ABOUT THE BOOK

The modern human lifestyle is energy and waste intensive, catalyzing overexploitation of natural resources, degradation and modification of natural habitats and deterioration in structure and function of environment. The latter have become precursors of unique societal environmental problems throughout the world, especially in developing nations. Environmental problems have traditionally been considered as economical and technical. However in recent times, social dimensions of environmental problems have attracted a lot of public attention and led to a paradigm shift in peoples' attitude in studies in disciplines of environmental psychology and sociology. Environmental education can facilitate revival of the age-old tradition of living in harmony with nature and adoption of environment friendly practices for sustainable development of human society.

The present book is the edited version of my doctoral thesis awarded by the Rani Durgawati University, Jabalpur. This is a humble effort in finding ways and means of sustainable development through the analysis of environmental attitude, awareness and behaviour among the Indian youth at higher secondary level of education. Environmental behaviour of individuals in particular and of the society in general is vitally important in controlling consequences of their action on environment and may help in finding cost-effective solutions to environmental problems at the local, regional, national and global levels.

ABOUT THE AUTHOR

Dr. (Mrs.) Archana Singhal is Assistant Professor in the Department of Education at St. Aloysius (Autonomous) College, Jabalpur that is reaccredited "A" by NAAC (CGPA – 3.5/4.00). She has obtained her bachelor and master degrees from Meerut University, Meerut. She has later obtained her bachelor, master and doctoral degrees in Education from Rani Durgavati University, Jabalpur. Recently, she has successfully completed her M.A. degree in Applied Psychology.

She is actively engaged in teaching and research in environmental education and psychology. She has published many research papers in leading national and international journals. Besides, she has presented her work in conferences, seminars and symposia. She has also contributed invited chapters in edited books. She has pioneered a psychology test to measure environmental behaviour in individuals that was published by National Psychological Corporation, Agra. She has recently completed a UGC research project on "Environmental behaviour of students in relation to level of education". Her research has been critically acclaimed by her peers. Her future research interest includes multidimensional analysis of environmental behaviour at different levels of education and disciplines across students pursuing traditional and professional courses.

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ENVIORNMENTAL AWARENESS, ATTITUDE AND BEHAVIOUR

Archana Singhal

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Environmental Awareness, Attitude and Behaviour

ARCHANA SINGHAL

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Dedicated

to the memory of
my beloved parents

"Life is resilient. It has persisted for more than two billion years, through five or more mass extinction crises, the most recent of which exterminated the great dinosaurs, leaving birds as their only descendants. Nature, in some form, will likely survive the rash actions of today's human societies that are based on ever-growing consumption of resources. But whether that pattern will enable modern societies to continue in their current form is not at all certain, even highly unlikely."

McNeely and Mainka (2009)
Conservation for a New Era

FOREWORD

To save the Mother Nature from the signs of sickness and global damage, there must be concerted action of all the people to detoxify the environment which will come through reorienting the citizenry's values i.e. imbuing the people with proper attitudes and values, specifically those that will lead to a greater concern for preserving balance in the ecosystem, besides teaching them how to save environment from further degradation. Emphasis should be laid on developing the values of social responsibility, concern for others and harmony with nature. A high level of awareness in combination with positive attitude and sound environment awareness, attitude and behaviour among the people help in minimizing the environmental degradation by rational use of resources and minimal generation of wastes by them. However, it is not enough to affect the people in their beliefs, attitudes and values unless there is a carryover into behavior and into every day decisions that they make.

The present piece of research by Dr. Archana Singhal pertains to the study of environmental awareness, attitude and behaviour. It is Singhal's assumption that the better educated students may be full of information but lack experience required for their environmentally sound behavior, because

they may still be less aware and concerned about their local environmental problems. The direct experiences can make the students truly appreciative of the interdependence among different components of environment. The change in attitude will lead to environmental behavior that nurtures and preserves the delicate natural balance of the environment. She has discovered in her review of literature a lack and gap in the research with an absence of studies on environmental awareness, attitude and behavior and how to develop all these in students to conserve environment. The researcher has used appropriate research design. In addition to the use of standardized tools, the construction and standardization of the 'Environmental Behavior Scale' has added strength to the present piece of research. The results of the study will not help only the policy planners in formulating environmental policies as per the local conditions but also the teachers in developing proper attitude and behavior in the future citizens of the nation and making them fully aware with the environmental problems.

I am sure this piece of research would be of immense importance to the future researchers who want to undertake research in the same field.

Place : Shimla

Prof. A.D.N. Bajpai
Vice-Chancellor
Himachal Pradesh University,
Shimla–171005

PREFACE

The industrial revolution of the 19th century has ushered the then agrarian human society into the industrial one and is now catalyzing its fourth transition to the knowledge society with the widespread application of emerging tools of information and communication technology. These developments catalyzed modernization of society considerably improving living standards, health care and availability of novel materials and processes. These improvements, however, have triggered a massive consumption of energy (fossil fuels) and natural resources resulting in a significant problem of pollution and greater emission and accumulation of greenhouse gases in the biosphere.

India is one of the 17 identified mega diverse countries of the world, and home for some 18,644 vascular plant species, of which 26.8% are endemic; and at least 59,353 insect, 2,546 fish, 240 amphibian, 460 reptile, 1,232 bird and 397 mammal species, of which 18.4% are endemic. It has two biodiversity hotspots, namely, the eastern Himalayas and the Western Ghats, and is composed of diverse ecological habitats such as forests, grasslands, wetlands, coastal and marine, and desert ecosystems. With only 2.4% of the total land area of

the world, the country contributes to about 8% of the known global biodiversity but also harbors 16.7% of the world human population. The sustenance of such a high human density under a regime of emerging economy coupled with serious problems of desertification, pollution, urbanization and changing climate is already causing enormous loss of biodiversity in the country.

India is also a fast developing nation being driven through globalization and outsourcing. At the annual expansion rate of Rs. 18 trillion, it may double its GDP by the year 2020 being the third largest economy whose sustenance critically depends on sufficient availability and supply of energy. Coal is still the main source of energy (51%), followed by mineral oil (36%), natural gas (9%), nuclear and water (2% each). There appear exigencies for evolving non-conventional and innovative methods first to conserve energy that may include designing of carbon neutral buildings and processes in synergy with harnessing of energy from such sources as sun, wind, water, and biomass. Indian government has rightly accorded top priority to expand energy production through non-conventional sources. National Electricity Policy 2005 requires State Electricity Regulatory Commissions to specify a proportion of power being produced and supplied through the non-conventional sources. Ministry of Non-conventional Energy Sources of Government of India has set a target of at least 10,000 MW capacities by the year 2012.

Environmental education has rightly attained great significance in this context, since it endeavours to create a way of thinking that requires people to overcome their prejudices and orients children to understand better the environment and hazards of its pollution towards our health and survival. The Chinese perception about education is relevant here, which says "If you plan for one year, plant rice; if you plan for ten years, plant trees; but if you plan for one hundred years, educate the people". The chief objective of environmental education is that individual and social groups should acquire awareness and knowledge, develop attitudes, skills and

abilities, and participate in solving real-life environmental problems. The lay public in rural, tribal slum and urban areas, students and teachers in schools, colleges and universities, and planners and policy makers need to be educated about their environment and its sustenance. This calls for a fresh approach in delivery of education that cuts across the domain of subjects and disciplines at the level of school as well as higher education.

We must make local, regional, national as well as global environmental issues more meaningful to learners by focusing on individual contributions to the problems and then to develop decision-making strategies for problem solving. A first-hand direct experience of local environmental problems may improve learners' environmental behaviour. Such a healthy environmental behaviour can motivate people to use alternate sources of energy, convert wastes into resources, and conserve biodiversity. Therefore, it is vitally important to know the awareness and attitude of the learners at the higher secondary levels towards their approach and perception of environment problems. A high level of awareness in combination with positive attitude and sound environmental behaviour among the students may facilitate rationale uses of resources and minimal generation of wastes by them, thereby saving extinction of life from our planet. It becomes, therefore, necessary to study not only the level of environmental awareness and attitude towards environment but also to see if there is any impact of these variables on environmental behaviour, since action is more important than the theoretical concept and knowledge alone. The emotional reaction to the changes taking place around someone may through empathy and love may itself regulate the action. If any impact is observed in the research findings then it will be advisable to have guidance and counseling sessions so that the mother earth is saved from devastation in terms of environmental pollution.

—Dr. (Mrs.) Archana Singhal

ACKNOWLEDGEMENT

The fast deteriorating quality of natural environment has become an issue of grave concern for sustenance of modern human life-style. There are various societal progenitors of environmental degradation leading to various human health hazards. The research on "Environmental Awareness, Attitude and Behaviour" has been an enlightening experience for me not only because I was able to study the level of environmental behaviour of adolescents, but also to have firsthand experience of their perception of and responses towards environment. This enabled me to suggest various strategies for adoption by various stakeholders in preservation of our fragile but perseverant environment.

It has been a great privilege for me to work under able guidance of Dr. (Mrs.) Urmila Verma, Ex-Director, Department of Education, Mata Gujri Mahila Mahavidyalaya, and Former Professor, Government College of Education, Jabalpur. I express my heartfelt gratitude and indebtedness to her for her apt guidance, constant encouragement and incessant support to me throughout the course of this research.

I am thankful to Dr. (Mrs.) K.K. Dube, the then Principal, Government College of Education, Jabalpur for providing all the necessary facilities for this research.

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I consider myself fortunate to be bestowed with the inspiring mentorship from Dr. Bhupendra Nigam, Retd. Counsellor, Government College of Educational Psychology & Guidance, Jabalpur. I am grateful to him for his valuable suggestions and time during the course of this work.

The well-renowned experts in the field of environmental science, education and psychology have greatly helped me in designing, development and validation of the Environmental Behaviour Scale used in the research. I owe a deep sense of gratitude to Dr. Bhupendra Nigam, Prof. A.D. N. Bajpai, Former Vice-chancellor, A.P.S. University, Rewa and Professor, Department of Economics, Prof. K.N. Shukla, Department of Sanskrit, and Prof. P.K. Singhal and Prof. S.N. Bagchi, Department of Biological Science, R.D. University, Jabalpur, Dr. Indu Gupta, Retd. Professor and Dr. R.K. Shrivastava, Government Model Science College, Jabalpur, Dr. M.K. Gupta, Head, Department of Botany and Microbiology, St. Aloysius' College Autonomous, Jabalpur, Dr. Pankaj Shrivastava, Scientist, Forensic Science Laboratory, Sagar, and Late Dr. J.L. Shrivastava, Senior Scientist, State Forest Research Institute, Jabalpur.

The present research would not have been complete without the unselfish help and active participation of the Principals, Faculty Members and Students of the selected schools of Jabalpur in this study, namely, St. Joseph Convent Girls Senior Secondary School, St. Aloysius' Senior Secondary School, Central School, GCF No. 1 and 2, Maharshi Vidya Mandir, Christchurch Girls Senior Secondary School, Central School, CMM, Govt. Girls Higher Secondary School, Karaundi, Khalsa Higher Secondary School, Cantonment, M.L.B. Girls Senior Secondary School, Nachiketa Higher Secondary School, Pandit L.S. Jha Govt. Model Higher Secondary School, and L.N.Y. Higher Secondary School. I am indebted to all of them for their active support to my research.

I am also thankful to Prof. B.K. Sahoo, the then Dean, Faculty of Education, R.D. University, Jabalpur, Dr. Bipin Asthana, Former Reader, St. Jones College, Agra, Dr. D.S. Malviya, Govt. College of Education, Jabalpur, and Prof. Sudha Mehta, Department of Psychology, Govt. M.K.B. College Autonomous, Jabalpur for extending their valuable support.

I would like to express my deep sense of gratitude to the renowned Environmentalist – Prof. P.K. Singhal, and Ex-Dean, Faculty of Life Science, R.D. University, Jabalpur – for his creative inputs and criticisms throughout the design, implementation and completion of this research. I must acknowledge a wonderful mentor in Prof. Uma Tripathi, Ex-Dean, Faculty of Arts, R.D. University, Jabalpur who transformed me completely and always motivated and encouraged me to achieve the unimaginable.

I acknowledge the whole-hearted assistance rendered to me by the Librarians of R.D. University, Mata Gujri Mahila Mahavidyalaya, St. Aloysisus' College Autonomous, Govt. Model Science College, Govt. M.K.B. College Autonomous, Govt. Psychology College and Govt. College of Education, Jabalpur, and Heads of Departments of Education and Philosophy, R.D. University, Jabalpur.

I am also grateful to Dr. (Mrs.) Bindu Keshwan, Head of the Department and Dr. (Mrs.) Tamanna Kaushal, Assistant Professor, St. Aloysius' College Autonomous, Jabalpur for their valuable cooperation and inspiration. I thank my colleagues at the Department and all those who have helped me directly or indirectly in various ways in the completion of my research work.

Last but not the least, I owe my special thanks to my family members for their selfless care, concern and love that always strengthens me from inside. I could spare the required time for this research only because of the forbearance and perseverance of my children – Shubham and Rashi, who always inspired me to dedicate myself for this cause.

—Dr. (Mrs.) Archana Singhal

CONTENTS

Chapter 1

THE PROBLEM AND ITS ELABORATION

1.1 GENERAL INTRODUCTION

The rich variety of genes, species and ecosystems, which has been the foundation for the social, economical and cultural diversity on this planet for past billion years, has now itself become an issue of serious concern. The industrial revolution that began from 1940 has permanently changed the ways human beings utilize natural resources and the ways they live on the Earth. The industrial revolution not only modernized the human society but has also caused an explosion in the population growth, which is projected to reach 9 billion over the next 50 years up form 6.8 billion today. The modern life requires much higher consumption of natural resources and energy by an average human being. The ensuing industrialization and urbanization have led to much faster degradation of natural habitats, intensive extraction of fossil fuels and its combustion, widespread incidence of rampant pollution, resulting in complex problems of global warming and ozone holes. The warming itself can threaten the very existence of life on this planet, if not controlled in time.

There is an increasing realization that the human race now stands on severe threat to its sustenance due to a conflict between environment and development. The industrial nations have developed faster than the non-industrial nations and achieved high standards of living. The developed nations are utilizing natural resources as a progenitor of novel products and processes, whereas the developing nations are consuming natural resources as means of their livelihood. As a result, the affluent societies of developed nations consume more resources creating pollution and the poor societies of developing nations survive on resources causing depletion of biodiversity and ecological degradation of habitats. Sustainable use and conservation of natural resources can make substantial contributions in reduction of poverty, improvement in human health and well-being, and availability of natural resources for a longer time period in developing nations.

The increasing deterioration in environmental quality has drawn a lot of attention from the international community. The UN World Conference on the Environment in Stockholm in 1972, the Montreal Protocol in 1990, the Earth Summit in Rio de Janeiro in 1992, the World Conservation Congress in Barcelona in 2008, and periodical meetings of Intergovernmental Panel on Climate Change (IPCC) show that environment is on the priority agenda of the international community. Global warming has recently emerged as the severe threat to human race. The increasing emission of greenhouse gases, like carbon di-oxide, methane, chlorofluorocarbons, water vapours, etc. is mainly responsible for global warming. India is rated already the fifth largest contributor in the total emission of greenhouse gases in the world. The total share of India is about 6% in the total emission of greenhouse gases in the World. The recent reports of IPCC suggest that India will be the worst sufferer by the adverse effects of global warming. There may be disappearance of major glaciers like Gangotri affecting the survival of the Indian main river – Ganges, and large-scale changes in the climate like rainfall, atmospheric temperature, and submergence of coastal areas

on the eastern and western coasts. All such changes may badly affect directly the agricultural and industrial production and indirectly the population, leading to large-scale conflicts among the society.

India is a mega-diverse country due to its location at the tri-junction of the Afro-tropical, the Indo-Malayan and the Paleo-Arctic realms. With only 2.4% of the global land area, it harbours 8% of the documented global biodiversity, but is also home for 17% of the global human population (ENVIS, 2009). In its pursuit to be a rich and developed nation, India is currently undergoing growth in agriculture, manufacturing, transport and urbanization sectors in synergy with a geometric rise in its human population and degradation of its natural habitat. This is a tricky situation for a developing country like India (CMF, 2009; CPCB, 2009). It is assumed that the population in India, at current rate of growth, may touch 1.35 billion by the year 2030. The Indian society is required to maintain the average Gross Domestic Product of 8% or above for the next 20 years in order to achieve some minimal standards of development for the projected population estimates. Electricity generation is the main progenitor for maintenance of such development standards. According to the Planning Commission of India (2006), there is a need to increase the current electricity generation of 128,000 MW to 800,000 MW by the year 2030. The major generation of electricity in India is presently made through thermal power plants, which use coal. It is more likely that coal will remain the main source of energy for electricity generation in the near future also. The coal combustion is already under intense international scrutiny from carbon footprint and global warming point of view.

The main hurdle in tackling the problem of environmental degradation in developing countries like India is not only the lack of scientific knowledge but also the will to act. Under such a scenario, the society needs to be educated about the importance of environment and sustainable development for ensuring a healthy and homeostatic environment for our future

generations. Environmental education in this context can play a significant role in sensitizing people about the rationale use of natural resources and hazards of environmental pollution. A high environmental awareness among the old and young people may motivate them to adopt such practices of living that are environmental friendly. It may include elimination of diseases, poverty and waste accumulation in conjunction with conservation of natural resources and biodiversity, recycling of wastes and use of alternate sources of energy. Such an eco-friendly psyche of people may cause a paradigm shift in their behaviour towards their immediate environment, which may reflect in their ways of utilization of natural resources, generation of wastes and its recycling, approach towards problems of environmental pollution and preservation of natural ecological resources. This in turn may harmonize environment with development.

1.2 CONCEPTUAL FRAMEWORK

Factual knowledge can be seen as a precondition of any attitude and, thus, the relationship between factual knowledge and behaviour is mediated by intention as well. Moreover, individual's values are also mediated by intention and therefore predict behaviour indirectly. Ecological behaviour may appear to be susceptible to a wide range of influences beyond one's control (Hines *et al.*, 1987). For example, our perception makes use of a material as resource or waste; cost of water affects water conservation; architecture of a home affects energy consumption; political measures promote or demote optimal usage of resources or/and minimal generation of wastes by the society. Thus, socio-cultural constraints may also determine which ecological behaviour is easier to carry out and which is harder. Awareness and attitude, therefore, may not be the only determinants of environmental behaviour. Attitude may be affected by direct experiences of natural beauty and local environmental problems, facilitating a better appreciation about the functioning of the nature and interdependence of its various components. The resulting

changed attitude may shape one's environmental behaviour based alone on empathy with and love for nature.

Global environmental problems of depleting natural resources, increasing pollution, urbanization and expanding population growth challenge the ways people live. The modern human life style is energy and waste intensive, resulting in over-exploitation of natural resources, degradation and modification of natural habitats and deterioration of environmental quality. These recent changes in the human life style have become the major precursors of new environmental problems throughout the world, especially in the metropolises. Environmental problems have traditionally been considered as technical and economic problems, while in the recent decades the social dimensions of environmental problems such as public attention and people's attitudes towards environment have became one of the areas of environmental sociology and environmental psychology. In this respect, environmental attitudes, awareness and behavior of individuals in particular and communities in general and their environmental consequences are becoming vitally important in solving the unique local, regional and global environmental problems during the last few decades. Environmental education can facilitate the age-old tradition of living in harmony with nature and adoption of environmentally friendly practices for sustainable development of the human society.

Psychology attempts to train human societies to be less exploitive in their use of natural resources (Kruse, 1995) and miser in generation of wastes. The degree of environmental awareness and attitude may determine an individual's ecological behaviour, i.e., human actions responsible for either environmental preservation or conservation or degradation (Axelrod and Lehman, 1993). A recent pioneering study has established environmental attitude as a powerful predictor of environmental behaviour (Kaiser *et al*., 1999). The three major components of environmental attitude, i.e., affect, knowledge and intention, may be used in prediction of environmental behaviour. There may be three orthogonal dimensions of

environmental behaviour: (1) environmental knowledge, (2) environmental values, and (3) ecological behavior intention. Environmental knowledge and environmental values shape ecological behavior intentions, which, in turn, may regulate general ecological behavior.

1.3 NEED AND IMPORTANCE

The emerging environmental problems like global warming, ozone holes and desertification are societal in nature and can be solved only by a collective action of society. Environmental educators are of the opinion that environmental endeavours should focus not only on awareness, but also on attitudes and skill development towards solving the environmental problems. The teachers as well as students should be exposed to higher levels of knowledge and practical implications of environmental issues. There are others who are convinced that environmental education in its present format has failed to suitably address fast emerging unique environmental problems by the modern societies, especially the urban ones. Since environmental education only educate people about environmental concepts and implications of their actions, it hardly empowers them to appreciate direct impact of local environmental problems on their life and the importance of a healthy environment for their sustenance.

The challenge today is to make these local, regional, national as well as global environmental issues more meaningful to learners by focusing on individual contributions to the problems and then to develop decision-making strategies for problem solving. The learners also need to understand the beauty of nature, and operation and interdependence of its various components. A better exposure to local environmental problems through direct experiences may improve learners' environmental behaviour. Such a healthy environmental behaviour can motivate people to use alternate sources of energy, convert wastes into resources, and conserve biodiversity. Therefore, it is vitally important to know the awareness and attitude of the learners at higher

secondary level towards their approach and perception of environment problems. A high level of awareness in combination with positive attitude and sound environmental behaviour among the students may facilitate rationale uses of resources and minimal generation of wastes by them, thereby saving extinction of life from our planet. The ingrained environmental behaviour can facilitate the sustained supply of vital ecosystem services, namely, provisioning (providing food, fiber, energy and medicine), regulating (maintaining quality of air, water and soil), and supporting (enhancing primary production, soil formation, nutrient and water cycling).

The perception of individuals and communities may determine their love for beauty of nature as well as concern about local environmental problems. This may change the attitude of the learners and motivate them to willfully act and change their behaviour for conservation and preservation of environmental quality. It, therefore, becomes necessary to study not only the level of awareness and attitude towards environment but also to see if there is any impact of these variables on environmental behaviour, since action is more important than the theoretical concept and knowledge alone. The emotional reaction to the changes taking place around someone may itself regulate the action through empathy and love. If any impact is observed in the research findings then it will be advisable to have guidance and counseling sessions so that the mother earth is saved from devastation in terms of environmental pollution.

1.4 OBJECTIVES

The following objectives have been formulated for the present study:

- To measure environmental awareness, attitude and behaviour among higher secondary students of Jabalpur city pursuing diversified disciplines.

- To compare environmental awareness, attitude and behaviour between students affiliated to Central and Madhya Pradesh Board of Secondary Education.
- To find gender differences among higher secondary students with respect to environmental awareness, attitude and behaviour.
- To elicit interrelationships among environmental awareness, attitude and behaviour of higher secondary students.

1.5 VARIABLES

The present research has the following three variables:

(i) Independent variables
- Environment awareness
- Environmental attitude

(ii) Dependent variable
- Environmental behaviour

(iii) Control variable
- Age of students

1.5.1 Environmental Awareness

Awareness is a relative concept and comprises of a human's perception and cognitive reaction to a condition or an event. We may be partially, subconsciously or acutely aware of an event. It provides the raw material from which we develop qualities or feelings or subjective ideas about our experiences. Environmental awareness may be defined as *to help the individuals and social groups to acquire a basic understanding of and sensitivity towards environment and its associated problems*. It provides understanding and competence to recognize resources and interdependence between physical and biological components of environment for growth and development.

According to the Belgrade International Workshop (1975), environmental awareness may provide power and understanding to:

(a) Recognize the interdependence among materials into physical environment, plant and animal life for survival, growth and development,

(b) Take decisions individually and collectively and initiate actions for social, cultural and economic survival, growth and development and for conservation of nature and natural resources,

(c) Identify human, material, space and time resources in the environment,

(d) Recognize ways of making effective use of environmental resources for social, economic and cultural survival, growth and development, and

(e) Take decisions for the effective use of resources, recognize special significance of conservation of natural resources and initiate or support community efforts for the purpose.

According to the United Nations Conference of Human Environment at Stockholm (1971), environmental awareness may be developed by:

(a) Identifying, analyzing and understanding the needs and problems of personal life including health, vocation, etc.,

(b) Social life at different levels, namely, family, caste, community, religion, town or village life, state and country, and

(c) National life including civic, economic, etc.

Environmental awareness may also be developed when:

(a) We appreciate, promote and use the environment to improve health, vocation and social and national life,

(b) We interact with government and social agencies and utilize the development facilities provided by these agencies in our individual capacity and also for organizing certain community activities, and

(c) We inculcate the aesthetic sense to appreciate beauty and adopt it in personal and social life.

(d) The stakeholders like family, society, teacher and education contribute in development of environmental awareness.

Man has started using chemicals in agriculture to get better yield enabling him to consume desirable types of food in abundance. This has resulted in soil depletion, erosion and pollution. The rapidly expanding human population demands more areas for agriculture and habitation, leading to wide-scale deforestation and loss of biodiversity. Modern life styles are sustained by high usage of energy for living, transportation and working, which is largely responsible for fast depletion of natural resources and environmental pollution. The continuous strive of the humans to improve their living standards may eventually reduce the habitability of the earth.

Social scientists including psychologists have become concerned about effects of environment on us. As toxic chemicals in air and water affect our physical health, adverse environmental characteristics can damage our mental and social health. Noise, crowding, building designs and community structure determine quality of our lives and day to day functioning. Men have radically altered physical and chemical characteristics of natural environment, disturbing its balance that has sustained the humankind in harmony with other animals and plants for millennia.

A recent paradigm shift in psychology is to develop an ecological perspective wherein the socio-cultural characteristics of groups and behaviour of individuals facilitate their adaptation to environment. Culture and behaviour are now being viewed as parts of a broader ecological system in which changes in one part of the system are usually accompanied by changes in the other. The impact of this emerging perspective on psychological thinking has led to consideration of both culture and behaviour of individuals in determining the

requirements of their ecology. For example, the origin and development of various competencies have been understood under this perspective. Many psychologists have indicated that the referents of competence vary considerably across societies, and that each society makes deliberate attempts to train infants, children and adolescents in order to enable them to fulfill their ecological and social obligations. Thus, the social and cultural psychologists have considered importance of ecological perspective on competence.

These abilities, however, have little functional value for agricultural population, who needs a different domain of competence. The socialization processes by its emphasis on compliance, obedience and responsibility in such a society are geared to achieve theses goals. The other ecological contexts may require other set of abilities for meeting their demands, and socio-cultural characteristics may develop in a way that permits the population to deal effectively with their ecological contexts.

These themes are being echoed in emerging field of environmental psychology (Proshansky *et al*., 1970; Stokols and Altman, 1987), ecological psychology (Barker, 1968, 1969), social ecology (Moos and Insel, 1974), and an ecological orientation to community mental health (Kelly, 1966, 1968). Environmental psychology, therefore, is a new branch of psychology that focuses on the relationship between the physical environment and human behaviour for their well being (Stokols and Altman, 1987). Social psychology may be considered as the multidisciplinary study of the impact that physical and social environments have on human beings. It is also concerned with the assessment and development of optimum human milieus (Moos and Insel, 1974). The main emphasis of this new emerging branch of psychology includes:

(a) A focus on adaptation, i.e. the capacity of organisms to cope, survive and grow within their environment,

(b) The interdependence of living and non-living elements that together defines an ecosystem,

(c) System change, i.e. some species prosper while others die or change as the system moves from one to another mode of organization, and

(d) A methodological emphasis on study of nature including psychological and social phenomena rather than laboratory research.

Environmental awareness may be affected by the following factors:

(i) Intelligence,

(ii) Maturity,

(iii) Sincerity,

(iv) Attitude,

(v) Values,

(vi) Participation in co-curricular activities,

(vii) Media of mass communication,

(viii) Literacy, and

(ix) Distance education

1.5.2 Environmental Attitude

An attitude has a well defined object of reference. For example, one's views regarding a profession, sport or music are attitudes. The degree or strength of a person's attitude may vary from extremely positive through a gradation to extremely negative (Freeman, 1968). Attitude comes from judgements. It develops in the ABC model, i.e. affect, behavioural change and cognition. The affective response is a physiological response that expresses an individual's preference for an entity. The behavioural intention is a verbal indication of the intention of the individual. The cognitive response is a cognitive evaluation of the entity to form intention of an individual.

Most attitudes are a result of observational learning from their environment. The link between attitude and behaviour

exists but depends on human behaviour, some of which are irrational. Unlike personality, attitudes are expected to change as a function of experience. Attitudes can be changed through persuasion. The celebrated work of Carl Hovland, at Yale University in the 1950's and 1960's, helped to advance knowledge of persuasion. In Hovland's view, we should understand attitude change as a response to communication. He and his colleagues did experimental research into the factors that can affect the persuasiveness of a message:

(a) **Target characteristics:** These are characteristics that refer to the person who receives and processes a message. One such trait is intelligence – it seems that more intelligent people are less easily persuaded by one-sided messages. Another variable that has been studied in this category is self-esteem. Although it is sometimes thought that those higher in self-esteem are less easily persuaded, there is some evidence that the relationship between self-esteem and persuasibility is actually curvilinear, with people of moderate self-esteem being more easily persuaded than both those of high and low self-esteem levels. The mind frame and mood of the target also plays a role in this process.

(b) **Source characteristics:** The major source characteristics are expertise, trustworthiness and interpersonal attraction or attractiveness. The credibility of a perceived message has been found to be a key variable here. For example, if one reads a report about health from a professional medical journal, he may be more easily persuaded than the other who believes it is from a popular newspaper.

(c) **Message characteristics:** The nature of the message plays a role in persuasion. Sometimes, presenting both sides of a story is useful to help change attitudes.

(d) **Cognitive routes:** A message can appeal to an individual's cognitive evaluation to help change an attitude. In the *central route* to persuasion, the individual is presented with the data and motivated to evaluate the data and arrive at an attitude changing conclusion. In the *peripheral route* to attitude change, the individual is encouraged not to look at the content but at the source. This is commonly seen in modern advertisements that feature celebrities. In some cases, physician, doctors or experts are used. In other cases film stars are used for their attractiveness/stimulus value.

The following procedures may help in development of environmental attitude:

(i) Personality of teacher,

(ii) Proper teaching methods,

(iii) Satisfaction of pupil's curiosity through appropriate techniques,

(iv) Use of literature related to environment,

(v) Spread of environmental awareness among young students, and

(vi) Facilitation of environmental education through nature visits, exhibition of posters, organization of festivals, etc.

Environmental attitude may be affected by the following factors:

(i) Mass communication,

(ii) Personal contacts,

(iii) Schooling,

(iv) Personal experience,

(v) Culture, and

(vi) Personality and attitude change

Young people's environmental attitudes are particularly important because they will ultimately be affected by and will

need to provide solutions to environmental problems arising from present-day actions. As future scientists, policymakers, consumers, and voters, today's youth will be responsible for "fixing" the environment, and they will be the ones who must be persuaded to adopt and pay the costs of future environmental policies. Therefore, it appears that effective environmental education for school age students is crucial. In general, young people's attitudes toward the environment begin to develop at a very early age. By the time they reach adolescence, many have acquired some level of environmental understanding of issues such as ecology, technology and economics, and can formulate their own views on how each influence environmental concerns and policy. It may be safely assumed that increased knowledge about the environment promotes positive attitudes. The researches indicate that higher secondary students exposed to environmental courses demonstrate a highly responsible environmental behaviour and a better awareness of environmental issues.

It is assumed by some that increased knowledge about the environment promotes positive attitudes (Arcury, 2000). Some researchers have reported that higher secondary students exposed to environmental courses demonstrated an increase in responsible environmental behaviour and an increased awareness of environmental issues. There are others who find that formal mode of environment education may not properly shape environmental attitude of young as well as adults, which needs to supplemented by knowledge about the local environment and its problems. Empathy towards the nature and love for its beauty may change one's environmental attitude and subsequently their environmental behaviour.

1.5.3 Environmental Behaviour

Behaviour refers to the actions or reactions of an object or organism in relation to the environment. It can be conscious or unconscious, overt or covert, and voluntary or involuntary action. Humans evaluate the acceptability of behaviour using

social norms and regulate behaviour by means of social control. In sociology, behaviour is considered as having no meaning, being not directed at other people and thus is the most basic human action. Behaviour is something we ourselves do and something we experience from others. Behaviour that we term as "*conduct*" denotes a broad range of activity under the guidance of social-moral norms. Behaviour that we term as "*performance*" denotes a range of activity governed by skill repertoires. Behaviour that we sometimes term as "*experience*" refers to actions and choices of action that maximize comfort or pleasure and minimize discomfort or pain. Finally, there is no particular other term for the very broad range of actions that fall under the heading of purposive or goal-driven, behaviour that appears dictated by a sense of who we are and what we want to become.

Hungerford and Volk (1990) have proposed changing learner behaviour through environmental education. Based on their model, there are three corresponding categories of variables that contribute to behaviour. These categories are (i) entry level, (ii) ownership and (iii) empowerment variables. Entry-level variables are prerequisite variables or at least variables that will strengthen the decision-making. Ownership variables are environmental issues that are important at a personal level. These variables appear to be critical to responsible environmental behaviour. The two major variables in this category are in-depth knowledge of the issues and personal investment. Empowerment variables strengthen the sense that we can change and are able to solve environmental problems to make a better world. Knowledge and skill in using environmental action strategies is the best predictor of pro-environmental behaviour because it brings self-confidence to help resolve environmental problems.

Environmental behaviour determines our actions towards environmental conservation or preservation, or how we can change our behaviour towards a more eco-friendly direction. Consequently, environmental knowledge and

attitude have been frequently evaluated when attempting to determine the effects of outdoor education programs on the development of environmental responsibility. Programs most likely to change behaviour involve concrete, environmentally positive, action-oriented experiences, a relevant content and long-term involvement support follow-up and reinforcement by role models. Kaiser *et al.* (1999) in their pioneering study established environmental attitude as a powerful predictor of ecological behaviour. They confirmed three measures as orthogonal dimensions by means of factor analysis: (i) environmental knowledge, (ii) environmental values, and (iii) ecological behaviour intention. Environmental knowledge and environmental values explained 40% of the variance of ecological behaviour intentions, which, in turn, predicted 75% of the variance of general ecological behaviour.

Generally, two types of environmental attitude are used to predict environmental behaviour: (1) attitudes towards the environment, and (2) attitude towards environmental behaviour (Hines *et al.*, 1987). Either the object of one's attitude is the natural environment itself or some aspects of it (e.g. air pollution) or the attitude object is environmental behaviour (e.g. plantation or social activism like "Chipko Andolan"). Only minorities of studies that relate environmental attitude with environmental behaviour refer to framework of the theory reasoned action (Ajzen and Fishbein, 1980) and its developed version, the theory of planned behaviour (Ajzen, 1985). In contrast, attitude towards the environment commonly refers to environmental concern (Vining and Ebreo, 1992).

Human behaviour is affected by the following factors:

(i) **Attitude –** It is the degree to which the person has a favourable or unfavourable evaluation of the behaviour in question,

(ii) **Social Norms –** This is the influence of social pressure that is perceived by the individual (normative beliefs) to perform or not perform certain behaviour, and

(iii) **Perceived Behavioural Control** – This construct is defined as the individual's belief concerning how easy or difficult performing the behaviour will be.

Human behaviour may be affected by environment stress through following factors (Baron and Byrne, 1995):

(i) Loud and unpredictable noise,

(ii) Extremely high and low temperatures,

(iii) Air Pollution, and

(iv) Catastrophes and Disasters

Human behaviour is also influenced by culture, attitude, emotions, values, ethics, authority, rapport, hypnosis, persuasion, coercion and/or genetics. The behaviour of people (and other organisms or even mechanisms) falls within a range with some behaviour being common, some unusual, some acceptable, and some unacceptable.

Environmental behaviour can be improved by the following factors:

- **Education prompt** – improves environmental knowledge and subsequently the environmental attitude. The latter is expected to encourage environmental behaviour.
- **Approach prompt** – stresses upon positive messages like "*keep your city clean*", "*grow more plants*", etc.
- **Avoidance prompt** – prohibits people for performing a particular behaviour like "*you will be fined for throwing garbage or spitting on roads*".

There are growing evidences that high environmental awareness in synergy with a positive environmental attitude may not be sufficient for getting the desired environmental behaviour in solving local environmental problems and sustaining environmental quality. The current system of environmental education helps students to be fully acquainted with their environment and implications of their actions (Saxena, 1986; Sarabhai *et al*., 2002; Trivedi, 2004; Sharma, 2006; Shrivastava, 2007) The better educated students may

be full of information but may lack experience required for their environmentally sound behaviour, because they may still be significantly less aware and concerned about their local environmental problems. Direct experience may help students to develop empathy with and love for the nature. Such experiences can make them truly appreciative of the interdependence among different components of environment. This change in attitude may in turn lead to environmental behaviour that nurtures and preserves the delicate natural balance of our environment. For inculcating an environment-friendly behaviour, it is, therefore, important that environment education should not only be formal (i.e. indoor activities) but also be informal (i.e. outdoor activities).

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Chapter 2

THEMATIC REVIEW OF LITERATURE AND HYPOTHESIS

2.1 PREVIOUS RESEARCHES

Research takes advantage of the past knowledge on the subject that has accumulated as result of constant human endeavours, helping a researcher to identify and develop a research problem. The researcher also expands his knowledge background, examines new findings in his field, identifies gaps in knowledge, and discovers contradictions in findings and need for fresh studies and its directions.

The selected important recent researches consulted by the researcher on different aspects of the research topic are being summarized below:

2.1.1 Environmental Awareness

Choubey (1998) studied levels of environmental awareness among the trainees studying in Government Pre-primary Training Institute, Jabalpur for construction of

syllabus for environmental education. The main objectives of her study were to (a) study awareness towards environment and environmental approach among the trainees and in-service teachers of Governmental pre-primary Training Institute, and (b) compare urban and rural trainees with respect to environmental awareness. The sample consisted of 100 persons, comprising of 80 trainees and 10 in-service teachers from the Institute and another 10 in-service teachers from other schools. A self-made Environmental Awareness Scale was used in the study that contained 50 questions, each having four answers. The researcher reported that a majority of the trainees and the in-service teachers have a clear understanding of general environmental concepts including pollution. The awareness about health and environment was higher among the trainees (74%) than the in-service teachers (65%). There were no significant differences in environmental awareness between the trainees and in-service teachers.

Soni (2004) studied environmental awareness and values among the students studying in higher secondary schools of Jabalpur city. The main objectives of the study were to (a) assess environmental awareness among the students studying in the school, (b) create awareness about environmental conservation among the students, and develop a sensitive and emotional outlook among the students towards environment. The sample consisted of 150 students studying in 10 higher secondary schools at Jabalpur. A self-made Environmental Awareness Questionnaire consisting of 50 questions and the standardized and validated Environmental Values Test comprising of 25 questions were used. Majority of the students had high to very high levels of environmental awareness as well as environmental values, which was not different between boys and girls.

Duroy (2005) studied the important determinants of environmental awareness among multilingual societies of 40 different countries. The main objectives of the research were to (a) assess the factors that influence people's level of awareness regarding environmental quality, and (b) enumerate role

of economic affluence into perspective in a model of the determinants of environmental values. The sample consisted of the results of the World Values Survey (1995-1997) on 40 countries addressing environmental issues in one of its section. The three variables of environmental awareness were created – positive environmental attitudes, willingness to pay to protect environment, and human-environment relationship – and then regressed against a set of economic, demographic, political, psychological, and education variables. A factor analysis, using principal component analysis, was subsequently conducted to determine the pattern of correlation between variables. The major findings of this research were (a) the economic affluence (indicated by GDP per capita) had, at best, a marginal direct influence on environmental awareness, (b) the degree of urbanization, the level of subjective well being and the level of income inequality had direct effects on environmental awareness. The research concluded that the actual individual commitment to protect the environment is a function of the level of education, the degree of subjective well being, and to a lesser extent the level of population pressure.

Kumari *et al*. (2006) studied environmental awareness and attitude and intentional ecological behaviour among higher secondary students of Gorakhpur. The main objective was to determine adolescent's environmental awareness. The sample consisted of 50 male and 50 female students of 11^{th} and 12^{th} standards from 4 schools of Gorakhpur City (U.P.). Environmental awareness was measured by using a standard test "Environmental Awareness Ability Measure" by Praveen Kumar Jha. Environmental attitude was measured by using a standard test "Environmental Attitude Scale" by N.N. Srivastava and Shashi Prabha Dubey. The researchers developed their own checklist for measuring intentional ecological behaviour. Most of the boys (66%) and girls (72%) were highly aware of harmful effects of environmental pollution and positive effects of environmental conservation. There was no significant relationship of environmental awareness with both environmental attitude and intentional ecological behaviour.

Verma and Singhal (2008) studied environmental awareness among the +2 students of Jabalpur. The main objectives of the research were to assess the level of environmental awareness among the boys and girls, and study the impact of environmental awareness of students on their environmental ethics and behaviour. The sample consisted of 197 students of standard XI chosen randomly from 6 schools of Jabalpur city in Madhya Pradesh. Environmental awareness was measured by using a standard test "Environmental Awareness Ability Measure" by Praveen Kumar Jha. The female students exhibited relatively higher environmental awareness than male students, especially in areas of emerging environmental issues. Environmental awareness had an impact on environmental ethics and behaviour of students. The research concluded that the present structure of environmental education facilitates a higher environmental awareness among the students and their better environmental behaviour towards problems of air, vehicular and water pollution but not towards the emerging environmental problems like global warming, urban pollution, etc.

Ushadevi and Dhanya (2009) studied student–teachers' environmental awareness and attitude towards local environmental issues in Kerala. The main objectives were to test for the effect of environmental awareness on attitude towards local environmental issues and for differences if any, among student – teachers at secondary level based on gender, locale of residence and subject of specialization. The sample consisted of 814 student–teachers at secondary level selected by stratified sampling from teacher education colleges of Palakkad district in Kerala, giving due representation to gender, locale of residence and subject of specialization. They have developed their own tools for the research. The results showed that student–teachers with high level of environmental awareness have more favourable attitude towards local environmental issues. Environmental awareness did not differ between genders, but the differences in subject of specialization were significant. Environmental

awareness also differed significantly according to locale of residence. The research concluded that the high awareness and its significant effect on attitude of student–teachers towards local environmental issues point out to the urgency in strengthening environmental awareness among student–teachers. Since there is significant difference in environmental awareness between language and arts and science group, the latter having higher average scores, more opportunities should be provided to language and arts group to participate in environmental related activities.

Ziadat (2010) studied major factors contributing to environmental awareness among people in Jordan. The main objective was to determine major factors that contribute to environmental awareness among people in a third world country such as Jordan. The sample consisted of randomly chosen 2000 individuals from five major cities including 59 villages in the southern part of Jordan, including age, gender, education levels, location of residency, and social status. The questionnaire used in the research consisted of 30 questions. The environmental awareness of female individuals exceeded significantly than that of males in each of individual cities and villages. The awareness also differed from one region to another as well as according to educational level of the individuals. Environmental awareness among the university students increased linearly as they progressed from first year to fifth year. The age of individual also affected his/her environmental awareness, with the older individuals recording more consistent responses and high awareness scores. The research concluded that individual commitment of the population to improve their environment in a third world country like Jordan appears to lag behind as compared to that of their counterparts in the developed countries. This is due to the fact that people in the developing countries have other important priorities in their daily chores to deem than environment, which includes the financial daily basic needs for the family.

These researches denote that people in general have high levels of environmental awareness, where female individuals across all ages record higher levels than male ones. The subject of specialization has a direct impact on the level of environmental awareness of individuals with those in the science recording higher levels than those in the arts and language streams. Environmental awareness also differs significantly according to the locale of residence and level of affluence. The inclusion of environmental education at the primary level has definitely helped the adolescents as well as adults to be well aware of local, national and global environmental problems, but there seems to be gaps related to recently emerging environmental problems like global warming, urbanization and habitat degradation. There are conflicting results on the relationship of environmental awareness with environmental attitude and behaviour. Most of the researches fail to establish a clear relationship of environmental awareness with behaviour or attitude of individuals, highlighting exigency of further researches on these aspects.

2.1.2 Environmental Attitude

Kuribayashi and Aoyagi-Usui (1998) compared environmental attitude and behaviour among people in Japan and Thailand. The main objective was to compare approach of people towards their environment sharing Buddhist traditions and being located in East Asia. The sample consisted of 242 Bangkok residents aged 20-49 and 2,178 people throughout Japan aged 16 and above. The respondents were asked about the most serious environmental problem based on 16 categories of environmental issues at the local, national, and global level. Among the Thai respondents, the top three responses at the local as well as national levels were air pollution, desertification and deforestation, and at the global level global warming, nuclear energy/ toxic waste and air pollution. Among the Japanese respondents, the top three responses at the local and national levels were household garbage, air and water pollution and deforestation, and at

the global level global warming, ozone hole and air pollution. These results indicate that Thailand shares with Japan about their concerns for air pollution as a local, national and global problem, deforestation as a national problem and global warming as global problems. The research concluded that Thai residents were more closely aligned with Americans rather than Japanese values and attitudes towards their environment.

Kaiser *et al.* (1999) studied environmental attitude and ecological behaviour of people in Switzerland. The main objectives of the study were to work out relationship between environmental attitude and ecological behaviour, and to see as to whether environmental attitude can be a predictor of ecological behaviour. The sample consisted of only German speaking subgroup comprising of 543 participants from an initial pool of 3,000 members from each of two Swiss transportation associations. A questionnaire comprising of 28 items was used to establish three environmental attitude scales, namely, environmental knowledge, environmental values and ecological behaviour intention. A 5-point Likert scale that ranged from totally agree (1) to totally disagree (5) was the response format used. A principal-factor analysis was performed to confirm the three factor structure. Forty percent of the variance of environmental behaviour intention could be explained by environmental knowledge and values. These two indicators of environmental behaviour intention themselves correlated considerably with one another (r = 0.87). Seventy-five percent of the variance of general ecological behaviour could be explained by one single indicator, ecological behaviour intention ($\beta = 0.87$). The research supported all the three propositions of environmental attitude, namely, (i) an abbreviated version of the theory of planned behaviour should be used as the theoretical framework; (ii) environmental attitude concepts and ecological behaviour should be measured rather generally; and (iii) any ecological behaviour measurement approach should assess one's ecological behaviour by means of behaviour difficulties.

Francis (2001) studied attitude towards environmental hazards in education. The main objectives were to investigate attitude of standard XI students and their teachers towards environmental hazards to education, and to compare attitude of different groups of students and teachers. The sample consisted of 300 standard XI students and 240 higher secondary teachers from 25 urban, rural and tribal schools in Raipur Division. The researcher constructed an Environmental Hazards Attitude Scale based on surroundings of the institution, physical facilities, television, crowded classes, politics and political power, and methods of teaching. Majority of students (79%) and teachers (81%) had negative attitudes towards environmental hazards affecting educational development. Cultural affinity played a significant role in attitude formation and change towards environmental hazards affecting education. The urban students and teachers had better attitude than their rural and tribal counterparts. The attitude of rural students and teachers was more favourable than tribal ones. The research concluded that sex had no impact independently or jointly with locale and the attitude of students and teachers about different hazards, whereas locale has functioned significantly for each hazard.

Kumari *et al*. (2006) studied environmental awareness, attitude and intentional ecological behaviour among higher secondary students of Gorakhpur city. The main objective was to determine adolescent's environmental attitude. A small fraction of boys (44%) and girls (36%) had favourable attitude, while 16% each of boys and girls recorded unfavourable attitude towards environment. Environment attitude had a significant relationship with intentional ecological behaviour.

Al-Rabaani and Al-Mekhlafi (2008) studied attitudes of the university students towards some environmental problems in Muscat. The main objectives of the research were to answer such question as (i) what are the attitudes of university students towards some environmental problems?, (ii) is their attitude a function of gender or college?, and (iii) is there a

relation between environmental attitude of students and their willingness to reduce environmental problems? The sample consisted of 317 final year students selected from colleges of art, agriculture, education, medicine and science at the Sultan Qaboos University, Muscat, Sultanate of Oman. The main instrument used in the study was a self-made questionnaire. The results showed that the students hold positive attitudes towards environmental issues. The women students were more positive than men. The students' attitudes towards environmental problems was not influenced by different schools, except for those studying in the Faculty of Energy who showed significantly more positive environmental attitude than those studying in other faculties. The researchers concluded that a positive environmental attitude facilitated their willingness in reduction of environmental problems. They suggested that more efforts are needed to raise students' awareness of the importance of their individual and community roles in tackling environmental problems.

Wray-Lake *et al.* (2008) studied trends in adolescent environment attitude, beliefs and behaviour across three decades in the United States of America. The main objective of the research was to present a descriptive analysis of trends in environmental attitude, beliefs and behaviour of high school seniors from 1976 to 2005. The data was used from the Monitoring the Future, a national survey of high school seniors conducted annually since 1976 in the United States of America. Six different forms of the survey, each with somewhat different content, were administered each year. The environmental concerns of adolescents across a range of indicators showed increments during the early 1990s and declines across the remainder of the three decades. Declining trends in the sense of personal responsibility for the environment, conservation behaviour, and belief that resources are scarce were particularly noteworthy. Across all years, youth tended to assign responsibility for the environment to the government and consumers rather than accepting personal

responsibility. The research concluded that the recent declines in environmental concerns of youth signaled the need for a renewed focus on young people's views and called for better environmental education and governmental leadership.

Ushadevi and Dhanya (2009) studied student–teachers' environmental awareness and attitude towards local environmental issues. The main objectives were to test for the effect of environmental awareness on attitude towards local environmental issues and for differences if any, among student – teachers at secondary level based on gender, locale of residence and subject of specialization. The student-teachers with high, average and low environmental awareness differed significantly in their attitude towards local environmental issues. The research found no significant differences in environmental attitude between genders and between urban and rural subjects, but those belonging to language and arts group differed significantly from those of science group. The research concluded that more opportunities should be provided to the people pursuing arts and language streams to participate in environment related activities. The prospective teachers must be oriented every year to carry out case studies on environmental issues of local significance.

These researches reveal that environmental attitude of individuals across all ages, assessed by using a large variety of tools, varies from average to favourable. The women have more positive attitude towards environment than men. The perception of individuals about either national or global environmental problems differs according to locale of residence and degree of affluence. The urban residents show more favourable attitude than rural residents, and the latter being better attitude than tribal. Across all years, youth tend to assign responsibility for the environment to the government and consumers rather than accepting personal responsibility. The researches, however, fail to establish a clearly defined relationship of environmental attitude with environmental behaviour, denoting the need of further researches.

2.1.3 Environmental Behaviour

Kaiser *et al.* (1999) studied environmental attitude and ecological behaviour of people in Switzerland. The main objectives of the study were to work out relationship between environmental attitude and ecological behaviour, and to see as to whether environmental attitude can be a predictor of ecological behaviour. The major tools were the questionnaires consisting of a Social Desirability Scale and a General Ecological Behaviour Measure. All four measures of interest, namely, environmental knowledge, values, behaviour intention and general ecological behaviour, were either correlated non-significantly ($p > 0.05$) or only marginally. Forty percent of the variance of environmental behaviour intention could be explained by environmental knowledge and values. These two indicators of environmental behaviour intention themselves correlated considerably with one another ($r = 0.87$). Seventy-five percent of the variance of general ecological behaviour could be explained by one single indicator, ecological behaviour intention ($\beta = 0.87$). The research concluded that environmental knowledge and values were significant preconditions of ecological behaviour intention. Ecological behaviour intention predicted ecological behaviour remarkably well. Environmental attitude was a powerful predictor of ecological behaviour.

Clark *et al.* (2003) examined internal and external Influences on pro-environmental behaviour with respect to participation in a Green Electricity Program. The main objective was to identify key internal and external variables those explain an actual instance of pro-environmental behaviour by integration of elements from psychology and economics. The sample consisted of a mail survey of 281 participants and 619 non-participants in Detroit Edison's Solar Currents Program in the state of Michigan, U.S.A. A nine-item Altruism Scale (Schwartz, 1970, 1977) and a ten-item modified New Ecological Paradigm (NEP) Scale (Dunlap *et al.*, 2000) were used in the research. The respondents tended to have pro-altruistic

attitudes with respect to most items. Both participants and non-participants demonstrated reasonably strong pro-environmental and altruistic attitudes. Estimated coefficients on NEP and the Altruism Scale were statistically significant. The positive signs on both attitudinal variables indicated that stronger pro-environmental and altruistic attitudes led to higher probabilities of participating in the green electricity program. Over 90% of the participants responded "yes" to the reason that solar energy is an environmentally sound way to generate electricity. Over 76% of the participants believed that their support of the program might reduce the costs of solar energy in future. Altruism and environmentalism appeared to be the internal variables and size of the family and income of the household appeared to be the external variables affecting the pro-environmental behaviour. The research concluded that a bio-centric motive ranked first, an altruistic motive ranked second and an egoistic motive ranked third.

Tonglet *et al.* (2004) studied pro-environmental behaviour of householders in the United Kingdom. The main objective was to determine drivers for householder pro-environmental behaviour. The research was conducted in three stages on 258 households in Brixworth, Northampton shire, United Kingdom. The questionnaire used in the research was based on the recycling and waste minimization literature, previous applications of the Theory of Planned Behaviour, and information received from the elicitation interviews of respondents. The overwhelming majority (>95%) of respondents were committed recyclers of wastes. The recycling attitudes were influenced firstly, by having the appropriate opportunities, facilities and knowledge to recycle, and secondly, by not being deterred by the issues of time, space and inconvenience in recycling. These attitudes were the major determinant of recycling behaviour. The other significant predictors of recycling behaviour were the previous recycling experiences and community concerns. The research provided support for the proposition that recycling,

waste minimization through point of purchase and repair or re-use represent different dimensions of waste management behaviour, and thus will require different strategies and messages.

Duroy (2005) studied the determinants of environmental awareness and behaviour. The main objectives were to assess the factors that influence people's level of awareness regarding environmental quality, enumerate the factors that affect people's actual involvement in the protection of environment, and put the role of economic affluence into perspective in a model of the determinants of environmental values. The sample consisted of the results of the World Values Survey (1995-1997) on 40 countries addressing environmental issues in one of its section. The dependent variables were regressed against a set of economic, demographic, political, psychological, and education variables. A factor analysis, using principal component analysis, was subsequently conducted to determine the pattern of correlation between variables. The positive environmental attitudes had significant positive relationship with happiness and education, and a marginal positive correlation with population density. The willingness to pay to protect the environment had significant positive relationship with urban population and happiness, and a marginal negative correlation with GDP per capita. Human-Environment relationship had significant positive relationship with urban population and negative with income equality, and a marginal positive correlation with GDP per capita. The research concluded that the actual individual commitment to protect the environment is a function of the level of education, the degree of subjective well being, and to a lesser extent the level of population pressure.

Kumari *et al.* (2006) studied environmental awareness, attitude and behaviour among adolescents. The main objective of the research was to find out relationship of intentional ecological behaviour with environmental awareness and attitude. Majority of students showed positive intentional

ecological behaviour. There was no significant relationship between environmental awareness and intentional ecological behaviour, but environmental attitude had a significant relationship with intentional ecological behaviour.

Onder (2006) studied environmental awareness and behaviour among students of Selcuk University in Turkey. The main objective was to analyze and understand the behaviour characteristics of students about the solutions to environmental issues. The sample consisted of 375 students studying under 12 faculties in Selcuk University, Konya, Turkey, based on goal-oriented sampling method. The questionnaire comprised of 18 questions distributed under 3 main parts. The students rated global warming (27.7%) as the most important global environmental problem, and depletion of natural resources (25.3%) as the most important national problem. Most of the students showed positive environmental behaviour and their willingness to find out solutions, but only 8.5% of the students regularly followed environmental publications and 7.7% hold membership to an environmental organization. The researcher concluded that an integrated approach involving social, political, economic and environmental values was required to develop responsibility and respect for the environment.

Kalantari *et al.* (2007) studied factors affecting environmental behaviour of urban residents in Tehran City, Iran. The main objectives were to find out some individual and social factors affecting environmental behaviour, and to identify relationships among personal factors, environmental attitudes and environmental behaviour. The sample consisted 1200 Tehran's residents aging over 16 years old. A questionnaire, after ensuring its reliability, was used for data collection and the survey worked out through face-to-face interview at local parks. There was a significant difference between men and women attitudes regarding environmental legislation and their behaviour towards environment. The environmental behaviour of the residents was different with respect to their occupation and income, but was not so with respect to their

place of residence and education. Environmental behaviour had a significant correlation with environmental legislation, preparedness to act and income. The researchers concluded that education and improving problem-based knowledge of Tehran residents could change their environmental attitude and increase their feeling of stress towards environment. These changes in turn improve their preparedness to act friendly with the environment, particularly with the help of environmental legislation.

Lucas *et al.* (2008) analyzed the implications of existing evidence and policy in promotion of pro-environmental behaviour among people. The study looked at fourteen policies and incentive schemes in the United Kingdom aimed at promoting pro-environmental behaviour. The policies were evaluated in terms of changing long-term behaviour, achieving objectives and producing a clear benefit for the environment. They were also assessed for unintended consequences, such as conflict with other policies, impact on international competitiveness, availability of monitoring data and suitability for the most vulnerable sectors of society. Lack of appropriate data to evaluate policies was a significant finding, particularly among schemes in the voluntary sectors. Better data-recording should therefore be part of future policies. The study provided seven key recommendations: (i) target audiences are more likely to adapt in line with a policy when they have been involved in its development, (ii) policies need to pull in the same direction and convey a consistent message to appear legitimate to their target audience, (iii) organizations need to have the relevant skills, resources and capacities to take on additional duties resulting from new policy initiatives, (iv) policies are more effective when responsibility for delivery is given to locally accountable bodies, (v) policies are most effective when they simultaneously tackle several aspects of behaviour at multiple levels, (vi) effective policies must be context specific, while recognizing the bigger picture, and (vii) it is important to lead by example.

Altruism and environmentalism appear to be the important variables that independently influence pro-environmental behaviour. Environmental knowledge and values are significant preconditions of ecological behaviour intention, which can predict ecological behaviour remarkably well. Environmental attitude may be a powerful predictor of ecological behaviour. The actual individual commitment to protect the environment is a function of the level of education, the degree of subjective well being, and to a lesser extent the level of population pressure. Enhanced education and problem-solving knowledge can improve environmental attitude that in turn improves one's environmental behaviour. Interesting facts emerging out of these researches are that there is no direct relationship of environmental awareness with environmental behaviour, individuals have firm beliefs that improvement and sustainability of environment is a government's responsibility, and direct involvement of people in environment monitoring, waste minimization and waste recycling programs may improve their commitment towards remediation of environmental problems. Environmental behaviour is a complex process that seems to be related to environmental attitude but not to environmental awareness. This requires further researches to assess the environmental awareness and attitude as dependent variables in controlling the environmental behaviour.

The literature indicates that environmental attitudes and situational and psychological variables may be important predictors of environmental behaviour. The Theory of Planned Behaviour provides the needed theoretical framework for systematic investigation of the factors influencing behavioural choices of individuals. This theory hypothesizes that the immediate determinants of behaviour is the intention of individuals to perform or not to perform that behaviour, and the environmental behaviour may be a function of reasoned action (Ajzen, 1991; Fig. 2.1).

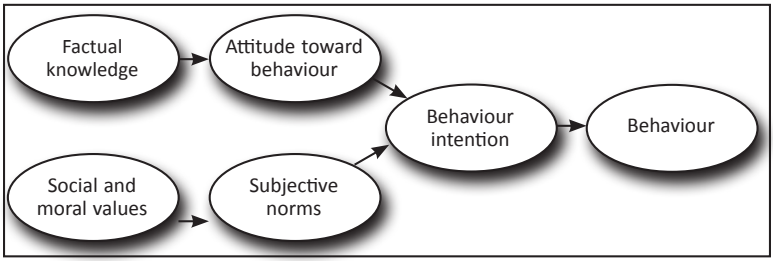

Fig. 2.1: Theory of reasoned action adapted from Ajzen (1991).

However, the individual's behaviour intentions may be influenced by the following three factors:

(i) Attitude, the individual's favourable or unfavourable evaluation of performing the behaviour,

(ii) The subjective norm, the individual's perception of social pressure to perform or not to perform the behaviour, and

(iii) Perceived control, the individual's perception of their ability to perform the behaviour.

There are researches that establish a significant relationship between environmental awareness and behaviour, but most others have failed to find such a relation between the two variables. Majority of the researches, however, find a direct relationship between environmental attitude and behaviour, and suggest environmental attitude as a strong determinant of environmental behaviour. Environmental knowledge seems to regulate environmental awareness, attitude as well as behaviour of individuals across societies, age classes and genders. This is, therefore, perplexing that environmental awareness is not related to environmental behaviour, but environmental attitude is related to environmental behaviour. Another important question is why female individuals should differ from their male counterparts in their environmental awareness, attitude as well as behaviour. Finally, why should subject of specialization or stream of subjects have impacts on the environmental awareness, attitude and behaviour of students across primary, secondary and higher levels

of education? In order to find answers to these relevant questions, the present research has been planned to test the pertinent hypotheses.

2.2 HYPOTHESIS

It may consist of either a suggested explanation for a phenomenon or a reasoned proposal suggesting a possible correlation between multiple phenomena. A hypothesis refers to a provisional idea whose merit needs evaluation, requiring a researcher to do necessary research in order to either confirm or disapprove it. A confirmed hypothesis in due course may become part of a theory or may itself become a theory.

The proposed research work has been planned to test the following hypotheses:

(a) There are no differences in environmental awareness, attitude and behaviour of students between Central and M.P. Board of Secondary Education.

(b) There are no differences in environmental awareness, attitude and behaviour of students belonging to humanities, commerce, science with biology and science with mathematics disciplines.

(c) There are no differences between male and female students in their environmental awareness, attitude and behaviour.

(d) There are no relationships among environmental awareness, attitude and behaviour of students.

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Chapter 3

RESEARCH PLAN AND PROCEDURE

3.1. RESEARCH PLAN

3.1.1 The present study was performed on the standard XI students studying in the higher secondary schools at Jabalpur city, Jabalpur district, Madhya Pradesh.

3.1.2 The randomly selected schools were segregated on the basis of their affiliation to Central Board of Secondary Education, New Delhi (CBSE) and Madhya Pradesh Board of Secondary Education, Bhopal (MPBSE).

3.1.3 The students from each school were randomly selected on the basis of gender, and discipline of study, namely commerce, humanities, science with biology, and science with mathematics.

3.1.4 Each student was tested for his/her level of environmental awareness, attitude and behaviour with the help of standard tests.

3.1.5 The collected data was used to test the hypotheses of the research by standard statistical methods.

3.2. TOOLS

The present research has used questionnaire-based tools, namely,

(i) Environmental Awareness Ability Measure by P.K. Jha,

(ii) Environmental Attitude Scale by N.N. Shrivastava and S.P. Dubey, and

(iii) Environmental Behaviour Scale developed by the researcher.

3.2.1 Environment Awareness Ability Measure

This test was devised by Praveen Kumar Jha to measure levels of environmental awareness of the respondents based on the following dimensions of environment:

(a) Causes of pollution,

(b) Conservation of air, forest, soil, etc.,

(c) Energy Conservation,

(d) Conservation of human health, and

(e) Conservation of wild life and animal husbandry

Seventy-one statements, based on the above five dimensions, were prepared. They were subjected to expert judgement. On the basis of expert opinion, 10 items were reframed and 20 were deleted. A list of 51 items was finalized, which included 43 positively worded and 8 negatively worded items. The standardization of the test was done on students randomly selected from High Schools and Inter Colleges of Saharsa town of Bihar. Their responses were scored by using Agree/Disagree categories. A numerical weightage of **1 (one)** each was assigned to the response categories of **agree** in case of **positive items** and **disagree** in the case of **negative items**.

Three indices of reliability were determined. Split-half reliability was found 0.61. The reliability by K-R method was found 0.84. Two test-retest reliabilities were determined, the first after an interval of three months and the second after six

month. The test-retest reliabilities were found 0.74 and 0.71, respectively.

The validity of the Environment Awareness Ability Measure was determined by computing correlation between the scores of the present scale and Environment Awareness Scale of Taranji. The coefficient of correlation was found 0.83. The Scale also possesses face and content validity since experts judged each item.

Norms of the Measure have been prepared and are as follows:

Awareness level	*Range of scores*
High	37 – 51
Average	16 – 36
Low	0 – 15

3.2.2 Environmental Attitude Scale

This scale was devised by N.N. Shrivastava and Shashi Prabha Dubey to determine environmental attitude of students. The test comprised of 40 items with all being positively worded. Every item was provided with three alternatives – **agree, undecided** and **disagree**. Each **agree** statement was allotted **2**, each **undecided 1**, and each **disagree 0** mark.

The scale was standardized on a randomly selected representative sample of 800 boys and 350 girls. The age range was from 12 years to 22 years. The sample was drawn from urban, sub-urban and rural areas.

Two indices of reliability were determined for the Scale. The Split-half reliability was found 0.75, and the Test-retest reliability was found 0.78. The item-analysis validity coefficients were determined for each item by bi-serial method. Only such items were retained that yielded bi-serial correlation of 0.5 and above with the total scores, significance level being 0.001.

Norms of the Environmental Attitude Scale have been prepared and are as follows:

Environmental attitude	*Boys*	*Girls*
Most favourable	59 and above	56 and above
Favourable	52 – 58	49 – 55
Intermediary	45 – 51	42 – 48
Unfavourable	38 – 44	35 – 41
Most unfavourable	37 and less	34 and less

3.2.3 Environmental Behaviour Scale

The researcher has decided to construct a new environmental behaviour scale to test and quantify environmental behaviour of the students. The framing of the statements was based on the following components of environmental behaviour:

(i) Social desirability,
(ii) Environmental concerns,
(iii) Environmental knowledge, and
(iv) Environmental values.

The test was based on the following dimensions of environment:

A. Air pollution,
B. Water pollution,
C. Noise pollution,
D. Land pollution,
E. Water conservation,
F. Forest conservation,
G. Biodiversity conservation,
H. Human health management,
I. Energy conservation & management, and
J. Environmental conservation & management.

Initially, a large number of statements on the above-mentioned dimensions were made and given to the experts in the field of environmental science, education and psychology.

The experts were requested to evaluate each statement so that it measured the dimension in question and had a single meaning. After evaluation by the experts, the statements were finally selected in construction of the scale. The experts also judged the efficacy of each statement along with clarity of instructions and scoring procedure. The statements included finally in the scale are given in Table 3.1.

Table 3.1: Arrangement of Statements in the Environmental Behaviour Scale.

Code	*Dimension*	*Number of Statements*	*Serial Number of Statements*
A	Air pollution	05	1 to 5
B	Water pollution	05	6 to 10
C	Noise pollution	05	11 to 15
D	Land pollution	05	16 to 20
E	Water conservation	05	21 to 25
F	Forest conservation	05	26 to 30
G	Biodiversity conservation	05	31 to 35
H	Human health management	05	36 to 40
I	Energy conservation & management	10	41 to 50
J	Environmental conservation & management	10	51 to 60

The following precautions were observed in construction of the scale:

(i) Each statement was worded carefully,

(ii) The closed-end format was used with yes/no response,

(iii) The statements were used to elicit the present and future responses and views from the respondents,

(iv) The statements were either related directly to life-style of respondents or most talked about in media and curricula, and

(v) The questionnaire has a judicious mix of easy and difficult state- ments.

The experts were also requested to pass judgement about such qualities of the questionnaire as clarity, minimal number and systematic arrangement of statements. The face and content validity was determined by the well-known experts in the field of education, environmental sciences, linguistics and psychology, since they were requested to judge relevance of the content and criterion of each statement with respect to environmental behaviour.

There are 60 statements in the scale. A total of 44 statements are positively worded – eliciting a 'yes' response, and the remaining 16 statements are negatively worded – eliciting a 'no' response from the students. For positive statements, 1 mark is to be awarded for a 'yes' response. For the negative statements, 1 mark is to be awarded for a 'no' response. The scale has the maximum score of 60 marks and the minimum of 0 marks. The serial numbers of statements eliciting a "yes" or "no" as a correct response from the students have been given in Table 3.2.

Table 3.2: Serial Numbers of Statements with "Yes" or "No" as Correct Answer in the Environmental Behaviour Scale.

Serial Number of "Yes" answer	*Serial Number of "No" answer*
1, 2, 3, 4, 6, 8, 9, 11, 12, 15, 16, 17, 18, 21, 22, 23, 24, 26, 27, 28, 30, 31, 32, 33, 34, 36, 37, 39, 40, 41, 42, 45, 47, 48, 49, 50, 51, 52, 53, 54, 56, 57, 59, 60	5, 7, 10, 13, 14, 19, 20, 25, 29, 35, 38, 43, 44, 46, 55, 58

Norms of the scale have been prepared on the basis statistical summary of the sample (Mean = 42.26, Standard Deviation = 4.78, N = 1385) using standard statistical procedures (Asthana, 2007) and are given in Table 3.3.

Table 3.3: Norms for Environmental Behaviour Scale.

z – score range	*Raw score range*	*Status of environmental behaviour*
+1.01 and above	48 – 60	Positive
-1.00 to +1.00	37 – 47	Average
-1.01 and below	00 – 36	Negative

3.3 PROCEDURE

3.3.1 The researcher visited the school at the scheduled dates and times. The selected students from each discipline were visited on different dates for the purpose of research. On each sampling date, the selected students from a particular discipline were gathered in a separate classroom and instructed for proper attempt of the tests. Each student was first given the Environment Awareness Ability Measure test and asked to attempt the test independently. The completed test booklets were collected from each student. Thereafter, each student was provided with the second test, Environmental Attitude Scale, and was asked to complete the test independently. The completed test booklets were collected from each student. Finally, each student was provided with the third test, Environmental Behaviour Scale, and was asked to complete the test independently. The completed test booklets were collected from each student. The care was taken to see that no item in each of the three tests was left blank or omitted by any of the respondents. This was done to ensure that all the students, who were selected randomly and included in the final analysis of the data, represented the population.

3.3.2 The completed test booklets of all the three tests were scored strictly according to the prescribed method using the scoring key provided with the respective

manual. The total score obtained by a student was marked on the front page of each booklet. The scores so obtained were tabulated separately for boys and girls pursuing disciplines of biology, commerce, humanities and mathematics in the schools affiliated to CBSE and MPBSE.

3.4 SAMPLE

The sample comprised a total of 1385 students with 722 in the schools affiliated to MPBSE and 663 to CBSE. The number of male and female students belonging to CBSE was 13 and 42, 102 and 145, 18 and 12, and 168 and 163, respectively, in the discipline of biology, commerce, humanities and mathematics (Table 3.4a).The corresponding values for MPBSE were 11 and 86, 106 and 191, 15 and 78, and 108 and 127, respectively (Table 3.4b).

3.5 STATISTICAL METHODS USED

3.5.1 The scores obtained by students in different tests were summarized by obtaining the arithmetic mean and standard deviation.

3.5.2 The Student's t-test was applied to compare two independent means and to test various hypotheses of the research.

3.5.3 The one – way Analysis of Variance (F) and Duncan's New Multiple Range tests were used to compare different means and to determine as to whether they belong to one group or more than one group of means.

3.5.4 The Product – Moment Correlation Coefficient (r) and Linear Regression analysis were used to determine the direction and magnitude of relationship among different variables, namely, environmental awareness, attitude and behaviour. The significance of the correlation coefficient was determined on basis of Student's t-test.

3.5.5 The null hypothesis (H_0) was accepted if the calculated value of a test was less than its table value at 0.05 level of significance and prescribed degree of freedom. The null hypothesis was rejected and the alternate hypothesis (H_1) was accepted if the calculated value of a test was equal or more than its table value at a particular level of significance and degree of freedom.

3.5.6 The different statistical measures and tests were obtained by using standard statistical procedures and tables as given by Garrett (1981), Steel and Torrie (1980), Snedecor and Cochran (1989), and Asthana (2007).

3.6 DELIMITATIONS

3.6.1 The present research has been conducted only on the students from the schools affiliated to either MPBSE or CBSE located under the jurisdiction of Jabalpur city.

3.6.2 Only those schools have been selected randomly wherein the diversified courses taken for studies are being taught.

3.6.3 The schools selected for the present research belonged to the same grade as specified and evaluated by the District Education Authority.

Table 3.4a: The Distribution of Randomly Selected Students from the Schools Affiliated to CBSE in Jabalpur City.

Name of School	*Discipline*	*Number of Students*		*Total Students*
		Boys	*Girls*	
St. Joseph Convent Girls Senior Secondary School	Commerce	Nil	21	21
	Mathematics	Nil	26	26
St. Aloysius Senior Secondary School	Commerce	27	Nil	27
	Mathematics	35	04	39
	Biology	Nil	01	01

Name of School	*Discipline*	*Number of Students*		*Total Students*
		Boys	*Girls*	
Central School GCF No. 1	Commerce	29	28	57
	Mathematics	47	31	78
	Humanities	18	12	30
	Biology	04	04	08
Maharshi Vidya Mandir	Commerce	37	28	65
	Mathematics	31	25	56
	Biology	03	11	14
Central School GCF No. 2	Commerce	09	04	13
	Mathematics	38	22	60
	Biology	03	06	09
Christchurch Girls Senior Secondary School	Commerce	Nil	64	64
	Mathematics	Nil	47	47
	Biology	Nil	15	15
Central School CMM	Mathematics	17	08	25
	Biology	03	05	08
Total		301	**362**	**663**

Table 3.4b: The Distribution of Randomly Selected Students from the Schools Affiliated to MPBSE in Jabalpur City.

Name of School	*Discipline*	*Number of Students*		*Total Students*
		Boys	**Girls**	
Government Girls Higher Secondary School, Karaundi	Commerce	Nil	63	63
	Mathematics	Nil	15	15
	Humanities	Nil	38	38
	Biology	Nil	37	37
Khalsa Higher Secondary School, Cantonment	Commerce	Nil	35	35
	Mathematics	Nil	21	21
	Humanities	Nil	22	22
	Biology	Nil	16	16

Name of School	*Discipline*	*Number of Students*		*Total Students*
		Boys	**Girls**	
M.L.B. Girls Senior Secondary School	Commerce	Nil	59	59
	Mathematics	Nil	36	36
	Humanities	Nil	17	17
	Biology	Nil	27	27
Nachiketa Higher Secondary School	Commerce	15	29	44
	Mathematics	45	39	84
	Biology	Nil	06	06
Pandit L. S. Jha Government Model Higher Secondary School	Commerce	48	05	53
	Mathematics	49	16	65
	Humanities	07	01	08
	Biology	07	Nil	07
L.N.Y. Higher Secondary School	Commerce	43	Nil	43
	Mathematics	14	Nil	14
	Humanities	08	Nil	08
	Biology	04	Nil	04
Total		240	**482**	**722**

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Chapter 4

ANALYSIS AND DISCUSSION OF RESULTS

Analysis of results is the next important component of any research work, because the data collected from the sample is statistically treated for verification of hypothesis and drawing conclusions.

This chapter has been divided into the following sections:

4.1. Analysis of Results

4.2. Discussion of Results

4.3. Verification of Hypothesis

The details of each section are being presented below.

4.1. ANALYSIS OF RESULTS

The analysis of results has been divided into the following sub-sections according to the variables to make the analysis not only meaningful but also comprehensive:

4.1.1. Environmental awareness

4.1.2. Environmental attitude

4.1.3. Environmental behaviour

4.1.4. Relationship between environmental awareness and attitude

4.1.5. Relationship between environmental awareness and behaviour

4.1.6. Relationship between environmental attitude and behaviour

4.1.1 Environmental Awareness

Environmental awareness of MPBSE students pursuing different disciplines ranged from 19 to 51 among boys and 21 to 51 among girls. Environmental awareness of boys was between 39 and 45, 24 and 51, 19 and 48 and 32 and 51, respectively, in biology, commerce, humanities and mathematics disciplines. The corresponding values for girls were 28 and 50, 21 and 49, 24 and 49 and 22 and 51, respectively. Majority of boys (100% in biology, 77% in commerce, 87% in humanities and 93% in mathematics) and girls (91% in biology, 86% in commerce, 73% in humanities and 97% in mathematics) recorded high (i.e. 37 to 51), while no student showed low environmental awareness (i.e. 0 to 15).

The mean environmental awareness of students differed significantly among different disciplines ($p < 0.001$, Table 4.1b, c and d). The boys of biology, commerce and humanities disciplines recorded statistically similar values, which were significantly less than that of mathematics (Table 4.1a). The girls of humanities recorded the minimum and that of mathematics recorded the maximum values. However, girls of commerce and biology recorded comparable mean awareness (Table 4.1a). All the students, i.e. boys and girls taken together, recorded the minimum in humanities and the maximum values in mathematics, but those of commerce and biology disciplines had statistically similar values (Table 4.1a).

Table 4.1a: Environmental Awareness of Students of M.P. Board of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	40.08 ± 4.90a	40.98 ± 4.41c	40.66 ± 4.60c
Humanities	38.47 ± 6.98a	38.44 ± 4.22a	38.44 ± 4.72a
Mathematics	43.08 ± 4.09b	43.43 ± 3.93e	43.27 ± 4.00e
Biology	41.73 ±2.37ab	41.22 ± 3.87c	41.31 ± 4.59c

Means that differ significantly between disciplines at $p = <0.05$ *are indicated by different alphabets (By Duncan's New Multiple Range Test).*

Table 4.1b: Comparison of Environmental Awareness of Male Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	622.24	207.41	9.70***
Error	236	5045.56	21.38	
Total	239	5667.80		

Table 4.1c: Comparison of Environmental Awareness of Female Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1237.02	412.34	23.80***
Error	478	8281.08	17.32	
Total	481	9518.10		

Table 4.1d: Comparison of Environmental Awareness of All Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1797.40	599.13	32.12***
Error	718	13391.94	18.65	
Total	721	15189.34		

*p = <0.05; **p = <0.01; ***p = <0.001

Among CBSE students, environmental awareness ranged from 19 to 51 among boys as well as girls. Environmental awareness of boys ranged from 39 to 47, 21 to 51, 19 to 46 and 26 to 51, respectively, in disciplines of biology, commerce, humanities and mathematics. The corresponding values for girls were 40 and 50, 19 and 49, 36 and 49 and 19 and 51, respectively. Majority of boys (100% in biology, 85% in commerce, 76% in humanities and 93% in mathematics) and girls (100% in biology, 97% in commerce, 92% in humanities and 96% in mathematics) recorded high (i.e. 37 to 51), while none recorded low environmental awareness (i.e. 0 to 15).

The mean environmental awareness of boys, girls and all the students differed significantly among different disciplines (p < 0.001, Table 4.2b, c and d). The boys as well as girls of biology, commerce and mathematics disciplines recorded statistically comparable values, though this was in order of commerce < mathematics < biology (p > 0.05, Table 4.2a). The girls and boys of humanities recorded the minimum values, which was significantly lesser than that of the other three disciplines (p < 0.05, Table 4.2a). All students recorded the maximum values in biology and the minimum in humanities (p < 0.05). The mean environmental awareness of all students belonging to humanities was much lower than that of biology, mathematics and commerce disciplines (Table 4.2a). According to the norms of the test, the students recorded high environmental awareness, because the mean levels were always in the scheduled range of 37 to 51.

Table 4.2a: Environmental Awareness of Students of Central Board of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	41.24 ± 5.44b	43.60 ± 4.38b	42.62 ± 4.98c
Humanities	37.83 ± 8.64a	40.75 ± 3.93a	39.00 ± 7.19a
Mathematics	43.55 ± 4.26b	44.41 ± 4.36b	43.98 ± 4.32c
Biology	43.77 ± 2.68b	44.88 ± 2.39b	44.62 ± 2.48c

Means that differ significantly between disciplines at $p = <0.05$ *are indicated by different alphabets (By Duncan's New Multiple Range Test).*

Table 4.2b: Comparison of Environmental Awareness of Male Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	761.31	253.77	10.22***
Error	297	7372.68	24.82	
Total	300	8133.99		

Table 4.2c: Comparison of Environmental Awareness of Female Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	670.71	223.57	16.30***
Error	358	4909.49	13.71	
Total	361	5580.20		

Table 4.2d: Comparison of Environmental Awareness of All Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	914.50	304.83	14.25***
Error	659	14092.77	21.385	
Total	662	15007.27		

*p = <0.05; **p = <0.01; ***p = <0.001

Environmental awareness of boys of both the boards taken together ranged from 39 to 47 in biology, 21 to 51 in commerce, 19 to 48 in humanities and 26 to 51 in mathematics. The corresponding values for the girls belonging to biology, commerce, humanities and mathematics were 28 to 50, 21 to 49, 24 to 49 and 22 to 51, respectively. Majority of boys (100% in biology, 81% in commerce, 81% in humanities and 95% in mathematics) and girls (96% in biology, 91% in commerce, 76% in humanities and 96% in mathematics) recorded high (i.e. 37 to 51), while none recorded low environmental awareness (i.e. 0 to 15).

Environmental awareness of all students differed significantly among different disciplines (Table 4.3d). The same results were obtained for boys (Table 4.3b) as well as girls (Table 4.3c). The students of both the boards recorded the minimum mean environmental awareness in humanities (38.12 to 38.58) and the maximum in mathematics discipline (42.42 to 42.83, Table 4.3a). The mean environmental awareness was in the order of mathematics > biology = commerce > humanities in case of male, female as well all the students belonging to both the boards ($p < 0.05$, Table 4.3a). The girls had better awareness than boys in disciplines of commerce, humanities and mathematics, but boys were relatively better aware than girls in the discipline of biology. According to the norms of the test, male, female as well as all the students of both the boards recorded high environmental awareness, because the mean levels were always in the scheduled range of 37 to 51.

Table 4.3a: Environmental Awareness of Students of both the Boards (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	40.64 ± 5.19b	42.11 ± 4.58d	41.55 ± 4.87d
Humanities	38.12 ± 7.81a	38.74 ± 4.23a	38.58 ± 5.40a
Mathematics	43.37 ± 4.19c	43.98 ± 4.20e	43.68 ± 4.20e
Biology	42.83 ± 2.70bc	42.42 ± 3.85d	42.49 ± 3.69d

Means that differ significantly between disciplines at $p = < 0.05$ *are indicated by different alphabets (By Duncan's New Multiple Range Test)*

Table 4.3b: Comparison of Environmental Awareness of Male Students of both the Boards.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1412.91	470.97	20.18***
Error	537	12530.83	23.34	
Total	540	13943.74		

Table 4.3c: Comparison of Environmental Awareness of Female Students of both the Boards.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1955.98	651.99	35.11***
Error	840	15600.18	18.57	
Total	843	17556.16		

Table 4.3d: Comparison of Environmental Awareness of all Students of both the Boards.

Source of Variation	*Degrees of freedom*	*Sum of Squares*	*Mean sum of Squares*	*F ratio*
Disciplines	3	3097.87	1032.62	50.08***
Error	1381	28473.04	20.62	
Total	1384	31570.91		

*p = <0.05; **p = <0.01; ***p = <0.001

The female students recorded significantly higher mean environmental awareness than the male ones in commerce discipline (42.11 vs. 40.64) and insignificantly higher levels in the humanities (38.74 vs. 38.12) and mathematics (43.98 vs. 43.37) (Table 4.4a). The gender differences were more pronounced in commerce (CR = 3.46, p < 0.001) and were

statistically insignificant in the humanities (CR = 0.56, $p > 0.05$), mathematics (CR = 1.73, $p > 0.05$) as well as biology (CR = 0.5, $p > 0.05$).

The students of CBSE recorded significantly more positive environmental awareness as compared to that of MPBSE in disciplines of commerce (42.62 vs. 40.66), mathematics (43.98 vs. 43.27) and biology (44.62 vs. 41.28), and insignificantly higher levels in the stream of mathematics (39.00 vs. 38.44) (Table 4.4b). Such differences between the boards were more pronounced in commerce and biology ($p < 0.001$) than that recorded in mathematics ($p < 0.05$) and humanities ($p > 0.05$).

The students of all disciplines belonging to CBSE recorded significantly higher environmental awareness that those belonging to MPBSE (43.30 vs. 41.31, Table 4c). Similar results were also recorded in case of male (42.44 vs. 41.40) as well as female students (44.05 vs. 41.26). Such differences between both the boards were more pronounced for female (CR = 9.42, $p < 0.001$, Table 4.4c) and all students (CR = 7.92, $p < 0.001$, Table 4.4c) as compared with that for male students (CR = 2.38, $p < 0.05$, Table 4.4c).

Table 4.4a: Gender Differences in Mean Environmental Awareness of Students According to Disciplines.

Discipline	*Gender*	*N*	*Mean*	*Std. Dev.*	*CR*
Commerce	Female	336	42.11	4.58	3.46***
	Male	208	40.64	5.19	
Humanities	Female	90	38.74	4.23	0.56
	Male	33	38.12	7.81	
Mathematics	Female	290	43.98	4.20	1.73
	Male	276	43.37	4.19	
Biology	Female	128	42.42	3.85	0.50
	Male	24	42.83	2.70	

Table 4.4b: Differences in Mean Environmental Awareness of Students between Boards According to Disciplines.

Discipline	*Board*	*N*	*Mean*	*Std. Dev.*	*CR*
Commerce	Central	247	42.62	4.98	4.77***
	M.P.	297	40.66	4.60	
Humanities	Central	30	39.00	7.19	0.49
	M.P.	93	38.44	4.72	
Mathematics	Central	331	43.98	4.32	1.99*
	M.P.	235	43.27	4.00	
Biology	Central	55	44.62	2.48	5.93***
	M.P.	97	41.28	3.73	

Table 4.4c: Differences in Mean Environmental Awareness of Students between Boards.

Gender	*Board*	*N*	*Mean*	*Std. Dev.*	*CR*
Female	Central	362	44.05	3.93	9.42***
	M.P.	482	41.26	4.49	
Male	Central	301	42.44	5.21	2.38*
	M.P.	240	41.40	4.87	
All	Central	663	43.30	4.76	7.92***
	M.P.	722	41.31	4.59	

*p = <0.05; **p = <0.01; ***p = <0.001

4.1.2 Environmental Attitude

Among students of MPBSE, environmental attitude ranged from 40 to 80 in boys and 39 to 80 in girls pursuing different disciplines. For boys, it was between 55 and 74, 40 and 80, 41 and 78 and 43 and 80, respectively, in disciplines of biology, commerce, humanities and mathematics. The corresponding values for girls were 48 and 80, 39 and 80, 40 and 80 and 39 and 80, respectively. Majority of boys (100% in biology, 95% in commerce, 87% in humanities and 96% in mathematics) and girls (99% each in biology, commerce and mathematics, and 97% in humanities) recorded favourable to most favourable (i.e. ≥49), while minority of the boys (0 to

13%) and girls (1 to 3%) recorded unfavourable environmental attitude (i.e. ≤41).

The mean environmental attitude of boys did not differ significantly among different disciplines ($p > 0.05$, Table 4.5a and b), but that of girls and all students has differed significantly ($p < 0.001$, Table 4.5c and d). The girls of humanities recorded the minimum, and those of mathematics recorded the maximum value. The girls of commerce and biology disciplines recorded comparable values (Table 4.5a). The mean environmental attitude of all the students was the minimum in humanities and the maximum in mathematics ($p < 0.05$), but that in commerce and biology discipline was statistically similar ($p > 0.05$, Table 4.5a). The mean values showed that all students had the most favourable environmental attitude.

Table 4.5a: Environmental Attitude of Students of M.P. Board of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	65.12 ± 8.44a	68.31 ± 7.14b	67.18 ± 7.77b
Humanities	64.53 ± 10.33a	64.62 ± 8.58a	64.60 ± 8.82a
Mathematics	67.58 ± 7.37a	70.20 ± 6.89c	69.00 ± 7.22c
Biology	63.27 ± 6.65a	68.31 ± 6.88b	67.74 ± 7.00bc

Means that differ significantly between disciplines at $p = <0.05$ are indicated by different alphabets (By Duncan's New Multiple Range Test).

Table 4.5b: Comparison of Environmental Attitude of Male Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	463.61	154.54	2.40
Error	236	15221.57	64.50	
Total	239	15865.18		

Table 4.5c: Comparison of Environmental Attitude of Female Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1516.18	505.39	9.52***
Error	478	25366.81	53.07	
Total	481	26882.99		

Table 4.5d: Comparison of Environmental Attitude of all Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1346.63	448.88	7.67***
Error	718	41931.73	58.56	
Total	721	43278.36		

*p = <0.05; **p = <0.01; ***p = <0.001

Among students of CBSE, environmental attitude ranged from 31 to 80 in boys as well as girls of different disciplines. For boys, it ranged from 55 to 77, 31 to 80, 42 to 76 and 40 to 80, respectively, in disciplines of biology, commerce, humanities and mathematics. The corresponding values for girls were 54 to 80, 49 and 80, 55 and 77 and 46 and 80, respectively. Majority of boys (100% in biology, 87% in commerce, 82% in humanities and 93% in mathematics) and girls (100% each in biology, commerce and humanities, and 99% in mathematics) recorded favourable to most favourable environmental attitude (i.e. ≥49), while a minority of boys (0 to 4%) and none of girls recorded unfavourable environmental attitude (i.e. ≤41).

The mean environmental attitude of boys, girls and all students differed insignificantly among different disciplines (Table 4.6b, c and d). As a result, boys as well as girls of CBSE recorded statistically comparable mean values of environmental attitude among different disciplines, though this was in the order of biology ≥ mathematics ≥ commerce

≥ humanities (Table 4.6a). All the students, i.e. boys and girls taken together, also followed the same order and recorded the minimum in humanities and the maximum value in biology, though the differences were statistically insignificant ($p > 0.05$). According to the norms of the test, all the students recorded the most favourable environmental attitude based on mean values.

Table 4.6a: Environmental Attitude of Students of Central Board of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	65.41 ± 11.03a	68.17 ± 8.11a	67.03 ± 9.50a
Humanities	62.21 ± 14.65a	66.50 ± 6.43a	63.93 ± 12.08a
Mathematics	65.85 ± 8.07a	68.73 ± 6.66a	67.27 ± 7.54a
Biology	67.54 ± 7.01a	69.69 ± 5.70a	69.18 ± 6.03a

Means that differ significantly between disciplines at $p = <0.05$ are indicated by different alphabets (By Duncan's New Multiple Range Test)

Table 4.6b: Comparison of Environmental Attitude of Male Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	267.32	89.11	0.97
Error	297	27383.02	92.20	
Total	300	27650.34		

Table 4.6c: Comparison of Environmental Attitude of Female Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	131.75	43.92	0.85
Error	358	18456.13	51.55	
Total	361	18587.88		

Table 4.6d: Comparison of Environmental Attitude of All Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	544.73	181.58	2.54
Error	659	47159.45	71.56	
Total	662	47704.18		

$^{*}p$ = <0.05; $^{**}p$ = <0.01; $^{***}p$ = <0.001

Environmental attitude of boys of both the boards taken together ranged from 55 to 77 in biology, 31 to 80 in commerce, 41 to 78 in humanities and 40 to 80 in mathematics. The corresponding values for girls of biology, commerce, humanities and mathematics were 48 to 80, 39 to 80, 40 to 80 and 39 to 80, respectively. Majority of boys (100% in biology, 91% in commerce, 84% in humanities and 95% in mathematics) and girls (99% each in biology, commerce and mathematics, and 98% in humanities) recorded favourable to most favourable environmental attitude (i.e. ≥ 49).

Environmental attitude of boys did not differ significantly among different disciplines (Table 4.7b), but that of girls and all students differed significantly among different disciplines (Table 4.7c and d). The boys, girls as well all students of both the boards recorded the minimum mean value in the discipline of humanities (i.e. 63.27 to 64.87) and the maximum in the discipline of mathematics (i.e. 66.53 to 69.38, Table 4.7a). The mean environmental attitude was statistically similar among the students pursuing disciplines of biology, commerce and mathematics, which was significantly higher that that of humanities (Table 4.7a). This was ranked in the order of mathematics ≥ biology ≥ commerce > humanities (Table 4.7a). The girls of all the disciplines recorded relatively higher values of environmental attitude than that of boys. According to the norms of the test, male, female as well as all students of both the boards recorded most favourable environmental attitude (i.e. ≥ 49).

Table 4.7a: Environmental Attitude of Students of Central and M.P. Boards of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	65.26 ± 9.77a	68.25 ± 7.57c	67.11 ± 8.59bc
Humanities	63.27 ± 12.73a	64.87 ± 8.32a	64.44 ± 9.67a
Mathematics	66.53 ± 7.83a	69.38 ± 6.79c	67.99 ± 7.45c
Biology	65.58 ± 7.04a	68.77 ± 6.53c	68.26 ± 6.69c

Means that differ significantly between disciplines at $p = <0.05$ *are indicated by different alphabets (By Duncan's New Multiple Range Test).*

Table 4.7b: Comparison of Environmental Attitude of Male Students of Central and M.P. Boards of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	416.78	138.93	1.73
Error	537	42959.66	80.00	
Total	540	43376.44		

Table 4.7c: Comparison of Environmental Attitude of Female Students of Central and M.P. Boards of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1422.68	474.23	9.04***
Error	840	44070.40	52.47	
Total	843	45493.08		

Table 4.7d: Comparison of Environmental Attitude of All Students of Central and M.P. Boards of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	1429.55	476.52	7.35***
Error	1381	89590.25	64.87	
Total	1384	91019.80		

*p = <0.05; **p = <0.01; ***p = <0.001

The female students recorded significantly higher levels of mean environmental attitude than the male students in disciplines of commerce (68.25 vs. 65.26), mathematics (69.38 vs. 66.53) and biology (68.77 vs. 65.58), and insignificantly higher levels in humanities (64.87 vs. 63.27) (Table 4.8a). The gender differences were more pronounced in commerce and mathematics ($p < 0.001$), less pronounced in biology ($p < 0.05$), and statistically insignificant in humanities ($p > 0.05$, Table 4.8a).

The students of MPBSE recorded higher levels of mean environmental attitude in comparison to that of CBSE in disciplines of commerce (67.18 vs. 67.03), mathematics (69.00 vs. 67.27) and humanities (64.60 vs. 63.93). However, such differences between both the boards were statistically significant only in mathematics ($p < 0.01$, Table 4.8b). The students of CBSE recorded insignificantly higher environmental attitude than that of MPBSE only in the discipline of biology ($p > 0.05$, Table 4.8b).

Among students of all disciplines taken together, there were no significant differences between the two boards in case boys as well girls (Table 4.8c). The boys of MPBSE recorded relatively higher environmental attitude compared to that of CBSE (66.11 vs. 66.55, $p > 0.05$). However, girls of CBSE had relatively better attitude than that of MPBSE (68.54 vs. 68.21, $p > 0.05$).

Table 4.8a: Gender Differences in Mean Environmental Attitude of Students According to Disciplines.

Discipline	*Gender*	*N*	*Mean*	*Std. Dev.*	*CR*
Commerce	Female	336	68.25	7.57	4.00***
	Male	208	65.26	9.77	
Humanities	Female	90	64.87	8.32	0.81
	Male	33	63.27	12.73	
Mathematics	Female	290	69.38	6.79	4.63***
	Male	276	66.53	7.83	
Biology	Female	128	68.77	6.53	2.17*
	Male	24	65.58	7.04	

Table 4.8b: Differences in Mean Environmental Attitude of Students between Boards According to Disciplines.

Discipline	*Board*	*N*	*Mean*	*Std. Dev.*	*CR*
Commerce	Central	247	67.03	9.50	0.20
	M.P.	297	67.18	7.77	
Humanities	Central	30	63.93	12.08	0.33
	M.P.	93	64.60	8.82	
Mathematics	Central	331	67.27	7.54	2.74**
	M.P.	235	69.00	7.22	
Biology	Central	55	69.18	6.03	1.28
	M.P.	97	67.74	7.01	

Table 4.8c: Differences in Mean Environmental Attitude of Students between Boards.

Gender	*Board*	*N*	*Mean*	*Std. Dev.*	*CR*
Female	Central	362	68.54	7.18	0.65
	M.P.	482	68.21	7.48	
Male	Central	301	65.55	9.60	0.72
	M.P.	240	66.11	8.10	
All	Central	663	67.19	8.49	0.73
	MP	722	67.51	7.75	

*p = <0.05; **p = <0.01; ***p = <0.001

4.1.3 Environmental Behaviour

Among students of MPBSE, environmental behaviour ranged from 26 to 58 in boys and 26 to 60 in girls pursuing different disciplines. In case of boys, it varied from 45 to 54, 30 to 58, 30 to 57 and 26 to 58, respectively, in biology, commerce, humanities and mathematics. The corresponding values for girls were from 27 to 56, 26 to 58, 31 to 55 and 28 to 60, respectively. The proportion of boys having the positive environmental behaviour (i.e. ≥ 48) was 82% in biology, 51% in commerce, 40% in humanities and 59% in mathematics. The

percentage of girls with the positive behaviour was 52%, 62%, 38% and 69%, respectively, in biology, commerce, humanities and mathematics disciplines. The negative environmental behaviour (i.e. ≤ 36) was recorded in only 0%, 8%, 27% and 7% of boys, and 8%, 6%, 11% and 3% of girls, respectively, in biology, commerce, humanities and mathematics disciplines. The remaining students had the average behaviour (i.e. 37 to 47).

The mean environmental behaviour of male, female and all students differed significantly among different disciplines (Table 4.9b, c and b). The boys and girls belonging to humanities recorded the minimum environmental behaviour (Table 4.9a). The maximum values were obtained in biology for boys and in mathematics for girls and all students. The behaviour of students was statistically comparable among biology, commerce and mathematics disciplines, which was higher than that in humanities discipline ($p > 0.05$, Table 4.9a). The mean values showed that all students had average to positive environmental behaviour (i.e. ≥ 37).

Table 4.9a: Environmental Behaviour of Students of M.P. Board of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	46.49 ±6.63ab	47.94 ±5.61bc	47.42 ± 6.03b
Humanities	43.87 ± 8.59a	45.31 ± 6.02a	45.08 ± 6.46a
Mathematics	47.87 ± 6.60b	49.13 ± 5.47c	48.55 ± 6.03b
Biology	50.64 ± 2.87b	46.65 ±5.63ab	47.10 ± 5.52b

Means that differ significantly between disciplines at $p = <0.05$ are indicated by different alphabets (By Duncan's New Multiple Range Test).

Table 4.9b: Comparison of Environmental behaviour of Male Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	397.51	132.50	3.05*
Error	236	10398.96	43.51	
Total	239	10796.47		

Table 4.9c: Comparison of Environmental Behaviour of Female Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	808.48	269.49	8.46***
Error	478	15223.24	31.85	
Total	481	16031.72		

Table 4.9d: Comparison of Environmental behaviour of All Students of M.P. Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	822.32	274.11	7.56***
Error	718	26040.07	36.27	
Total	721	26862.39		

*p = <0.05; **p = <0.01; ***p = <0.001

Among students of CBSE, environmental behaviour ranged from 22 to 59 in boys and 26 to 59 in girls pursuing different disciplines. Environmental behaviour of boys varied from 26 to 55, 22 to 59, 30 to 53 and 25 to 57, respectively, in disciplines of biology, commerce, humanities and mathematics. The corresponding values for girls were from

32 to 58, 29 to 59, 26 to 56 and 26 to 59, respectively. The positive environmental behaviour (i.e. ≥ 48) was observed in 38%, 48%, 22% and 34% of boys, and 67%, 52%, 75% and 60% of girls, respectively, in biology, commerce, humanities and mathematics disciplines. The negative behaviour (i.e. ≤ 37) was observed in 16%, 15%, 34% and 18% of boys, and 4%, 10%, 8% and 8% of girls, respectively, in biology, commerce, humanities and mathematics disciplines.

The mean environmental behaviour of male, female and all students did not differ significantly among different disciplines ($p > 0.05$, Table 4.10b, c and d). In case of boys, the maximum mean value was observed in commerce and the minimum in humanities (Table 4.10a). In case of girls, the maximum mean value was obtained in mathematics and the minimum in commerce. In case of boys and girls taken together, the minimum mean value was recorded in humanities and the maximum in biology (Table 4.10a). Environmental behaviour of male, female and all students was statistically comparable among different disciplines ($p > 0.05$, Table 4.10a). The male as well as all students of all disciplines and female ones of commerce had the average behaviour (i.e. 37 to 47). The girls of biology, humanities and mathematics disciplines had positive environmental behaviour (i.e. ≥ 48).

Table 4.10a: Environmental Behaviour of Students of Central Board of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	45.25 ± 7.61a	46.49 ± 7.09a	45.98 ± 7.32a
Humanities	41.72 ± 7.18a	48.00 ± 9.22a	44.23 ± 8.50a
Mathematics	43.90 ± 7.72a	48.34 ± 6.75a	46.09 ± 7.58a
Biology	43.38 ± 9.12a	48.05 ± 6.54a	46.95 ± 7.42a

Means that differ significantly between disciplines at $p = <0.05$ are indicated by different alphabets (By Duncan's New Multiple Range Test).

Table 4.10b: Comparison of Environmental Behaviour of Male Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	245.80	81.93	1.38
Error	297	17686.84	59.55	
Total	300	17932.64		

Table 4.10c: Comparison of Environmental Behaviour of Female Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	278.50	92.83	1.92
Error	358	17314.90	48.37	
Total	361	17593.40		

Table 4.10d: Comparison of Environmental Behaviour of All Students of Central Board of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	144.75	48.25	0.85
Error	659	37228.52	56.49	
Total	662	37373.27		

*p = <0.05

Among students of both the boards taken together, environmental behaviour of boys ranged from 26 to 55 in biology, 22 to 59 in commerce, 30 to 57 in humanities and 25 to 58 in mathematics. The corresponding values for girls belonging to biology, commerce, humanities and mathematics disciplines were 27 to 58, 26 to 59, 26 to 56 and 26 to 60, respectively. The percentage of boys and girls recording positive environmental behaviour (i.e. ≥ 48) were 58 and 57% in biology, 50 and 57% in commerce, 30 and 43% in humanities, and 44 and 64% in mathematics, respectively. The proportion of boys and girls showing negative environmental behaviour (i.e. ≤ 37) were 8 and 7%, 11 and 8%, 30 and 11%, and 14

and 6%, respectively, in disciplines of biology, commerce, humanities and mathematics.

Environmental behaviour of boys did not differ significantly among different disciplines (Table 4.11b), but that of girls and all students differed significantly (Table 4.11c and d). The students of both the boards recorded the minimum value in humanities. The boys recorded the maximum value in biology, and girls and all students in mathematics. The behaviour was statistically similar among students of biology, commerce and mathematics, which was significantly higher than that of humanities ($p < 0.05$, Table 4.11a). The behaviour was in the order of mathematics ≥ biology ≥ commerce ≥ humanities. According to the norms of the test, the students recorded an average environmental behaviour (i.e. 37 to 47). The female students of mathematics discipline recorded positive environmental behaviour (≥ 48).

Table 4.11a: Environmental Behaviour of Students of Central and M.P. Boards of Secondary Education (values are mean ± standard deviation).

Discipline	*Students*		
	Male	*Female*	*All*
Commerce	45.88 ± 7.14a	47.32 ± 6.32b	46.77 ± 6.68b
Humanities	42.70 ± 7.80a	45.67 ± 6.53a	44.87 ± 6.99a
Mathematics	45.45 ± 7.55a	48.69 ± 6.22b	47.11 ± 7.08b
Biology	46.71 ± 7.78a	47.11 ± 6.07b	47.05 ± 6.34b

Means that differ significantly between disciplines at $p = <0.05$ are indicated by different alphabets (By Duncan's New Multiple Range Test)

Table 4.11b: Comparison of Environmental Behaviour of Male Students of Central and M.P. Boards of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	324.93	108.31	1.97
Error	537	29554.31	55.04	
Total	540	29879.24		

Table 4.11c: Comparison of Environmental behaviour of Female Students of Central and M.P. Boards of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	738.42	246.14	6.25***
Error	840	33067.10	39.37	
Total	843	33805.52		

Table 4.11d: Comparison of Environmental Behaviour of All Students of Central and M.P. Boards of Secondary Education.

Source of variation	*Degrees of freedom*	*Sum of squares*	*Mean sum of squares*	*F ratio*
Disciplines	3	521.59	173.86	3.72*
Error	1381	64583.94	46.77	
Total	1384	65105.53		

*p = <0.05; ***p = <0.001

The female students recorded significantly higher mean environmental behaviour than the male students in commerce (47.32 vs. 45.88), humanities (45.67 vs. 42.7) and mathematics (48.69 vs. 45.45), and insignificantly higher levels in biology (47.11 vs. 46.71) (Table 4.12a). The gender differences were more pronounced in mathematics ($p < 0.001$), less pronounced in commerce and humanities ($p < 0.05$), and statistically insignificant in the discipline of biology ($p > 0.05$, Table 4.12a).

The students of MPBSE recorded higher levels of environmental behaviour in comparison with that of CBSE in all disciplines (47.1 vs. 46.95 in biology, 47.42 vs. 45.98 in commerce, 45.08 vs. 44.23 in humanities, and 48.55 vs. 46.09 in mathematics) (Table 4.12b). However, such differences between the boards were statistically significant only in commerce ($p < 0.05$) and mathematics ($p < 0.001$), and insignificant in biology and humanities ($p > 0.05$, Table 4.12b).

The students of all disciplines taken together recorded a better environmental behaviour in MPBSE than CBSE ($p < 0.001$, Table 4.12c). The girls had comparable environmental

behaviour between two boards (47.6 vs. 47.56, $p > 0.05$). However, MPBSE boys showed a better behaviour than that of CBSE (47.14 vs. 44.2, $p = <0.001$). The summarized data denoted that male students of both the boards had average environmental behaviour while the girls have shown positive behaviour.

Table 4.12a: Gender Differences in Mean Environmental Behaviour of Students According to Disciplines.

Discipline	*Gender*	*N*	*Mean*	*Std. Dev.*	*CR*
Commerce	Female	336	47.32	6.32	2.46*
	Male	208	45.88	7.14	
Humanities	Female	90	45.67	6.53	2.12*
	Male	33	42.70	7.80	
Mathematics	Female	290	48.69	6.22	5.59***
	Male	276	45.45	7.55	
Biology	Female	128	47.11	6.07	0.29
	Male	24	46.71	7.78	

Table 4.12b: Differences in Mean Environmental Behaviour of Students between Boards According to Disciplines.

Discipline	*Board*	*N*	*Mean*	*Std. Dev.*	*CR*
Commerce	Central	247	45.98	7.32	2.52*
	M.P.	297	47.42	6.03	
Humanities	Central	30	44.23	8.50	0.58
	M.P.	93	45.08	6.46	
Mathematics	Central	331	46.09	7.58	4.14***
	M.P.	235	48.55	6.03	
Biology	Central	55	46.95	7.42	0.18
	M.P.	97	47.10	5.52	

Table 4.12c: Differences in Mean Environmental Behaviour of Students between Boards.

Gender	*Board*	*N*	*Mean*	*Std. Dev.*	*CR*
Female	Central	362	47.56	6.98	0.09
	M.P.	482	47.60	5.77	
Male	Central	301	44.20	7.73	4.65***
	M.P.	240	47.14	6.72	
All	Central	663	46.03	7.51	3.87***
	MP	722	47.45	6.10	

* p = <0.05; ** p = <0.01; *** p = <0.001

4.1.4 Relationship between Environmental Awareness and Attitude

The students of biology in MPBSE recorded a significant positive relationship between the two variables, but those belonging to CBSE had an insignificant relationship (Fig. 4.1). The coefficient of determination ($\mathbf{R^2}$) was 0.185 and 0.029, respectively, for MPBSE and CBSE, and explained only 3 to 19 % of the variance environmental attitude of biology students.

The students of commerce discipline in both the boards recorded a significant positive relationship between the two variables (Fig. 4.2). The coefficient of determination ($\mathbf{R^2}$) was 0.314 for both the boards, explaining only 31% of the variance of environmental attitude of the commerce discipline.

The students of humanities discipline of both the boards recorded a significant positive relationship between environmental awareness and attitude (Fig. 4.3), but the level of significance was high in case of MPBSE (p = < 0.001) than that in CBSE (p = < 0.05) The coefficient of determination ($\mathbf{R^2}$) was 0.292 and 0.194, respectively, for MPBSE and CBSE, and explained only 19 to 29% of the variance of environmental attitude of students of humanities discipline.

The students of mathematics stream studying in CBSE as well as MPBSE recorded a significant positive relation between two variables (Fig. 4.4). The value of correlation coefficient was relatively higher in case of MPBSE than that in CBSE. The coefficient of determination ($\mathbf{R^2}$) was 0.24 and 0.13, respectively, for students of MPBSE and CBSE, respectively, and explained only 13 to 24% of the variance of environmental attitude.

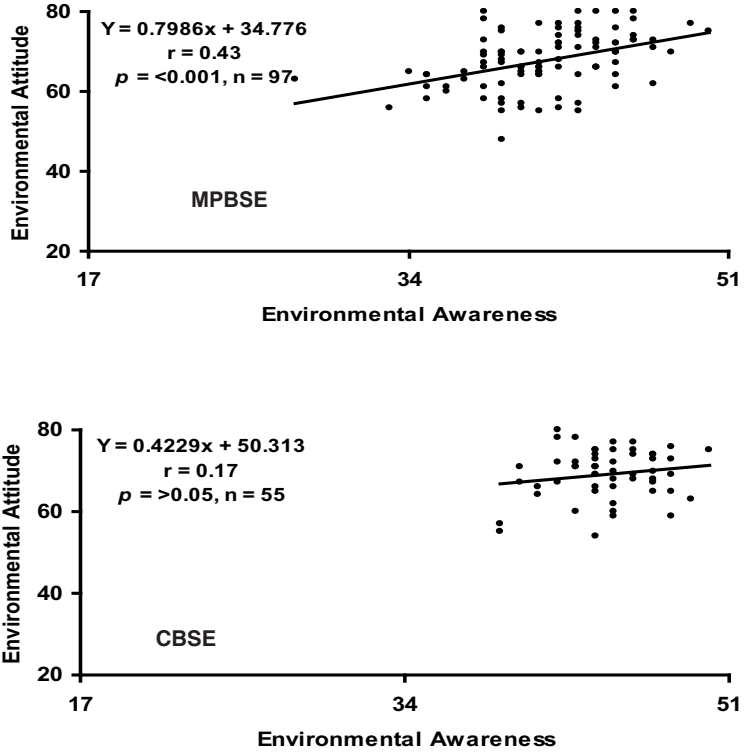


Fig. 4.1: Relationship between environmental awareness and attitude among students of biology discipline (r = Correlation Coefficient, ***p*** = Significance Level of r, n = Number of Observations).

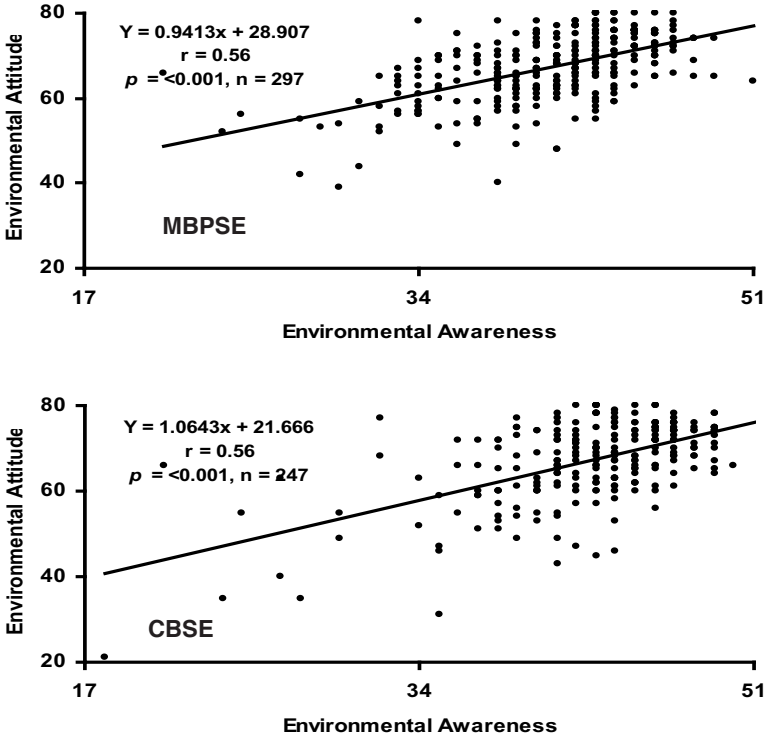
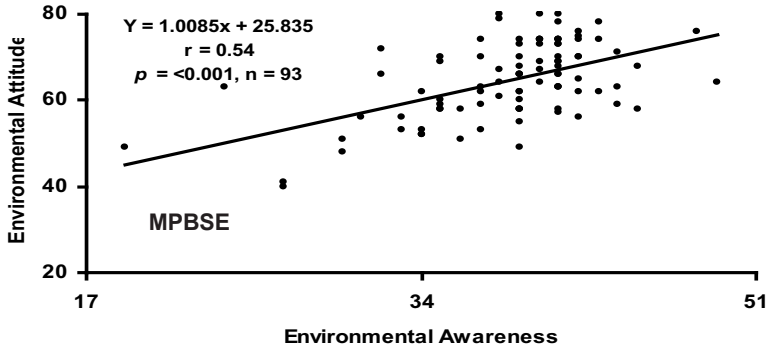


Fig. 4.2: Relationship between environmental awareness and attitude among students of commerce discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).



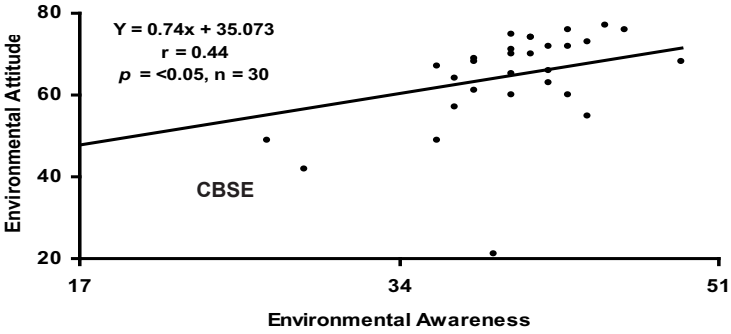


Fig. 4.3: Relationship between environmental awareness and attitude among students of humanities discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

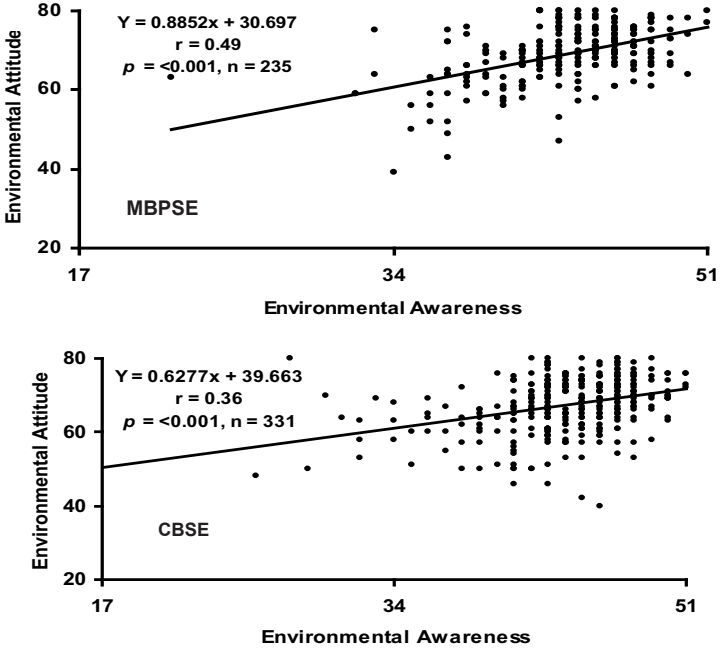


Fig. 4.4: Relationship between environmental awareness and attitude among students of mathematics discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

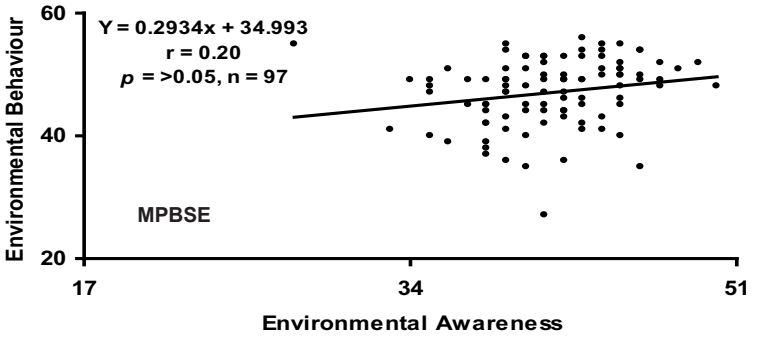
4.1.5 Relationship between Environmental Awareness and Behaviour

The students of biology discipline recorded a positive relationship between the two variables, which was significant only in case of CBSE (Fig. 4.5). The coefficient of determination ($\mathbf{R^2}$) was only 0.04 for MPBSE and 0.078 for CBSE, could explain only 4 to 8% of the variance of environmental behaviour.

The students of commerce discipline recorded a significant positive relationship between environmental awareness and behaviour (p = <0.001, Fig. 4.6). The coefficient of determination ($\mathbf{R^2}$) was 0.185 and 0.16, respectively, for MPBSE and CBSE students, and therefore could explain 16 to 19% of the variance of environmental behaviour of commerce discipline.

The students of humanities discipline recorded a positive relationship between environmental awareness and behaviour, which was significant only for MPBSE (Fig. 4.7). The coefficient of determination ($\mathbf{R^2}$) was 0.221 for MPBSE and 0.068 for CBSE students, explaining 7 to 22% of the variance in environmental behaviour.

The students of mathematics discipline recorded a positive relationship between environmental awareness and behaviour, which was significant only in case of CBSE (Fig. 4.8). The coefficient of determination ($\mathbf{R^2}$) was 0.109 and 0.023, respectively, for CBSE and MPBSE students. Therefore, environmental awareness could explain only negligible variance of environmental behaviour of mathematics discipline.



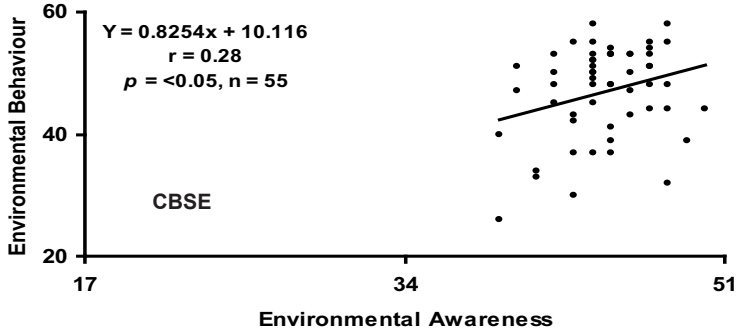


Fig. 4.5: Relationship between environmental awareness and behaviour among students of biology discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

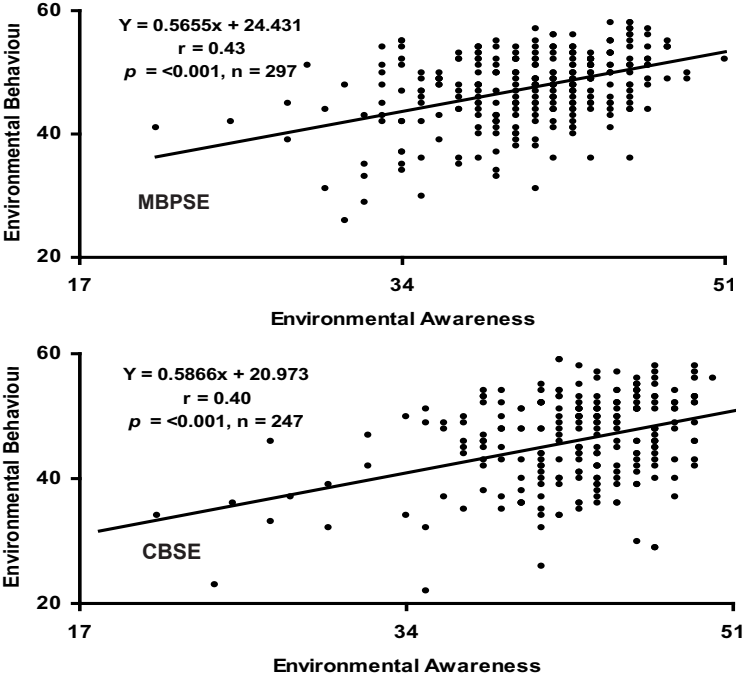


Fig. 4.6: Relationship between environmental awareness and behaviour among students of commerce discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**,

n = Number of Observations).

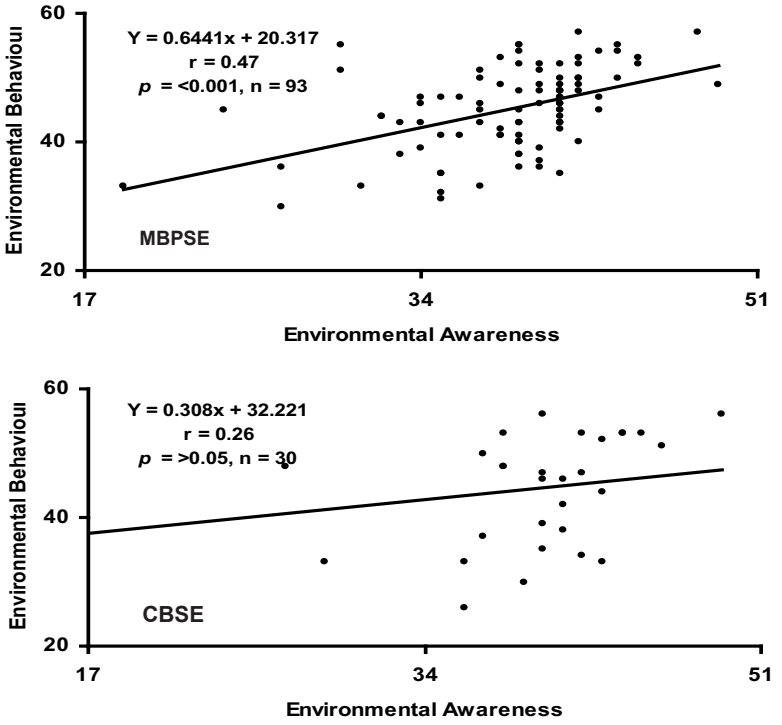
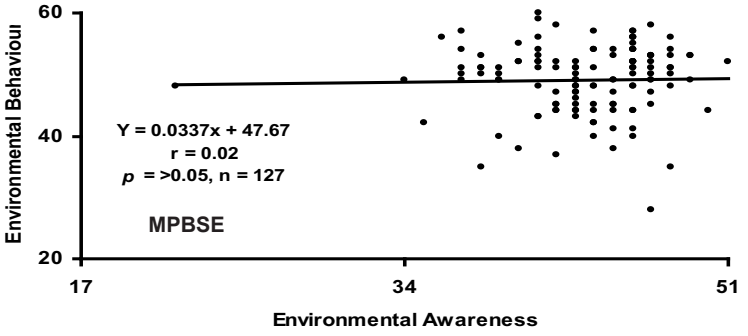


Fig. 4.7: Relationship between environmental awareness and behaviour among students of humanities discipline (r = Correlation Coefficient, ***p*** = Significance Level of r, n = Number of Observations).



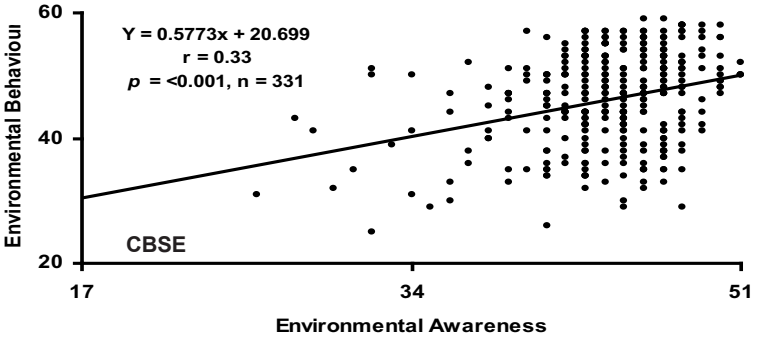


Fig. 4.8: Relationship between environmental awareness and behaviour among students of mathematics discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

4.1.6 Relationship between Environmental Attitude and Behaviour

The students of biology discipline in MPBSE recorded insignificant relationship but those in CBSE a significant positive relationship between the two variables (Fig. 4.9). The coefficient of determination ($\mathbf{R^2}$) was 0.103 and 0.003 for students of CBSE and MPBSE, respectively, and could explain the negligible variance in environmental behaviour of students of biology discipline.

The students of commerce discipline recorded a significant positive relationship between the two variables, which was comparable between both the boards (Fig. 4.10). The coefficient of determination ($\mathbf{R^2}$) was 0.152 and 0.096 for CBSE and MPBSE students, respectively. Therefore, environmental attitude explained only 10 to 15% of the variance of environmental behaviour in students of commerce discipline.

The students of humanities discipline belonging to both the boards recorded a significant positive relationship between the two variables (Fig. 4.11). The coefficient of determination ($\mathbf{R^2}$) was 0.16 and 0.084 for CBSE and MPBSE, respectively.

Therefore, environmental attitude explained only 8 to 16% of the variance of environmental behaviour in humanities.

The students of mathematics discipline affiliated to both the boards recorded a significant positive relationship between the two variables (Fig. 4.12). The coefficient of determination ($\mathbf{R^2}$) was 0.084 for CBSE and 0.032 for MPBSE. Therefore, environmental attitude could explain only negligible amount of the variance of environmental behaviour in students of mathematics discipline.

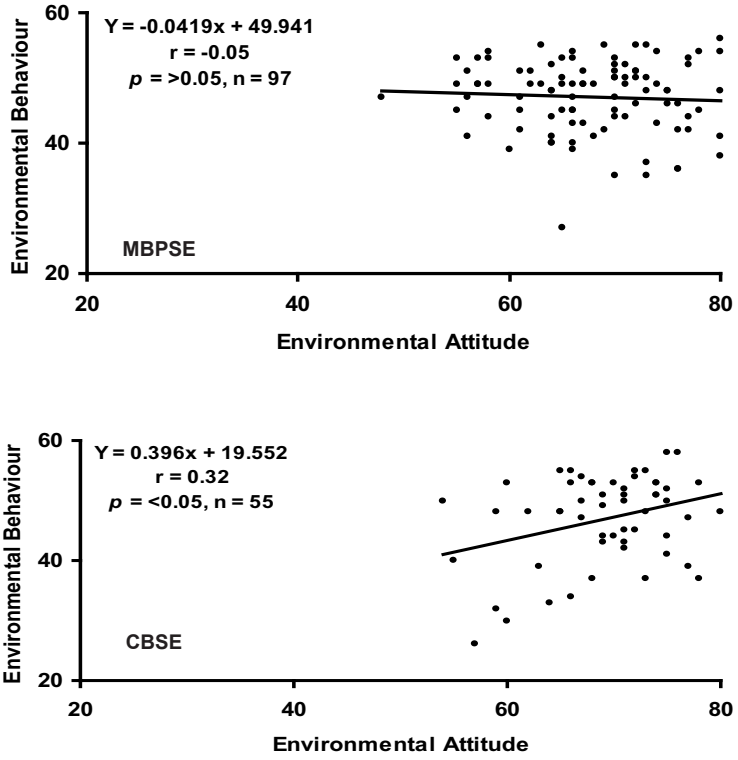
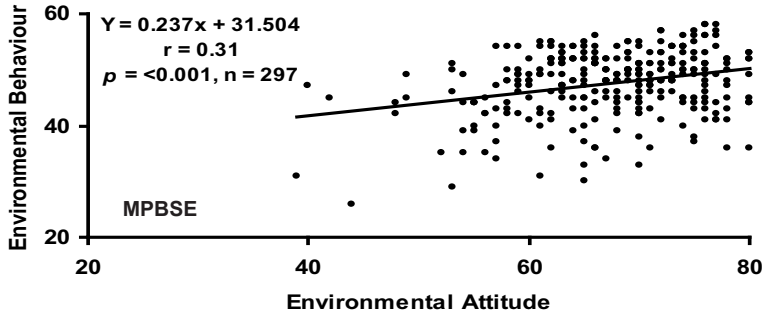


Fig. 4.9: Relationship between environmental attitude and behaviour among students of biology discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).



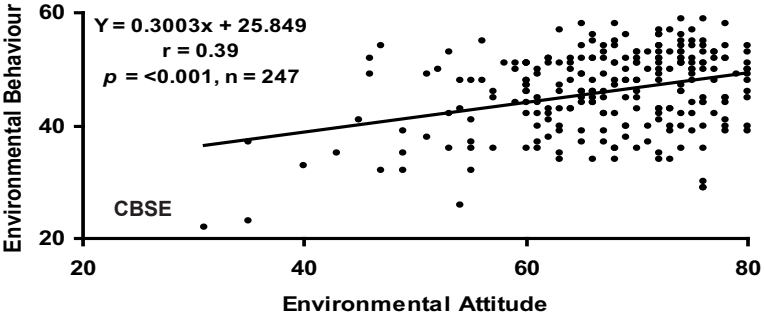
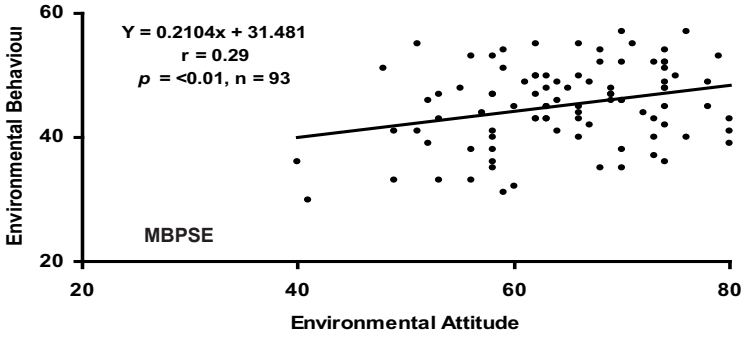


Fig. 4.10: Relationship between environmental attitude and behaviour among students of commerce discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of r, **n** = Number of Observations).



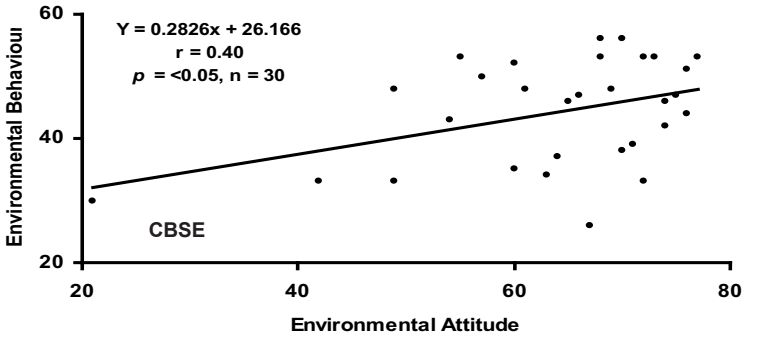


Fig. 4.11: Relationship between environmental attitude and behaviour among students of humanities discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

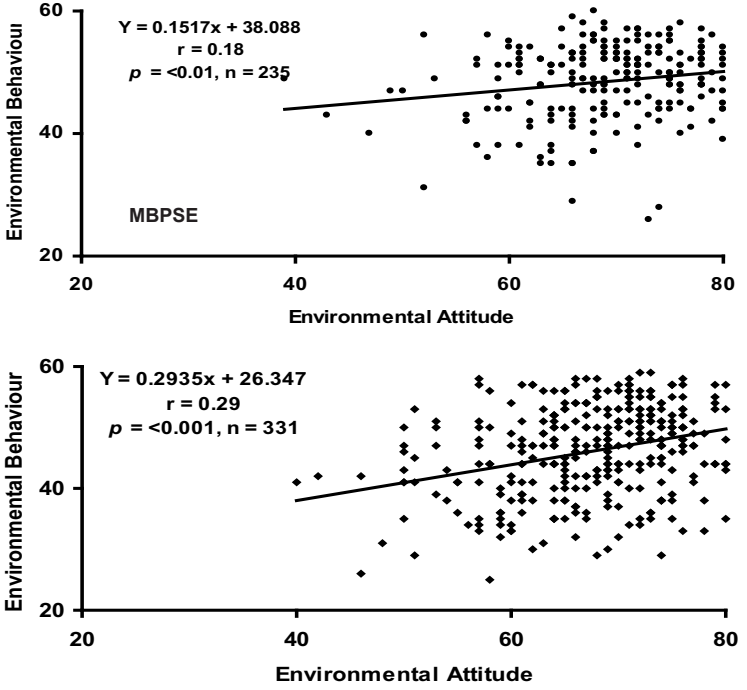


Fig. 4.12: Relationship between environmental attitude and behaviour among students of mathematics discipline (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

4.2 DISCUSSION OF RESULTS

The detailed statistical analysis of the results now leads to the detailed discussion of results, building the base for verification of hypothesis on the basis of analysis and discussion of results.

4.2.1 Environmental Awareness

Majority of boys and girls exhibited high levels of environmental awareness, while none of them recorded the low levels. These results are consistent with those reported by the earlier researchers (Choubey, 1998; Soni, 2004; Kumari *et al*., 2006; Verma and Singhal, 2008). Such findings clearly denote that the inclusion of environmental education in the syllabi of primary and secondary classes since last two decades have considerably improved environmental knowledge of the students. The intense national and international efforts in improving the quality of environmental education appear to be paying rich dividends now (United Nations Educational, Scientific and Cultural Organization's Conference on Environmental Education at Tbilisi, 1987; Saxena, 1986; The Brundtland Report, 1987; Sarabhai *et al*., 2002; Sharma, 2006; Shrivastava, 2007).

The Central Board of Secondary Education seems to have a better designed and comprehensive syllabus of environmental education relative to that of the M.P. Board, since the students affiliated with the Central Board showed a significantly higher level of environmental awareness than their counterparts studying with the M.P. Board across all the disciplines and both the genders. Another plausible reason for such differences between the two boards may be the levels of subject's well being, income inequality and competence of the concerned parents. Since parents of most of the students of the Central Board are the employee of the Government of India, the students studying in the schools affiliated with the Central Board generally belong to more prosperous families having better educated and competent parents in comparison with those affiliated to the M.P. Board.

The impact of quality of the syllabi imparting environmental education on the level of environmental awareness has been further demonstrated by the observed significant differences in environmental awareness of students pursuing various disciplines of study. The students of the humanities discipline recorded the minimum, whereas those of biology and mathematics disciplines showed the maximum level of environmental awareness. Similar findings have earlier been reported by the other researchers (Ushadevi and Dhanya, 2009; Ziadat, 2010). Despite the well established fact that girls are more perseverant towards their families and environment in comparison with the boys, the girls failed to record significantly higher environmental awareness in comparison to the boys. There are conflicting reports about gender differences in environmental awareness. For example, Soni (2004) and Ushadevi and Dhanya (2009) reported insignificant differences between the two genders, while others like Verma and Singhal (2008) and Ziadat (2010) found females to have better environmental awareness than the males. Since, the male and female students of both the boards are taught the similar curricula in the same way, there is no rationale for the gender differences in environmental awareness.

These results may support the earlier notions that the degree of urbanization, the level of subjective well being and the level of income inequality have direct effects on environmental awareness (Duroy, 2005). The role of families, societies, teachers and media in communicating enthusiasm and awareness about environmental action to the young people are the important factors in development of environmental awareness among the higher secondary students (Wray-Lake *et al*., 2008). The level of environmental awareness in turn can play a pivotal role in ensuring the sustainable development of any country (The Brundtland Report, 1987).

4.2.2 Environmental Attitude

Majority of students from both the Boards have shown favourable to most favourable environmental attitude,

while a small minority (<18% of the students) recorded the unfavourable attitude. Environmental attitude did not differ between the Central and M.P. Boards. Al-Rabaani and Al-Mekhlafi (2008) also found that students' attitude towards environmental problems was not influenced by different schools. These results may denote that family background or well being of the subjects has no impact on the level of environmental attitude, which is in contrast what has been noted earlier in case of environmental awareness. The results of earlier researches in this respect are contradictory. Silberstein (1981) and Cohen and Wingerd (1993) found that education has a positive effect on student attitudes, while others have shown no relation between education and attitude (Al-Najede, 1990; Lyons and Breakwell, 1994).

There are the researches that found no gender differences in environmental attitude (Francis, 2001; Ushadevi and Dhanya, 2009). But the other researches, on the other hand, found that environmental attitudes are influenced by gender (Kuhn, 1979; Schahn and Holzer, 1990, Worsley & Skrzypiec, 1998; Singhal, 2008). The girls in the present study have shown a more favourable environmental attitude than the boys, which may be linked to our cultural heritage and milieu. Cultural affinity seems to play a significant role in attitude formation towards environmental concerns and problems (Kuribayashi and Aoyagi-Usui, 1998). For example, the girls are engaged in daily chores of a typical Indian home, making them more sensitive towards their environment.

The discipline of study has significantly affected the level of environmental attitude among the students, which followed an order of mathematics ≥ biology ≥ commerce ≥ humanities. These results are consistent with the earlier researches reported by others (Al-Rabaani and Al-Mekhlafi, 2008; Ushadevi and Dhanya, 2009). These results may show that actual individual commitment to protect the environment is a function of the level of education. This demonstrates that highly educated populations are more likely to be actively involved in environmental protection (Goetz *et al.*, 1998).

Arcury (2000) also assumed that increased knowledge about environment promotes positive attitudes. Most theories of attitudes have noted two components: an emotional dimension involving feelings and a cognitive aspect that refers to dispassionate facts and beliefs. An attitude is something else beyond simple facts that may be judged against other data, it has an evaluation component. This may be very deep at an emotional level, where it is called affect. Environmental affects are crucial concepts in the environmental concern domain (Maloney & Ward, 1973; Maloney *et al*., 1975).

Analyses of trends in youth attitudes toward environmental responsibility in U.S.A. revealed that they tended to see government and people in general as more responsible for environmental problems than they themselves felt. Clearly, the average high school senior across the past three decades has not viewed him or herself as the first line of defense in protecting the environment (Wray-Lake *et al*., 2008). Therefore, it appears that effective environmental education for school age students is crucial, since young people's attitude towards environment begins to develop at a very early age.

4.2.3 Environmental Behaviour

Majority of students of both the boards exhibited average to positive environmental behaviour, while a minority (<33% of the students) recorded the negative behaviour. These results are in total contrast to what has been observed in case of environmental awareness and attitude. However, these findings are consistent with those reported by other researchers (Clark *et al*., 2003; Tonglet *et al*., 2004; Kumari *et al*., 2006; Onder, 2006). The proportion of the students having positive environmental behaviour was the minimum in the discipline of humanities and the maximum in disciplines of biology and mathematics. Such results may denote that environmental knowledge, family background or/ and well-being of the subjects may not have any direct impact on environmental behaviour of the students.

Duroy (2005) showed that economic affluence had no direct impact on environmental behaviour, but education, population pressure and happiness are significantly correlated with environmental behaviour. Analyses in political science and psychology lend support to the hypothesis that environmental quality is perceived as a luxury good that gains significance only when basic needs have been met. Thus, the wealthy societies and nations are more likely to become focused on environmental behaviour than the poor ones (Inglehart, 1990, 1997). In contrast, Wray-Lake *et al.* (2008) have concluded that there was an inverse relation between trends of affluence and youth's personal environmental responsibility and conservation behaviours. Many researchers have reported that level of education (Goetz *et al*., 1998), happiness (Frey and Stutzer, 2002) and population pressure (Brechin and Kempton, 1994) raised environmental concern and subsequently improved individuals' environmental behaviour (Duroy, 2005).

Environmental behaviour was similar among students pursuing biology, commerce and mathematics disciplines, which was more positive than that recorded for humanities discipline. The students of M.P. Board revealed a more positive environmental behaviour in comparison with those of Central Board. The girls showed a higher level of environmental behaviour relative to the boys. It seems plausible that the cultural affinity and moral norms in conjunction with education standard of students may play a substantial role in shaping their environmental behaviour. As observed earlier, typical Indian girls in comparison to boys are more involved in daily chores of their home and management of family affairs, thereby making them more concerned and sensitive about their environment. Tonglet *et al.* (2004), based on a study of recycling behaviour of British society, observed that moral norms may be an important factor for recycling behaviour in addition to attitude, subjective norm and perceived control.

There are studies that suggest a multi-attribute model, where attitude is one of many attributes, better explain

environmental behaviour of people (Ajzen and Fishbein, 1980; Loudon and Della Bitta, 1993; Hini *et al.*, 1995). In fact, Kaiser *et al.* (1999) concluded that environmental knowledge, environmental values and ecological behaviour intention were the most important drivers of environmental behaviour. Environmental knowledge and values are significant preconditions of ecological behaviour intentions. Ecological behaviour intention is the most powerful predictor of environmental behaviour.

4.2.4 Relationship between Environmental Awareness and Attitude

Environmental awareness is significantly positively related with environmental attitude of male and female students belonging to different disciplines as well as both the boards of secondary education. The average correlation was 0.54 for students of the M.P. Board, with the results varying narrowly from 0.43 to 0.62. The average correlation for students of the Central Board was 0.44, though the results fluctuated widely between 0.09 and 0.75. The average correlation of the present study is far better than 0.28 reported for student – teachers from Kerala by Ushadevi and Dhanya (2009). These results may substantiate the hypothesis that environmental knowledge and values are significant factors affecting environmental attitude of populations (Kuribayashi and Aoyagi-Usui, 1998; Arcury, 2000; Singh, 2003; Kalantari *et al.*, 2007). However, Kumari *et al.* (2006) reported no correlation of environmental awareness with environmental attitude of higher secondary students from Uttar Pradesh.

Despite a highly significant correlation, environmental awareness can explain only 19 to 29% of the variance of environmental attitude, signifying the role of other regulatory variables in formation and prediction of environmental attitude. This may denote that environmental knowledge and values may not be only factors that shape one's attitude towards environment. The cultural affinity, commitment towards environmental conservation and life's priorities

may play a pivotal role in evolution of individuals' attitude towards environment. For example in a comparison of Thai and Japanese societies with respect to their environmental attitudes, Kuribayashi and Aoyagi-Usui (1998) concluded that Thai residents were more closely aligned with Americans rather than Japanese in their environmental attitudes. Individual commitment of the population to improve their environment in developing countries appears to lag far behind than their counterparts living in developed nations (Ziadat, 2010).

Environmental quality is perceived more as a luxury good that attracts people only when their basic needs have been met. As the western countries have reaped benefits of industrialization by becoming prosperous and rich, they have become more concerned with their environment focusing on improved quality of life (Inglehart, 1997). These results may demonstrate what some researches have argued: highly educated populations are more likely to be actively involved in environmental protection (Goetz *et al*., 1998), and happier people are more likely to commit to preservation of environment regardless of the level of their affluence (Frey and Stutzer, 2002).

4.2.5 Relationship between Environmental Awareness and Behaviour

A highly significant linear positive correlation between environmental awareness and behaviour may indicate that there is a link stronger than chance between the two variables among higher secondary students under the study. But a weak correlation between the two variables ($R^2 \sim 0.12$) denote that environmental awareness can not be a useful predictor of environmental behaviour. Many other studies have also not reported a significant correlation between the two variables (Kumari *et al*., 2006; Kalantari *et al*., 2007). This is in contrast to widely-held belief that environmental awareness plays a significant role in strengthening the sustainable development of any country (The Brundtland Report, 1987). Kaiser *et al.* (1999) also supported the notion

that environmental knowledge and environmental values are significant preconditions of ecological behaviour intentions, as 40% of the variance of ecological behaviour intentions was explained by these two variables. A wide variation in the strength of correlation between environmental awareness and behaviour across students pursuing different disciplines of study appears to have brought down the strength of average relationship between the two variables.

Although there is little evidence to support the awareness-behaviour assumption, this may not indicate that such a link does not exist, or that there is no causal relationship between awareness and behaviour. Environmental knowledge may, therefore, not be the driving variable for a suitable environmental behaviour. Moral norms (Tonglet *et al*., 2004), the sense of environmental stress (Kalantari *et al*., 2007) and the degree of commitment and responsibility (Wray-Lake *et al*., 2008) may be important determinants of environmental behaviour in comparison with environmental awareness alone.

4.2.6 Relationship between Environmental Attitude and Behaviour

A highly significant correlation between environmental attitude and behaviour observed in this research is consistent with the widely held notion that environmental attitude is a powerful predictor of environmental behaviour (Kaiser *et al*., 1999; Clark *et al*., 2003; Tonglet *et al*., 2004; Hini *et al*., 2005; Kumari *et al*., 2006; Kalantari *et al*., 2007). However, a very weak relationship (e.g. average R^2 varying from 6 to 10%) may imply that environmental attitude may not be a useful predictor of environmental behaviour, especially for the Indian youth. Attitude theory suggests that attitudes that are specifically related to a particular behaviour should be better predictors of that behaviour than general attitudes (Ajzen and Fishbein, 1980). However, the overall predictive power of the specific attitudes may not be better than that achieved using general attitudes to predict behaviours (Hini *et al*., 2005). Generally, two types of environmental attitudes have been used to predict environmental behaviour: (i) attitudes

towards environment, and (ii) attitudes towards ecological behaviour (Hines *et al*., 1987).

In face of the mounting empirical support against a simple causal link between environmental attitudes and behaviours, a more complex model of attitude-behaviour relationship (i.e., Fishbein's Attitude Model) has been developed to maximize this relationship. In Fishbein's Behavioural Intention Model, behaviour is sometimes considered equivalent to behaviour intention, which is a weighted sum of attitudes to performing a behaviour and subjective norms regarding the behaviour. Kaiser *et al*. (1999) in a pioneering study established that environmental knowledge and values had a strong correlation between them, which explained a significant amount of variance of environmental behaviour intention. The latter could explain as much as 75% of the variance of general ecological behaviour. Tonglet *et al*. (2004) reported that inclusion of additional factors of the moral norm, situational factors, concern for the environment and recycling outcomes in the traditional theory of planned behaviour model of attitude, subjective norm and perceived control has considerably improved its predictive power for recycling behaviour of the society.

GreenCOM (2001) observes that raising public awareness or fostering positive attitudes about a problem or issue does not ensure that people will act on that new knowledge and awareness. Despite increased knowledge and positive attitudes, majority of people still act in ways that they know they shouldn't. Lucas *et al*. (2008) seem to have made very relevant recommendations in this respect: (i) people should be directly involved in a policy with responsibility for delivery, (ii) policy must simultaneously tackle several aspects of behaviour at multiple levels, and (iii) policies must pull in the same direction making them legitimate to the target audience.

The present study unambiguously proves that introduction of environmental education at primary and secondary levels of education have considerably improved environmental awareness and attitude of the Indian youth.

But this in turn has not improved their environmental behaviour. The widely popular Theory of Planned Behaviour seems to be more relevant for social behaviour rather than environmental behaviour. Environmental behaviour is a complex phenomenon that involves not only the knowledge, attitude and behaviour intention but also the firm commitment and moral norms about the preservation of environmental quality. Situational factors coupled with the earlier experiences, sense of environmental stress and likely outcomes of the sustainable environmental actions are the strong motivators for a favourable environmental behaviour. Our adolescent as well as young students should be made direct stakeholders in environmental improvement exercises in order to make them empowered environment-conscious citizens. Such an environment responsible society may be the appropriate custodian of our rich biodiversity and heritage.

VERIFICATION OF HYPOTHESES

HYPOTHESIS 1.1

There is no difference in environmental awareness of students between CBSE and MPBSE.

The critical ratio of the difference in mean environmental awareness of the boys between the two boards was significant ($p < 0.05$, Table 4.4c). Hence, there is a difference in environmental awareness among boys between the two boards, and boys of CBSE have a better environmental awareness than those of MPBSE (Fig. 4.13).

The critical ratio of the difference in mean environmental awareness of the girls between the two boards was highly significant ($p < 0.001$, Table 4.4c). Hence, there is a difference in environmental awareness of girls between the two boards. The girls of CBSE have a better environmental awareness than that of MPBSE (Fig. 4.13).

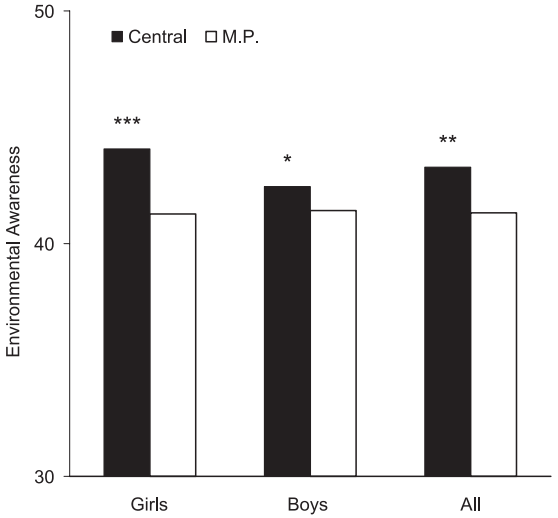


Fig. 4.13: Comparison of mean environmental awareness of male, female and all students between the Central and M.P. Board of Secondary Education (* p = <0.05; ** p = <0.01; *** p = <0.001).

The critical ratio of the difference between mean environmental awareness of all students between the two boards was highly significant ($p < 0.001$, Table 4.4c), signifying differences between the two boards. The students of CBSE have a better environmental awareness than those of MPBSE (Fig. 4.13).

Therefore, the hypothesis that **"there is no difference in environmental awareness of the students between CBSE and MPBSE"** is rejected, denoting that there is a difference in environmental awareness of students between the two boards.

HYPOTHESIS 1.2

There is no difference in environmental attitude of students between CBSE and MPBSE.

The critical ratio of the difference in mean environmental attitude of boys between the two boards was insignificant ($p > 0.05$, Table 4.8c). Hence, there is no difference in mean

environmental attitude of boys between the two boards (Fig. 4.14).

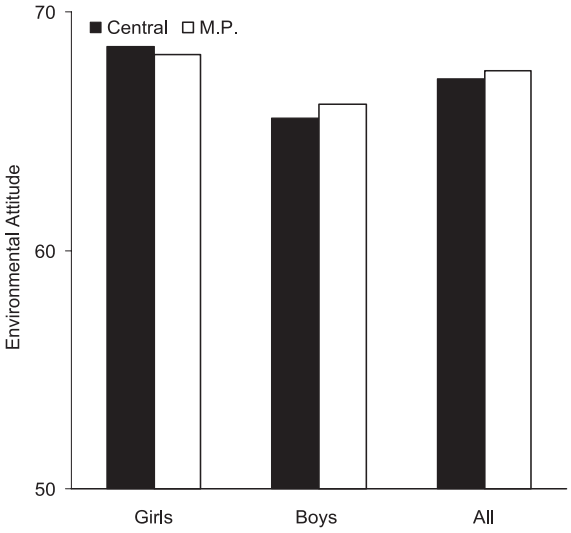


Fig. 4.14: Comparison of mean environmental attitude of male, female and all students between the Central and M.P. Board of Secondary Education
(***p*** = <0.05; ****p*** = <0.01; ***** ***p*** = <0.001).

The critical ratio of the difference in mean environmental attitude of girls between the two boards was insignificant (***p*** > 0.05, Table 4.8c). Hence, there is no difference in mean environmental attitude of boys between the two boards (Fig. 4.14).

The critical ratio of the difference in mean environmental attitude of all students between the two boards was insignificant (p > 0.05, Table 4.8c). Hence, there is no difference in mean environmental attitude of boys between the two boards (Fig. 4.14).

Therefore, the hypothesis that "**there is no difference in environmental attitude of the students between CBSE and MPBSE**" is accepted. It may be concluded that environmental attitude of students does not differ between CBSE and MPBSE.

HYPOTHESIS 1.3

There is no difference in environmental behaviour of students between CBSE and MPBSE.

The critical ratio of the difference in mean environmental behaviour of boys between the two boards was highly significant ($p < 0.001$, Table 4.12c). Hence, there is a difference in mean environmental behaviour of boys between the two boards. The boys of MPBSE have a better score than that of CBSE (Fig. 4.15).

The critical ratio of the difference in mean environmental behaviour of girls between the two boards was insignificant ($p > 0.05$, Table 4.12c). Hence, there is no difference in mean environmental attitude of girls between the two boards (Fig. 4.15).

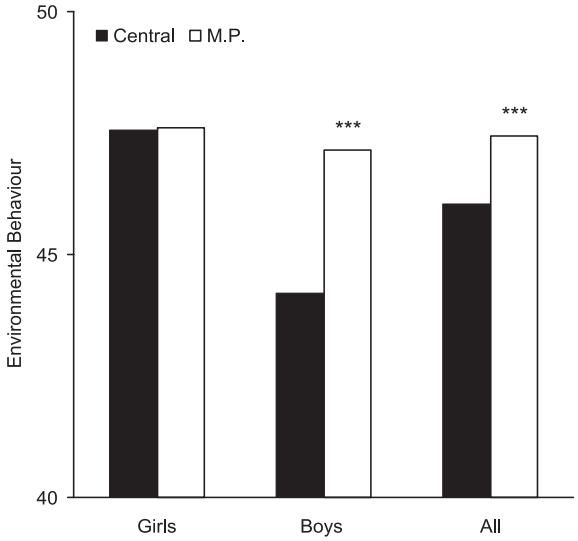


Fig. 4.15: Comparison of mean environmental behaviour of male, female and all students between the Central and M.P. Board of Secondary Education
(*p = <0.05; **p = <0.01; *** p = <0.001).

The critical ratio of the difference in mean environmental behaviour of all students between the two boards was highly significant ($p < 0.001$, Table 4.12c). Hence, there is a difference in mean environmental behaviour of all students between the two boards. The students of MPBSE have a better behaviour than that of CBSE (Fig. 4.15).

Therefore, the hypothesis that "there is no difference in environmental behaviour of the students between CBSE and MPBSE" is rejected. It may be concluded that environmental behaviour of the students significantly differs between CBSE and MPBSE.

HYPOTHESIS 2.1

There is no difference in environmental awareness of students pursuing biology, commerce, humanities and mathematics disciplines.

The '**F**' ratio of the differences in mean environmental awareness of MPBSE students among different disciplines was highly significant ($\boldsymbol{p} < 0.001$, Table 4.1d). Hence, there are differences in mean environmental awareness of students belonging to various disciplines. The mean scores were ranked in the order of humanities < commerce ≤ biology < mathematics ($p = <0.05$; Fig. 4.16), with the minimum in humanities and the maximum in mathematics discipline.

The '**F**' ratio of the differences in mean environmental awareness of CBSE students among different disciplines was highly significant ($\boldsymbol{p} < 0.001$, Table 4.2d). Hence, there are differences in mean environmental awareness of students among various disciplines. The students of CBSE recorded similar environmental behaviour ($\boldsymbol{p} = > 0.05$) among biology, commerce and mathematics disciplines, which was better than that of humanities ($\boldsymbol{p} = <0.05$, Fig. 4.16).

Therefore, the hypothesis that "**there is no difference in environmental awareness of students belonging to biology, commerce, humanities and mathematics streams**" is rejected. It may be concluded that environmental awareness

of students of both the boards significantly differs according to their discipline of study.

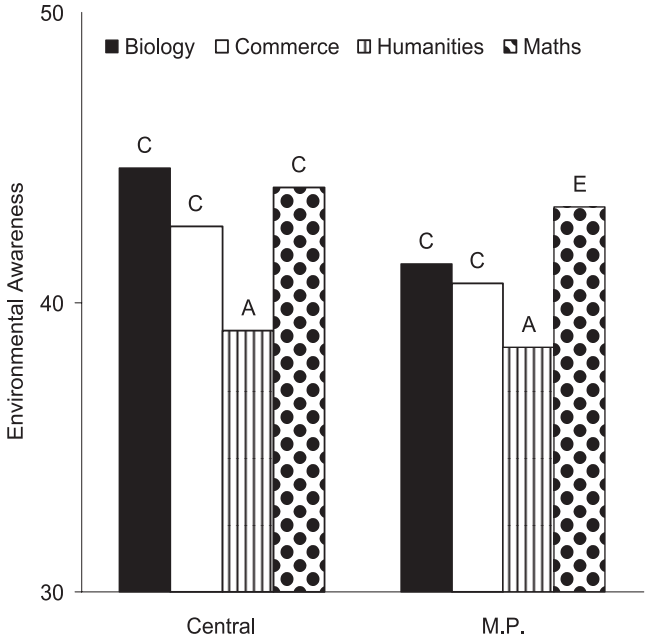


Fig. 4.16: Comparison of mean environmental awareness of students among different disciplines in the Central and M.P. Board of Secondary Education. Means that differ significantly between disciplines at p = <0.05 are indicated by different alphabets.

HYPOTHESIS 2.2

There is no difference in environmental attitude of students pursuing biology, commerce, humanities and mathematics disciplines.

The '**F**' ratio of the differences in mean environmental attitude among students of various disciplines in MPBSE schools was highly significant (p < 0.001, Table 4.5d). Hence, there are differences in mean environmental attitude of students belonging to various disciplines. The mean score of MPBSE students was the minimum in humanities and the

maximum in mathematics discipline, following an order of humanities < commerce < biology ≤ mathematics (p = < 0.05, Fig. 4.17).

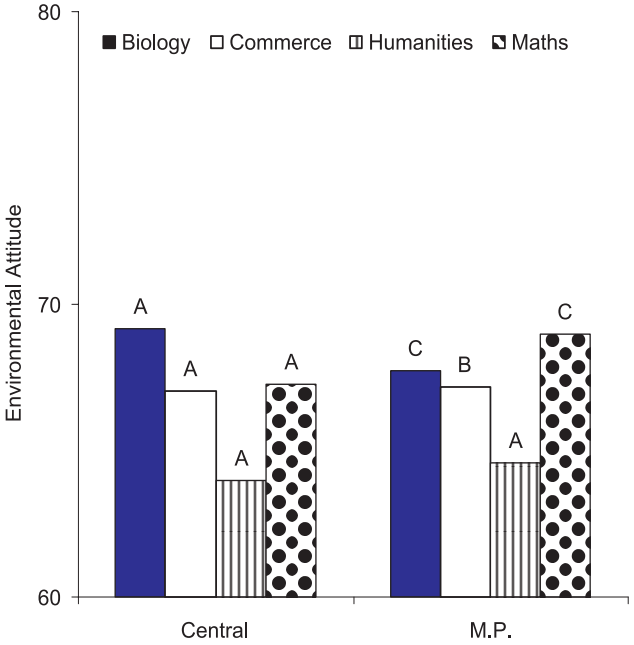


Fig. 4.17: Comparison of mean environmental attitude of students among different disciplines in the Central and M.P. Board of Secondary Education. Means that differ significantly between disciplines at p = <0.05 are indicated by different alphabets.

The '**F**' ratio of the differences in mean environmental attitude among students of different disciplines in CBSE schools was not significant (p = > 0.05, Table 4.6d). Hence, there are no differences in environmental attitude of CBSE students among various disciplines. The students of humanities recorded the minimum and those of the biology discipline recorded the maximum score (p = >0.05, Fig. 4.17).

Therefore, the hypothesis that "**there is no difference in environmental attitude of students pursuing biology, commerce, humanities and mathematics discipline**" is rejected

in case of MPBSE and accepted in case of CBSE students. It may be concluded that environmental attitude of MPBSE students differs significantly according to their discipline of study, but the same is not true for CBSE students. However, environmental attitude was ranked in the order of humanities ≤ commerce ≤ biology ≤ mathematics for both the boards.

HYPOTHESIS 2.3

There is no difference in environmental behaviour of students pursuing biology, commerce, humanities and mathematics disciplines.

The '**F**' ratio of the differences in the mean environmental behaviour of MPBSE students in various disciplines was highly significant (p < 0.001, Table 4.9d). Hence, there are differences in mean environmental behaviour of students according to disciplines. The mean behaviour of MPBSE students was statistically similar among biology, commerce and mathematics (p = > 0.05, Fig. 4.18), which was higher than that of humanities discipline (p = < 0.05, Fig. 4.18). The mean behaviour of MPBSE students was found in the order of humanities < commerce ≤ biology ≤ mathematics (p = < 0.05, Fig. 4.18).

The '**F**' ratio of the differences in mean environmental behaviour of CBSE students in different disciplines was insignificant (p = > 0.05, Table 4.10d), denoting no differences in environmental attitude of CBSE students according to disciplines. The humanities students recorded the minimum and those of biology discipline recorded the maximum value of behaviour, ranking as humanities ≤ commerce ≤ mathematics ≤ biology (p = > 0.05; Fig. 4.18).

Therefore, the hypothesis that "**there is no difference in environmental behaviour of students pursuing biology, commerce, humanities and mathematics disciplines**" is rejected for MPBSE and accepted for CBSE. It may be concluded that behaviour of students significantly differs according to their discipline of study only in case of the

M.P. Board. However, behaviour was ranked in same order between the two boards, i.e. humanities ≤ commerce ≤ biology ≤ mathematics.

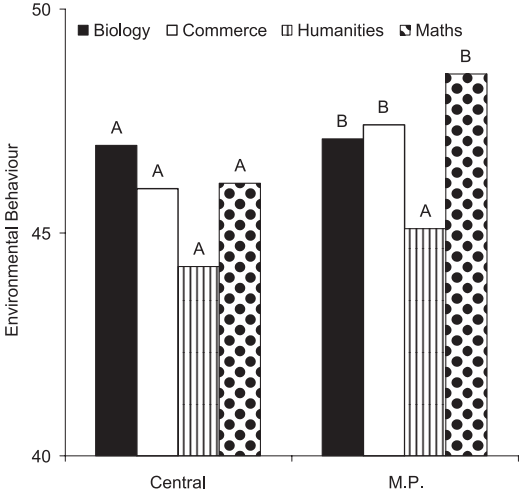


Fig. 4.18: Comparison of mean environmental behaviour of students among different disciplines in the Central and M.P. Board of Secondary Education. Means that differ significantly between disciplines at p = <0.05 are indicated by different alphabets.

HYPOTHESIS 3.1

There is no difference between male and female students in their environmental awareness.

The critical ratio of the difference in the mean environmental awareness between boys and girls of biology discipline was not significant ($p > 0.05$, Table 4.4a). Hence, there is no difference in mean environmental awareness between boys and girls of biology discipline (Fig. 4.19).

The critical ratio of the difference in the mean score between boys and girls of commerce discipline was highly significant ($p < 0.001$, Table 4.4a). Hence, there is a difference in mean environmental awareness between boys and girls of commerce discipline, where girls were better than boys (Fig. 4.19).

The critical ratio of the difference in the mean environmental awareness between boys and girls of humanities discipline was not significant (p > 0.05, Table 4.4a). Hence, there is no difference in mean environmental awareness between boys and girls of humanities discipline (Fig. 4.19).

The critical ratio of the difference between the mean environmental between boys and girls of mathematics discipline was not significant (p > 0.05, Table 4.4a). Therefore, boys and girls of the humanities stream have similar levels of environmental awareness (Fig. 4.19).

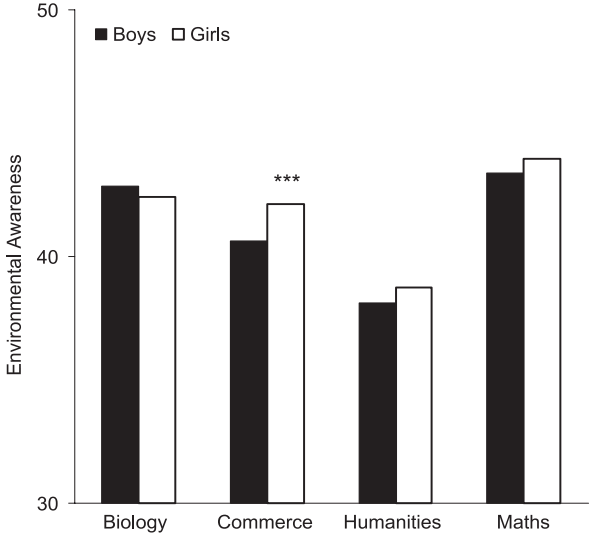


Fig. 4.19: Comparison of mean environmental awareness between male and female students of different disciplines (*p = <0.05; **p = <0.01; *** p = <0.001).

Therefore, the hypothesis that "**there is no difference between male and female students in their environmental awareness**" is accepted in biology, humanities and mathematics streams and rejected in commerce discipline. It may be concluded that environmental awareness is not different between boys and girls for all the disciplines except for commerce.

HYPOTHESIS 3.2

There is no difference between male and female students in their environmental attitude.

The critical ratio of the difference between the mean environmental attitude of boys and girls in biology discipline was significant (p < 0.05, Table 4.8a). Hence, there is a difference between boys and girls, and the latter show a better environmental attitude than that of boys (Fig. 4.20).

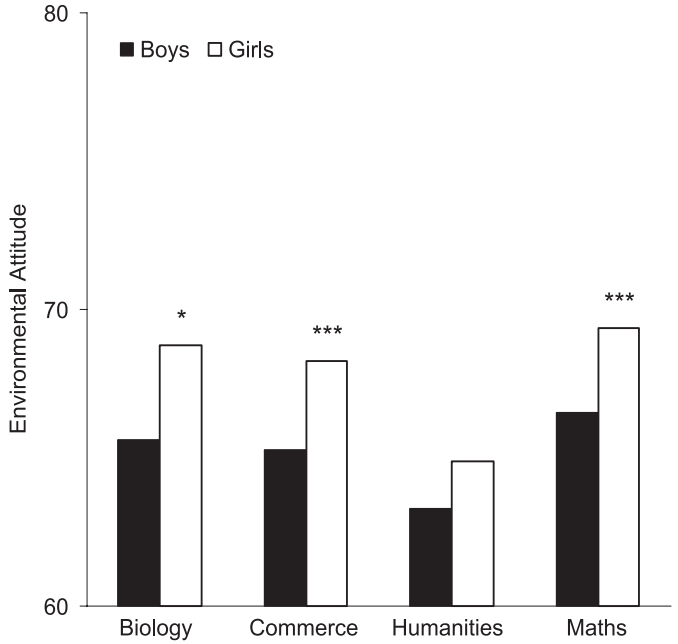


Fig. 4.20: Comparison of mean environmental attitude between male and female students of different disciplines (*p = <0.05; **p = <0.01; *** p = <0.001).

The critical ratio of the difference between the mean environmental attitude of boys and girls the commerce discipline was highly significant (p < 0.001, Table 4.8a). Hence, there is a difference between boys and girls. The girls show a better environmental attitude than that of boys (Fig. 4.20).

The critical ratio of the difference between the mean environmental attitude of boys and girls in humanities discipline was insignificant ($p > 0.05$, Table 4.8a). Therefore, boys and girls of humanities have similar levels of environmental awareness (Fig. 4.20).

The critical ratio of the difference between mean environmental attitude score of boys and girls in mathematics discipline was highly significant ($p < 0.001$, Table 4.8a). Hence, there is a difference between boys and girls. The girls show a better environmental attitude than boys (Fig. 4.20).

Therefore, the hypothesis that "**there is no difference between male and female students in their environmental attitude**" is rejected for biology, commerce and mathematics disciplines and accepted only for humanities. It may be concluded that environmental attitude is different between boys and girls of all the disciplines except for humanities, and girls are better than boys.

HYPOTHESIS 3.3

There is no difference between male and female students in their environmental behaviour.

The critical ratio of the difference between the mean environmental behaviour of boys and girls in biology discipline was insignificant ($p > 0.05$, Table 4.12a). Hence, there is no difference in mean environmental behaviour between boys and girls (Fig. 4.21).

The critical ratio of the difference between the mean environmental behaviour of boys and girls in commerce discipline was insignificant ($p < 0.05$, Table 4.12a). Hence, there is a difference in mean environmental attitude between boys and girls. The girls show a more positive environmental behaviour than boys (Fig. 4.21).

The critical ratio of the difference between the mean environmental behaviour of boys and girls in humanities discipline was significant ($p < 0.05$, Table 4.12a). Therefore,

there is a difference in environmental behaviour of boys and girls, and the latter were more positive than boys (Fig. 4.21).

The critical ratio of the difference between the mean environmental behaviour of boys and girls in mathematics discipline was highly significant ($p < 0.001$, Table 4.12a). Therefore, there is a difference in environmental behaviour of boys and girls. The girls of mathematics have a more positive environmental behaviour than boys (Fig. 4.21).

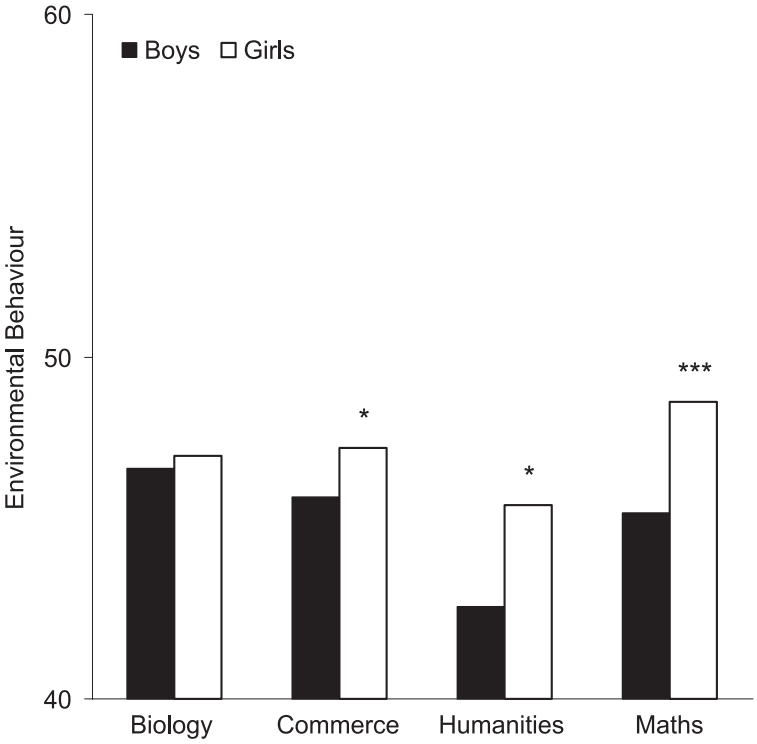


Fig. 4.21: Comparison of mean environmental behaviour between male and female students of different disciplines (***p*** = <0.05; ****p*** = <0.01; ***** ***p*** = <0.001).

Therefore, the hypothesis that "**there is no difference between male and female students in their environmental behaviour**" is rejected in case of commerce, humanities and

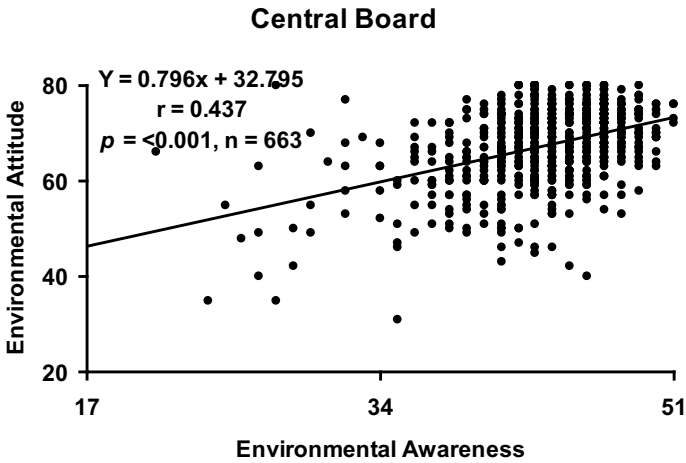
mathematics disciplines and accepted in case of biology. It may be concluded that environmental behaviour of boys and girls is different and girls are more positive than boys in all the disciplines except for biology.

HYPOTHESIS 4.1

There is no relationship between environmental awareness and environmental attitude of students.

There is a significant positive linear correlation between environmental awareness and attitude of CBSE students (**r** = 0.437, $p < 0.001$; Fig. 4.22). Hence, there is a relationship between environmental awareness and attitude. The coefficient of determination ($\mathbf{R^2}$) was 0.191, implying that environmental awareness could explain only 19% of the variance of environmental attitude of CBSE students.

There is a significant positive linear correlation between environmental awareness and attitude of MPBSE students (r = 0.538, $p < 0.001$; Fig. 4.22). Hence, there is a relationship between environmental awareness and attitude. The coefficient of determination (R^2) was 0.289, implying that environmental awareness could explain 29% of the variance of environmental attitude of MPBSE students.



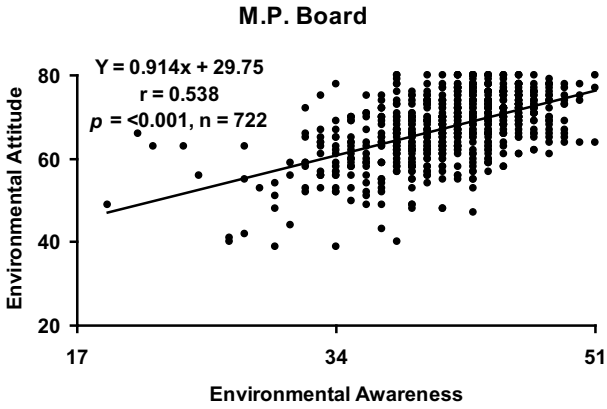


Fig. 4.22: Relationship between environmental awareness and attitude of students in both the boards (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

Therefore, the hypothesis that "**there is no relationship between environmental awareness and environmental attitude of students**" is rejected for both the boards. It may be concluded that environmental attitude of the students is positively related with their environmental awareness.

HYPOTHESIS 4.2

There is no relationship between environmental awareness and environmental behaviour of students.

There is a significant positive linear correlation between environmental awareness and behaviour of CBSE students (**r** = 0.334, ***p*** < 0.001; Fig. 4.23). Hence, there is a relationship between environmental awareness and behaviour. The coefficient of determination ($\mathbf{R^2}$) was 0.112, implying that environmental awareness could explain only 11% of the variance of environmental behaviour of CBSE students.

There is a significant positive linear correlation between environmental awareness and behaviour of the students affiliated with the M.P. Board (r = 0.346, ***p*** < 0.001; Fig. 23). Hence, there is a relationship between environmental awareness and behaviour. The coefficient of determination

(R^2) was 0.12, denoting that environmental awareness could explain only 12% of the variance of environmental behaviour of MPBSE students.

Therefore, the hypothesis that "there is no relationship between environmental awareness and environmental behaviour of students" is rejected for both the boards. It may be concluded that environmental behaviour of the students is positively related with their environmental awareness.

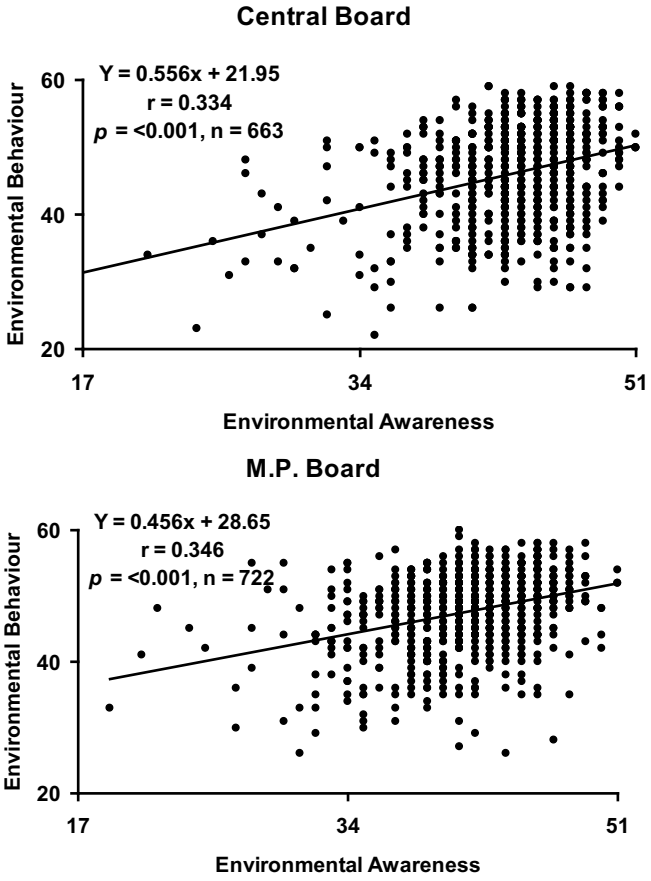


Fig. 4.23: Relationship between environmental awareness and behaviour of students in both the boards (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

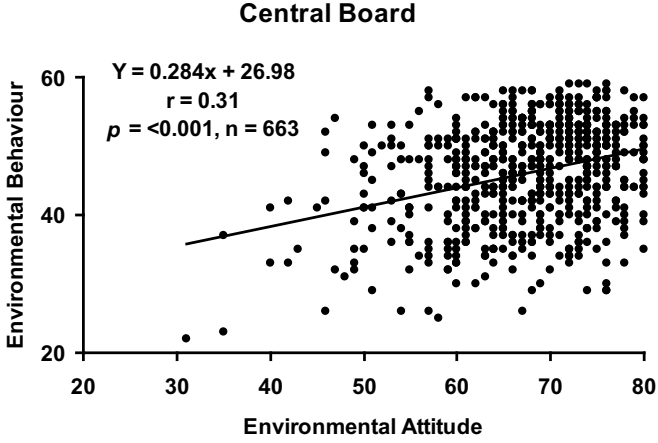
HYPOTHESIS 4.3

There is no relationship between environmental attitude and environmental behaviour of students.

There is a significant positive linear correlation between environmental attitude and behaviour of the students affiliated with the Central Board (**r** = 0.31, $p < 0.001$; Fig. 4.24). Hence, there is a relationship between environmental attitude and behaviour. The coefficient of determination ($\mathbf{R^2}$) was 0.096, implying that environmental attitude could explain only 10% of the variance of environmental behaviour of CBSE students.

There is a significant positive linear correlation between environmental awareness and behaviour of the students affiliated with the M.P. Board (r = 0.234, $p < 0.001$; Fig. 4.24). Hence, there is a relationship between environmental attitude and behaviour. The coefficient of determination (R^2) was 0.055, implying that environmental attitude could explain only 6% of the variance of environmental behaviour of MPBSE students.

Therefore, the hypothesis that "there is no relationship between environmental attitude and environmental behaviour of students" is rejected for both the boards. It may be concluded that environmental behaviour of students is positively related with their environmental attitude.



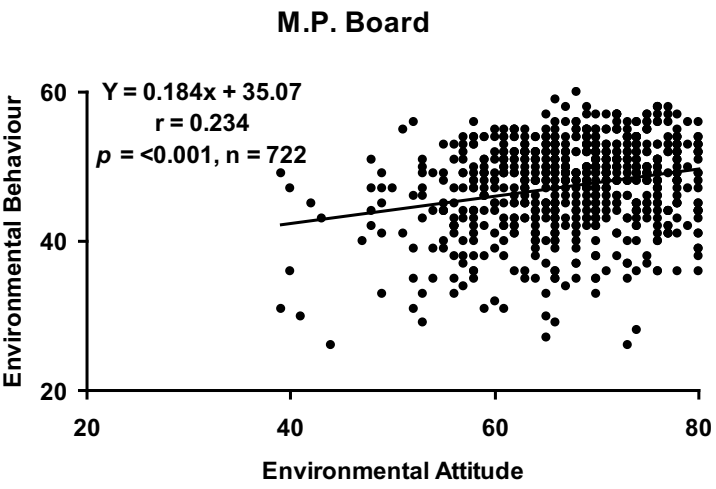


Fig. 4.24: Relationship between environmental attitude and behaviour of students in both the boards (**r** = Correlation Coefficient, ***p*** = Significance Level of **r**, **n** = Number of Observations).

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Chapter 5

CONCLUSIONS AND SUGGESTIONS

5.1 CONCLUSIONS

On the basis of results obtained by the researcher, the following conclusions are made:

1. Environmental awareness ranged from 19 to 51 among the boys and 21 to 51 among the girls on a scale of 0 to 51. According to norms of the test, majority of students (≥ 70%) recorded high awareness (i.e. between 37 and 51), while none recorded low awareness (i.e. <16). Awareness of the male as well as female students differed significantly among different disciplines, following an order of mathematics ≥ biology ≥ commerce ≥ humanities. The girls were better aware than the boys, though the differences were significant only in the discipline of commerce. The CBSE students showed a significantly higher level of awareness than the ones of MPBSE across all the disciplines and the genders.

2. Environmental attitude ranged from 31 to 80 among the boys as well as girls on a scale of 0 to 80. According to norms of the test, majority of students (≥ 82%) recorded favourable to most favourable attitude (i.e. between 49 and 80), while a minority (<18%) recorded the unfavourable environmental attitude (i.e. <41). The girls as well as boys belonging to CBSE and boys of MPBSE have similar means among different disciplines. The female and all students of MPBSE had significantly different scores among different disciplines. The ranked order across disciplines was mathematics ≥ biology ≥ commerce ≥ humanities. The girls recorded more favourable attitude than the boys across all the disciplines and the boards. However, such differences were significant only in the discipline of biology, commerce and mathematics. The students of both the boards have statistically similar mean attitude among different disciplines, except for mathematics, between genders.
3. Environmental behaviour ranged from 22 to 59 among the boys and 26 to 60 among the girls on a scale of 0 to 60. According to norms of the test, majority of the students (≥ 66%) recorded average to positive behaviour (i.e. between 37 and 60), while a minority (34%) recorded the negative behaviour (i.e. <37). The boys and girls of MPBSE have significantly different values among various disciplines, but those of CBSE have statistically similar values. The behaviour varied in the order of mathematics ≥ biology ≥ commerce ≥ humanities. The girls recorded a more positive behaviour than boys in all the disciplines. The MPBSE students recorded greater values in comparison with the CBSE ones across all the disciplines, though the differences were statistically significant only in case of commerce and mathematics. The male and all the students of MPBSE also recorded a more positive behaviour than those of CBSE. However, the behaviour of girls did not differ significantly between the two boards.

4. There was a significant positive correlation between environmental awareness and attitude of the students belonging to MPBSE in the discipline of biology (**r** = 0.43; $p < 0.001$), commerce (**r** = 0.56; $p < 0.001$), humanities (**r** = 0.0.54; $p < 0.001$), and mathematics (**r** = 0.49; $p < 0.001$). For the CBSE students, the correlation between the two variables was significant only in the discipline of commerce (**r** = 056; $p < 0.00$), humanities (**r** = 0.44; $p < 0.05$) and mathematics (**r** = 0.36; $p < 0.001$), but insignificant in biology. The amount of the variance in environmental attitude explained by environmental awareness ranged from 18 to 31% for the students of MPBSE and from 3 to 31% for the students of CBSE.
5. There was a significant positive correlation between environmental awareness and behaviour of MPBSE students in the discipline of commerce (**r** = 0.43; $p < 0.001$) and humanities (**r** = 0.47; $p < 0.01$), and insignificant in biology and mathematics. For CBSE students, the correlation between the two variables was significant in the discipline of biology (**r** = 0.28; $p < 0.05$), commerce (**r** = 0.4; $p < 0.001$) and mathematics (**r** = 0.33; $p < 0.001$), and insignificant in humanities. The amount of the variance in environmental behaviour explained by environmental awareness ranged from 0 to 22% for MPBSE students and **7** to 16% for CBSE students.
6. The relationship between environmental attitude and behaviour for the students belonging to MPBSE was significant only in the discipline of commerce (**r** = 0.31; $p < 0.01$), humanities (**r** = 0.29; $p < 0.01$) and mathematics (**r** = 0.18; $p < 0.01$), and insignificant in biology. The students of CBSE recorded significant relationship between the two variables in all disciplines [e.g., biology (**r** = 0.32; $p < 0.05$), commerce (**r** = 0.39; $p < 0.001$), humanities (**r** = 0.4; $p < 0.05$) and mathematics (**r** = 0.29; $p < 0.001$)]. The amount of variance in environmental behaviour being explained by environmental attitude was in the range of 0 to 10% in

case of the students belonging to MPBSE and 8 to 16% for the students of CBSE.

7. The students of CBSE recorded a more positive environmental awareness than the students of MPBSE (**CR** = 2.38 to 9.42; $p < 0.05$ to < 0.001). The CBSE students also recorded significantly more positive environmental awareness than MPBSE students in the discipline of biology (**CR** = 5.93; $p < 0.001$), commerce (**CR** = 4.77; $p < 0.001$) and mathematics (**CR** = 1.99; $p < 0.05$), and insignificantly higher values in humanities (**CR** = 0.49; $p > 0.05$). Therefore, the hypothesis that "**there is no difference in environmental awareness of the students between Central and M.P. Board**" is rejected. This denotes that there is a difference in environmental awareness of students between the two boards.
8. The students of the Central and M.P. Boards recorded statistically similar values of environmental attitude (**CR** = 0.65 to 0.73; $p > 0.05$). The CBSE students also recorded similar levels of attitude relative to that of MPBSE in the discipline of biology (**CR** = 1.28; $p > 0.05$), commerce (**CR** = 0.2; $p > 0.05$), and humanities (**CR** = 0.33; $p > 0.05$). However in the discipline of mathematics, MPBSE students recorded a more favourable environmental attitude than CBSE students (**CR** = 2.74; $p < 0.01$). Therefore the hypothesis that "**there is no difference in environmental attitude of the students between Central and M.P. Board**" is accepted. This may highlight that environmental attitude of the students does not differ between the two boards.
9. The MPBSE students recorded a more positive environmental behaviour in comparison with that CBSE ones (**CR** = 3.87 to 4.65; $p < 0.001$). This was true in all the disciplines, though such differences were significant only in commerce (**CR** = 2.52; $p < 0.05$) and mathematics (**CR** = 4.14; $p < 0.001$), and insignificant in biology (**CR** = 0.18; $p > 0.05$) and humanities (**CR** = 0.58; $p > 0.05$). Therefore, the hypothesis that "**there is no**

difference in environmental behaviour of the students between Central and M.P. Board" is rejected. It may be concluded that students of the M.P. Board have more positive environmental behaviour as compared with that of the Central Board.

10. The male (**F** = 20.18; $p < 0.001$), female (**F** = 35.11; $p < 0.001$) and all the students (**F** = 50.08; $p < 0.001$) belonging to both the boards recorded significantly different levels of environmental awareness among different disciplines. On the basis of multiple comparisons of various means, it was found that the mean environmental awareness of male, female as well as all the students was ranked in the order of mathematics ≥ biology ≥ commerce > humanities ($p < 0.05$). Therefore, the hypothesis that "**there is no difference in environmental awareness of students belonging to biology, commerce, humanities and mathematics disciplines**" is rejected. This may denote that environmental awareness of students of both the boards significantly differs according their discipline of study.
11. The differences in the mean environmental attitude among different disciplines were insignificant for both the genders in case of Central Board (**F** = 0.85 to 2.54; $p > 0.05$). In case of the M.P. Board, such differences were significant in case of female (**F** = 9.52; $p < 0.001$) and all the students (**F** = 7.67; $p < 0.001$), and insignificant in case of male students (**F** = 2.4; $p > 0.05$). On the basis of multiple comparisons, the environmental attitude of both the genders in both the boards was found to be arranged in the order of mathematics ≥ biology ≥ commerce > humanities. Therefore, the hypothesis that "**there is no difference in environmental attitude of students belonging to biology, commerce, humanities and mathematics disciplines**" is rejected in case of MPBSE and accepted for CPBSE. This indicates that students of the M.P. Board differ significantly in their environmental

attitude according to their discipline of study, but the same is not true for the students of the Central Board. However, the ranked order of environmental attitude was mathematics ≥ biology ≥ commerce ≥ humanities for the students of both the boards.

12. The differences in the mean environmental behaviour among different disciplines were insignificant for both the genders in case of CBSE (**F** = 0.85 to 1.92; $p > 0.05$). For MPBSE students, such differences were significant for both the genders (**F** = 3.05 to 7.56; $p < 0.05$ to < 0.001). On the basis of multiple comparisons, the environmental behaviour of both the genders in both the boards was found to be arranged in the order of mathematics ≥ biology ≥ commerce > humanities. Therefore, the hypothesis that "**there is no difference in environmental behaviour of students belonging to biology, commerce, humanities and mathematics disciplines**" is rejected in case of the M.P. Board and accepted for the Central Board. This denotes that environmental behaviour of students differ according to their discipline of study following an order of mathematics ≥ biology ≥ commerce ≥ humanities for both the boards.

13. The differences in the mean environmental awareness between boys and girls were significant only in the discipline of commerce (**CR** = 3.46; $p < 0.001$) and insignificant in the disciplines of biology, humanities and mathematics (**CR** = 0.5 to 1.73; $p > 0.05$). Therefore, the hypothesis that "**there is no difference between male and female students in their environmental awareness**" is accepted for students belonging to biology, humanities and mathematics and rejected for those of commerce discipline. It denotes that environmental awareness is not different between girls and boys for all the disciplines except for commerce.

14. The differences in the mean environmental attitude between boys and girls were significant in biology, commerce and mathematics disciplines (**CR** = 2.17 to 4.63; $p < 0.05$ to < 0.001) and insignificant in humanities (**CR** = 0.81; $p > 0.05$). Therefore, the hypothesis that "**there is no difference between male and female students in their environmental attitude**" is rejected for students belonging to biology, commerce and mathematics and accepted for students of humanities discipline. It denotes that girls have more favourable environmental attitude in comparison with boys.
15. The mean environmental behaviour of girls was significantly more positive in comparison with that of boys in the disciplines of commerce, humanities and mathematics (**CR** = 2.12 to 5.59; $p < 0.05$ to < 0.001) and similar in biology stream (**CR** = 0.29; $p = >0.05$). Therefore, the hypothesis that "**there is no difference between male and female students in their environmental behaviour**" is rejected for students of commerce, humanities and mathematics disciplines and accepted for biology discipline. This denotes that female students have more positive environmental behaviour as compared with that of male students.
16. There was a significant linear positive correlation between environmental awareness and attitude of the CBSE (**r** = 0.437, $p < 0.001$) and MPBSE students (**r** = 0.538, $p < 0.001$). Therefore, the hypothesis that "**there is no relationship between environmental awareness and attitude of students**" is rejected for both the boards. This signifies that environmental awareness can be a predictor of environmental attitude. The environmental awareness can explain 19 to 29% of the total variation in environmental attitude.
17. There was a significant linear positive correlation between environmental awareness and behaviour of the students affiliated to CBSE (**r** = 0.334, $p < 0.001$) and MPBSE (**r** = 0. 346, $p < 0.001$). Therefore, the hypothesis that "**there**

is no relationship between environmental awareness and behaviour of students" is rejected for both the boards. This signifies that environmental awareness can be a predictor of environmental behaviour. The environmental awareness can explain only 12% of the total variation in environmental behaviour.

18. There was a significant linear positive correlation between environmental attitude and behaviour of CBSE (**r** = 0.31, $p < 0.001$) as well as MPBSE students (**r** = 0.234, $p < 0.001$). Therefore, the hypothesis that "**there is no relationship between environmental attitude and behaviour of students**" is rejected for both the boards. This signifies that environmental awareness can be a predictor of environmental behaviour. The environmental attitude can explain only 6 to 10% of the total variation in environmental behaviour.

The present research unambiguously proves that introduction of environmental education at the primary and secondary levels of education have considerably improved environmental awareness and attitude of the Indian youth. But this in turn has not improved their environmental behaviour. The social psychology model such as the Theory of Planned Behaviour seems to be more relevant for social behaviour rather than environmental behaviour. The scientific evidences, that raising public awareness or fostering positive attitudes about a environmental problem or issue does not ensure that people will act on that new knowledge and awareness, also render these theories less applicable in explanation or formation or prediction of environmental behaviour of a population.

Environmental behaviour is a complex process that involves not only the knowledge, attitude and behaviour intention of individuals but also their firm commitment and moral norms about the preservation of environmental quality. Situational factors coupled with earlier experiences, sense of environmental stress and likely outcomes of the sustainable environmental actions (e.g. Restoration of degraded Habitats,

Minimization and Recycling of Pollutants, Conservation of Biodiversity, etc.) are the strong motivators for a favourable environmental behaviour.

5.2 SUGGESTIONS

Suggestions for Students

1. There is a need to evolve an effective strategy to make students as well as their parents realize that environmental conservation and management is as much their responsibility as it is of the government.
2. The students should be encouraged to visit habitats like gardens, forests, ponds, etc. in order to get them better acquainted with the structure and function of nature to improve their understanding of environment.
3. The students should be facilitated to develop scientific temper in their perception about fragile ecological balance to improve their environmental behaviour.
4. The students should be regularly monitored and mentored for improvement in their environmental behaviour, enabling them to refrain from any environmentally negative behaviour.
5. The students should be taught about usage of alternate sources of energy or sharing transport means, facilitating a positive environmental behaviour for threatening problem of societal pollution like Global Warming.

Suggestions for Teachers

1. The teachers should discuss the current environmental issues with the students for a better understanding of such environmental problems as global warming, ozone holes, synthetic chemicals, urbanization, etc.
2. The teachers should expose their students to existing environmental problems and their impact on them as well as on the society.

3. The teachers should organize debates, puzzles, quizzes and workshops related to environmental problems and their solutions.
4. The teachers should try to become role models by following environmental-friendly life style for emulation by their students.
5. The teachers should motivate their students to actively participate in programmes organized by the school for development of not only the awareness but also the favourable attitude towards the environment.

Suggestions for Schools

1. In their daily morning Assembly, the schools must include a topic related to environmental knowledge or attitude or behaviour, improving students' perception of the environment.
2. The schools must motivate the students to participate in inter-school problem-solving activities. This may facilitate not only an improvement in students' knowledge and views but may also promote positive environmental behaviour.
3. The schools must engage their students and teachers in a better understanding of the environmental values and its promotion through community activities.
4. The syllabi should compulsorily include environmental education in all the disciplines of studies at the secondary level of education.
5. The syllabi should include details about the international cooperation, conventions and treaties being signed by various countries to tackle emerging environmental issues under the banner of United Nations Organization (UNO), United Nations Environment Programme (UNEP), Intergovernmental Panel on Climate Change (IPCC), World Health Organization (WHO), etc.

Suggestions for Future Research

1. Gender differences in environmental awareness, attitude and behaviour of students studying at different levels of education.
2. Impact of primary, secondary and tertiary education levels on environmental awareness, attitude and behaviour of students and teachers.
3. Impact of conventional and innovative programmes on environmental awareness, attitude and behaviour of higher secondary students of different localities, i.e. rural and urban.
4. Impact of media, governmental actions and economic growth on environmental awareness, attitude and behaviour of the society.
5. Testing relevance of the "**Theory of planned behaviour**" and "**Theory of reasoned action**" in formation and prediction of environmental action and behaviour.

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BIBLIOGRAPHY

Ajzen, I. (1985) From intentions to actions: A theory of planned behaviour. In: *Action Control: From Cognition to Behaviour* (Ed.: J. Kuhl and J. Beckmann). Springer, Berlin, Germany.

Ajzen, I. (1991) *The theory of planned behaviour*. *Organizational Behaviour and Human Decision Processes* 50: 179-211.

Ajzen, I. and M. Fishbein (1980) *Understanding Attitudes and Predicting Social Behaviour*. Prentice-Hall, New Jersey, U.S.A.

Al-Najede, A. (1990) The effect of environmental science curriculum on development of environmental attitudes of in service teachers. *Egyptian Association of Curricula and Teaching Methods* 1: 40 – 45.

Al-Rabaani, A.B.H. and M.S.S. Al-Mekhlafi (2008) Attitudes of the Sultan Qaboos University students towards some environmental problems. *Indian Journal of Environmental Education* 8: 8-21.

Arcury, T.A. (2000) Environmental attitude and environmental knowledge. *Human Organization* 49: 300-304.

Asthana, B.B. (2007) *Statistics in Behavioural Sciences*. Shri Vinod Pustak Mandir, Agra, India.

Axelford, L.J. and D.R. Lehman (1993) Responding to environmental concern: what factors guide individual action. *Journal of Environmental Psychology* 13, 149-159.

Barker, R.G. (1968) *Concepts and Methods for Studying the Environment of Human Behaviour*. Standard University Press, Stanford, U.S.A.

Barker, R.G. (1969) Wanted: an eco-behavioural science. In: *Naturalistic Viewpoints in Psychological Research* (Ed.: E.P. Willems and H.L. Raush). Holt, Rinehart & Winston, Inc., New York, U.S.A.

Baron, R.A. and D. Byrne (1995) *Social Psychology: Understanding Human Interaction*. Prentice Hall of India Pvt. Ltd., New Delhi, India.

Best, J.W. (1977) *Research in Education*. Prentice-Hall, New Jersey, U.S.A.

Bhatnagar, R.P. (2002) *Readings in Methodology of Research in Education*. Surya Publications, Meerut, India.

Brechin, S.R. and W. Kempton (1994) Global environmentalism: a challenge to the postmaterialist thesis. *Social Science Quarterly* **75**: 245-269.

Buch, M.B. (1991) *Fourth Survey of Research in Education* (Vol. I, II 1983-88). National Council of Education Research and Training, New Delhi, India.

Chhatwal, G.R. (1997) *Encyclopedia of Environmental Analysis* (Vol. 1 to 3). Anmol Publications Pvt. Ltd., New Delhi, India.

Choubey, S. (1998) *A study of Awareness and Attitude towards Environment among the Trainees studying in Government Pre-primary Training Institute, Jabalpur and to accordingly suggestions on building of syllabus for Environmental Education*. A M.Ed. Dissertation, Rani Durgavati Vishwavidyalaya, Jabalpur, India (***In Hindi***)

Clark, C.F., M.J. Kotchen and M.R. Moore (2003) Internal and external influences on pro-environmental behaviour: participation in a Green Electricity Program. *Journal of Environmental Psychology* 23: 237–246.

CMF (2009) *India's GHG Emission Profile: Results of Five Climate Modelling Studies*. Climate Modelling Forum, India. Ministry of Environment & Forests, Government of India, New Delhi, India.

Cochran, W.G. (1937) The use of the analysis of variance in enumeration by sampling. *Journal of American Statistical Association* 34: 492-510.

Cohen, S. and D. Wingerd (1993) Children and the environment: ecological awareness among preschool children. *Environment and Behaviour*, 25:103 – 120.

CPCB (2009) *Comprehensive Environmental Assessment of Industrial Clusters*. Central Pollution Control Board. Ministry of Environment & Forests, Government of India, New Delhi, India.

Dalen, V. and V. DeoBold (1979) *Understanding Education Research*. McGraw Hill Book Co., New York, U.S.A.

David, F.J. (1969) *The Research Process in Education*. Holt, Rinehart & Winston, Inc., New York, U.S.A.

Dunlap, R.E., K.D. Van Liere, A.D. Mertig and R.E. Jones (2000) Measuring endorsement of the New Ecological Paradigm: a revised NEP Scale. *Journal of Social Issues* 56: 425-442.

Duroy, Q.M. (2005) The determinants of environmental awareness and behaviour. *Rensselaer Working Papers in Economics* 0501: 1-25.

ENVIS (2009) *State of Environment Report India – 2009*. Environmental Information System (ENVIS). Ministry of Environment & Forests, Government of India, New Delhi, India.

Francis, S. (2001) Attitude towards environment hazards in education. *Psycho Lingua* 31: 93-98.

Freeman, F.S. (1968) *Theory and Practice of Psychological Testing (III Edition)*. Oxford & I.B.H. Publishing Co., New Delhi, India.

Frey, B.S. and A. Stutzer (2002) *Happiness and Economics: How the Economy and Institutions Affect Well-Being*. Princeton University Press, Princeton, U.S.A.

Garrett, H.E. (1981) *Statistics in Psychology and Education (X Indian Reprint)*. Vakils, Feffer and Simons Ltd., Bombay, India.

GreenCOM (2001) *Environmental Education and Communication (EE&C) for Behavior Change: Its Role in Forest, Water, and Biodiversity Resource Management for Sustained Economic Growth in Bolivia*. The Environmental Education and Communication (GreenCOM) Project Report, Academy for Educational Development, Washington, U.S.A.

Goetz, S.J., D.L. Debertin and A. Pagoulatos (1998) Human capital, income, and environmental quality: a state level analysis. *Northeastern Agricultural and Resource Economics* 27: 200-208.

Hines, J.M., H.R. Hungerford and A.N. Tomera (1987) Analysis and synthesis of research on responsible environmental behaviour: a meta-analysis. *Journal of Environmental Education* 18: 1-8.

Hini, D., P. Gendall and Z. Kearns (1995) *The link between environmental attitudes and behaviour*. Marketing Bulletin 6: 22-31.

Hungerford H.R. and T. Volk. (1990) Changing learner behaviour through environ- mental education. *Journal of Environmental Education* 21: 8-21.

Inglehart, R. (1990) *Culture Shift in Advanced Industrial Society*. Princeton University Press, Princeton, U.S.A.

Inglehart, R. (1997) *Modernization and Postmodernization: Culture, Economic, and Political Change in 43 Societies*. Princeton University Press, Princeton, U.S.A.

Kaiser, F.G., S. Wolfing and U. Fuhrer (1999) Environmental attitude and ecological behaviour. *Journal of Environmental Psychology* 19: 1-19.

Kalantari, K., H.S. Fami, A. Asadi and H.M. Mohammadi (2007) Investigating factors affecting environmental behaviour of urban residents: a case study in Tehran City- Iran. *American Journal of Environmental Sciences* 3: 67-74.

Kaplan, L. (1965) *Foundation of Human Behaviour*. Harper & Row Publishers, New York, U.S.A.

Kelly, J.G. (1966) Ecological constraints on mental health services. *American Psychologist* 21: 32-40.

Kelly, J.G. (1968) *Toward an ecological conception of preventive intervention. In: Research Contribution from Psychology to Community Mental Health* (Ed.: J.W. Carter). Behavioural Publications, New York, U.S.A.

Kerlinger, F.N. (1973) *Foundation of Behavioural Research (II Edition)*. Holt, Rinehart & Winston, Inc., New York, U.S.A.

Kruse, L. (1995) Global environmental changes: a challenge for psychology. *Psychologische Rundschau* 46: 81-92.

Kuhn, D. (1979) Study of the attitudes of secondary school students towards energy-related issues. *Science Education* 63: 609 –620.

Kumari, C., S. Kumar, M. Gauraha and B. Tripathi (2006) Environmental awareness, environmental attitude and intentional ecological behaviour among adolescents. *University News* 44: 20-26.

Kuribayashi, A. and M. Aoyagi-Usui (1998) Pro environ- mental attitudes and behaviour: a comparison of Thailand and Japan. *NLI Research* 122: 34-46.

Loudon, D.L. and A.J. Della Bitta (1993) *Consumer Behaviour: Concepts and Applications (IV Edition)*. McGraw Hill, Auckland, New Zealand.

Lucas, K., M. Brooks, A. Damton and E. Jones (2008) Promoting pro-environmental behaviour: existing evidence and policy implications. *Environmental Science and Policy* 11: 456-466.

Lyons, E. and G. Breakwell (1994) *Factors predicting environmental concern and indifference in 13 – to 16 years – olds*. *Environment and Behavior* 26: 223 – 238.

Maloney, M. P. and M. P. Ward (1973) Ecology: let's hear from the people. an objective scale for the measurement of ecological attitudes and knowledge. *American Psychologist* 28: 583-586.

Maloney, M. P., M. P. Ward and G. N. Braucht (1975) Psychology in action: a revised scale for the measurement of ecological attitudes and knowledge. *American Psychologist* 30: 787-790.

McNeely, J.A. and S.A. Manika (2009) *Conservation for a New Era*. International Union for Conservation of Nature, Gland, Switzerland.

Moos, R.H. and P.M. Insel (1974) *Issues in Social Psychology: Human Milieus*. California University Press, Polo Alto, U.S.A.

Morgan, C.T., R.A. King, J.R. Weisz and J. Schopler (1986) *Introduction to Psychology (VII Edition)*. Tata McGraw-Hill Publishing Co., New Delhi, India.

Onder, S. (2006) A survey of awareness and behaviour in regard to environmental issues among Selcuk University students in Konya, Turkey. *Journal of Applied Sciences* 6: 347-352.

Planning Commission of India (2006) *Integrated Energy Policy, Report of the Expert Commission*. Planning Commission, Government of India, New Delhi, India.

Proshansky, H.M., W.H. Ittelson and L.G. Rivlin (1970) Freedom of choice and behaviour in physical settling. In: *Environmental Psychology* (Ed.: H.M. Proshansky, W.H. Ittelson and L.G. Rivlin). Holt, Rinehart & Winston, Inc., New York, U.S.A.

Sarabhai, K.V., M. Raghunathan and S. Jain (2002) Environmental education: some experiences from India. In: *The Path to Success: Some Pioneering Examples of Environmental Education*. Institute for Global Environmental Strategies, Japan.

Saxena, A.B. (1986) *Environmental Education*. National Psychological Co., Agra, India.

Schahn, J. and E. Holzer (1990) Studies of individual environmental concern: the role of knowledge, gender, and background variables. *Environment and Behavior* 122: 767 – 786.

Schwartz, S.H. (1970) Elicitation of moral obligation and self-sacrificing behaviour. *Journal of personality and Social Psychology* 15: 283-293.

Schwartz, S.H. (1977) Normative influences on altruism. In: *Advances in Experimental Psychology, Vol. 10* (Ed.: L. Berkowitz). Academic Press, New York.

Sharma, P.D. (2009) *Ecology and Environment (X Edition)*. Rastogi Publications, Meerut, India.

Sharma, R.A. (1992) *Fundamental of Educational Research*. Loyal Book Depot, Meerut, India.

Sharma, R.C. (1981) *Environmental Education*. Metropolitan Books Co. Pvt. Ltd., New Delhi, India.

Sharma, S.P. (2006) *Environmental Education*. Vista International Publishing House, New Delhi, India.

Shrivastava, P. (2007) *Environment Education*. Madhya Pradesh Granth Academy, Bhopal, India. (***In Hindi***)

Silberstein, M. (1981) Factors which affect students' attitudes towards the use of living animals in learning biology. *Journal of Science Education* **65**: 119–130.

Singh, M.M. (2003) School education vis-à-vis environmental values. *Journal of Value Education* **3**: 56-73.

Singhal, A. (2008) *A Study on Impact of Environmental Awareness and Environmental Attitude on Environmental Ethics and Behaviour among the +2 Students*. A M.Ed. Dissertation, Rani Durgavati Vishwavidyalaya, Jabalpur, India.

Snedecor, G.W. and W.G. Cochran (1989) *Statistical Methods (VIII Edition)*. Affiliated East – West Press Pvt. Ltd., New Delhi, India.

Soni, B. (2004) *A Study of Environmental values and Environmental Awareness among the students studying in Higher Secondary Schools*. A M.Ed. Dissertation, Rani Durgavati Vishwavidyalaya, Jabalpur, India. (***In Hindi***)

Steel, R.G.D. and J.H. Torrie (1981) *Principles and Procedures of Statistics*. McGraw-Hill Book Company, Singapore.

Stokols, D. and I. Altman (1987) *Handbook of Environmental Psychology*. Wiley, New York, U.S.A.

Taylor, C. (1964) *The Explanation of Behaviour*. Routlede & Kegan Paul Ltd., London, U.K.

The Brundtland Report (1987) *Our Common Future*. Repot of the World Commission on Environment and Development

(WCED). United Nations General Assembly, 96th plenary meeting, 11 December 1987. A/RES/42/187.

Tonglet, M., P.S. Phillips and M.P. Bates (2004) Determining the drivers for householder pro-environmental behaviour: waste Minimization compared to recycling. *Resources, Conservation and Recycling* **42**: 27-48.

Trivedi, P.R. (2004) *Environmental Education*. A.P.H. Publishing Co., New Delhi, India.

Trivedi, P.R. and G. Raj (1998) *Encyclopedia of Environmental Science (Vol. 1 to 25)*. Akashdeep Publication House, New Delhi, India.

Ushadevi, V.K. and R. Dhanya (2009) Student-teachers' environmental awareness and attitude towards local environmental issues. *Indian Journal of Environmental Education* 9: 8-15.

Verma, U. and A. Singhal (2008) Environmental awareness on environmental ethics and behaviour among +2 students. *Research Link* **7**: 98-100.

Vining, J. and A. Ebreo (1992) Predicting recycling behaviour from global and specific environmental attitudes and changes in recycling opportunities. *Journal of Applied Social Psychology* 22: 1580-1607.

Worsley, A. and G. Skrzypiec (1998) Environmental attitudes of senior secondary school students in South Australia. *Global Environmental Change* 8: 209–225.

Wray-Lake, L. C.A. Flanagan and D.W. Osgood (2008) *Examining Trends in Adolescent Environmental Attitudes, Beliefs, and Behaviour across Three Decades*. Network on Transitions to Adulthood Research Network Working Paper. MacArthur Foundation Network on the Transition to Adulthood, U.S.A.

Ziadat, A.H. (2010) Major factors contributing to environmental awareness among people in a third World country/Jordan. *Environment Development and Sustainability* **12**: 135-145.

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