের প্রধান উৎস।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১২. পরিবেশের ভারসাম্য রক্ষার জন্য উদ্ভিদ বাস্তুতন্ত্রের সংরক্ষণ জাতীয় উদ্ভিদ উদ্যান সৃষ্টির প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৩. প্রয়োজনীয় বৃষ্টির জন্য গাছ কেটে ফেলার দরকার নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৪. দূষণমুক্ত পরিবেশের জন্য সামাজিক বনসৃজন প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	অবশ্যই হ্যাঁ	হ্যাঁ	জানিনা	না	অবশ্যই না
১৫. মাটির ক্ষয়রোধে বনভূমি রক্ষা ও সৃষ্ণের কোন ভূমিকা নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৬. খড়া ও মরুভূমির বিস্তারে উদ্ভিদ বৈচিত্র্যের প্রয়োজন নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৭. অর্থকরী উদ্ভিদ প্রজাতির বেশী ব্যবহার এবং অবাস্তিত উদ্ভিদ প্রজাতির ধূসের দ্বারা সার্বিক উদ্ভিদ প্রজাতি বৈচিত্র্যের হার হ্রাস পাচ্ছে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৮. জীবনদায়ী নতুন নতুন ওষুধের আবিষ্কার ও প্রস্তুতির জন্য বনভূমি সংরক্ষণ একান্ত প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
১৯. প্রয়োজন বোধে কিছু গাছ কাটা যেতে পারে - তাতে কোন ক্ষতি নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২০. গভীর জঙ্গল থেকে কয়েকটি গাছ কেটে ফেললে ক্ষতি নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২১. পরিবেশের ভারসাম্য রক্ষার জন্য বন্যপ্রাণী সংরক্ষণ এবং অভয়ারণ্য সৃষ্টি করার বিশেষ প্রয়োজন নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	অবশ্যই হ্যাঁ	হ্যাঁ	জানিনা	না	অবশ্যই না
২২. বন্যপ্রাণী হত্যা ও বনপাখী খাঁচায় বন্দী করার প্রতিরোধে আইন কঠোরভাবে প্রয়োগ করা উচিত।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৩. বন্যপ্রাণীদের প্রতি সর্বসাধারণের সহানুভূতিশীল মনোভাব গড়ে তোলা দরকার।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৪. পাখিরা পতঙ্গ ও পতঙ্গের মুককীট খেয়ে কীট পতঙ্গের হাত থেকে ফসলকে রক্ষা করে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৫. উপযুক্ত পরিবেশের অভাবের জন্যও পাখির বৈচিত্র্য রক্ষার স্বার্থে পাখির কৃত্রিম বাসা তৈরী করে দেওয়া আজকে বিশেষ প্রয়োজন হয়ে পড়েছে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৬. ক্ষেতে ফসলকে পোকাকার হাত থেকে বাঁচাতে যেসব রাসায়নিক দ্রব্য ব্যবহৃত হয় তা ক্ষেতের অন্যসব প্রাণী যেমন - পাখী, ব্যাঙ, কেঁচো ইত্যাদির কোন ক্ষতিসাধন করে না।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৭. মৎস চাষে শুধুমাত্র প্রয়োজনীয় মাছের চাষ করা এবং অন্য মাছ ধুংস করা বিজ্ঞানসম্মত।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	অবশ্যই হ্যাঁ	হ্যাঁ	জানিনা	না	অবশ্যই না
২৮. মাংসের লোভে কচ্ছপ ধরা ও মারা ঠিক নয়।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
২৯. ভারতের মতো দরিদ্র দেশে অর্থব্যয় করে বাঘ ও কুমীরের মতো হিংস্র প্রাণী সংরক্ষণ নিষ্প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩০. মানুষের খাদ্য ও বিভিন্ন প্রয়োজনের উপযোগী প্রাণীর অধিক উৎপাদন ও অন্য প্রজাতির প্রাণীর প্রতি অবহেলা জৈব বৈচিত্র্যের পক্ষে ক্ষতিকারক।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩১. চাষাবাদে রোগ প্রতিরোধে জৈব বৈচিত্র্যের ভূমিকা ব্যাপক।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩২. জৈব বৈচিত্র্যে অন্যতম সংরক্ষক সহনশীল কৃষি নয়।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩৩. শুধু একপ্রকারের ফসল চাষের অভ্যাস ভবিষ্যতে অনিবার্য ধ্বংসের কারণ হবে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩৪. পোকামাকড় মারার রাসায়নিক পদার্থ (যেমন সীসা, মার্কারী, ফ্লুরোকার্বন, ক্লোরিনেটেড পেপ্তিসাইড) প্রভৃতির মতো মারাত্মক বস্তু সমূহ বায়ু, মাটি, নদী ও সমুদ্রের জলে মিশে জৈব বৈচিত্র্যে বিস্ত্রিত করছে।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	অবশ্যই হ্যাঁ	হ্যাঁ	জানিনা	না	অবশ্যই না
৩৫. সহনশীল কৃষির মাধ্যমেই কেবলমাত্র অনাবাদী জমিকে আবাদিত করে তোলা যায়।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩৬. পোকামাকড় ও ব্যাধির হাত থেকে গাছকে রক্ষার জন্য যে গবেষণা তার পিছনে অর্থব্যয় নিশ্চয়প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩৭. অনাবাদী জমিকে আবাদিত করে তুলতে জৈব বৈচিত্র্যে নিহিত বিভিন্ন জেনেটিক উৎসের ব্যবহারের প্রয়োজন নেই।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩৮. যে সব জমি চাষের অযোগ্য সেখানে ভূমিক্ষয় রোধের জন্য গাছ লাগানোর প্রয়োজন।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৩৯. প্রয়োজনীয় গাছের সংখ্যা বৃদ্ধির জন্য অপ্রয়োজনীয় গাছ বা আগাছা কেটে ফেলা উচিত।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
৪০. শঙ্কর প্রজাতির জীবের জন্য জীন সংরক্ষণ একান্তই অপরিহার্য।	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	অবশ্যই হ্যাঁ	হ্যাঁ	জানিনা	না	অবশ্যই না
<p>৪১. জৈব বৈচিত্র্যে রক্ষা, জীন সংরক্ষণ ও নতুন শব্দের প্রজাতি সৃষ্টির ক্ষেত্রে কোন কোম্পানীর বা কোন দেশের একচেটিয়া অধিকার থাকা উচিত নয়।</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>৪২. অর্থকরী উদ্ভিদ সমূহের বীজ সংরক্ষণের মাধ্যমে জীন সংরক্ষণ সম্ভব।</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>