

# ENVIRONMENTAL PERCEPTIONS

## A CASE STUDY OF FISH HOEK SENIOR HIGH SCHOOL



P.J. MANN

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**ENVIRONMENTAL PERCEPTIONS:**

**A CASE STUDY OF**

**FISH HOEK SENIOR HIGH SCHOOL**

by

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fulfilment of the requirements for the degree of

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## ABSTRACT

The study was initiated as a result of a growing concern of the researcher at the apathy prevalent amongst his students at Fish Hoek Senior High School towards environmental activities which took place out of school hours. Linked to this was a perceived lack of understanding of environmental issues and very little commitment towards positive environmental actions such as recycling. These were students in the final phase of their secondary education at a school situated in a valley bounded by mountains and two oceans and serving a community which is continually involved in disputes over environmental issues. It was therefore disturbing that the environmental experiences both inside and outside the school had largely failed to produce environmentally-committed students.

The purpose of the study was to gauge student perceptions and feelings concerning a wide range of environmental concepts and issues both globally and locally. In addition, it was an attempt to establish the level of personal commitment of the students towards a variety of positive environmental actions.

In order to achieve this goal, a wide-ranging questionnaire was drawn up and administered to 286 students of Fish Hoek Senior High School. Several different formats were used in developing items for the questionnaire. These included illustrated concepts to which the students gave open-ended responses concerning their awareness of and attitudes towards each concept. Students were asked to rate their concern about a number of global and local issues on a scale of 10. There were multiple choice items as well as questions to test specifically for knowledge. However most of the items were in the form of Likert-type statements to assess attitudes. In some cases a single issue was tested in several formats in order to establish consistency of attitudes towards that issue. The questionnaire covered a broad spectrum of topics and included items on animal conservation, local issues, pollution and resource conservation, conflict situations between the interests of nature and those of humans, and between conservation and development, as well as items on student perceptions on the environment in the school curriculum. Items relating to student commitment included questions on the frequency with which students carried out environmentally-responsible actions such as recycling, items probing

fundraise for a number of environmental projects. There was also a section on biographical data. The students took approximately 35 minutes to complete the questionnaire.

The analysis of the data was mostly descriptive and a statistical approach in the form of Pearson's chi-square test, was only used for between-group analysis. The response presentation varied according to the nature of the item or group of items tested and included histograms, pie charts and tables. Where suitable, responses were subjected to correspondence analysis and displayed as a 'perceptual map'. The possible effect of independent variables on student responses was assessed by analysing and comparing the responses of sub-groups based on gender, standard (grade), previous school, anonymity and subject choice.

The main conclusions emanating from the analysis of the student responses were firstly that student knowledge of most of the concepts and issues tested was generally poor. Linked to this was the student perception of the environment as the natural environment quite distinct from the human environment. While many of the students regarded social issues as sufficiently important to warrant inclusion in the school curriculum, they were not seen as linked to environmental issues. A feature of the responses throughout the questionnaire was the strong biocentric orientation of most of the students and their antipathy to any sort of action which would harm species. In conflict situations most students usually opted for the ecocentric rather than anthropocentric viewpoint. Conservation was viewed in its protectionist context by most of the students who believed that conservation and development were incompatible. The students showed far greater concern for global environmental issues than for local ones in fact, a high proportion showed little interest and were largely ignorant about local issues. The analysis confirmed the lack of personal commitment both in terms of environmental actions and in support of environmental activities. This applies particularly to those activities which require the student to give up personal time. It is suggested that this lack of commitment indicates an egocentric view in that the students in weighing up the personal costs and benefits of an activity such as recycling have decided that it is not in their personal interest to do this

The overall conclusion reached was that whilst developing positive attitudes towards the natural environment, the environmental experiences of the students had not provided the knowledge and understanding of environmental issues needed to develop a sense of commitment towards the environment.

A number of recommendations relating to curriculum development, teaching strategies and teacher support is suggested. The aim of these recommendations is to attempt to persuade the student that the environment and environmental issues, particularly local issues are relevant to him/her personally. Thus the researcher hopes that each student would feel a personal commitment to the environment both individually and for the benefit of society as a whole.

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# CHAPTER 1

## INTRODUCTION

*The school (Fish Hoek Senior High School) has a long tradition of environmental awareness and concern, probably prompted by the natural beauty of its surroundings.*  
*Rostrum 1994:2*

### 1.1 The nature of the research question

This study was prompted by the researcher's own observations and concerns about the lack of student understanding of and commitment to environmental issues, especially at a local level. It appears that while students at the Fish Hoek Senior High School are reasonably well informed about the environment, this awareness is confined largely to that of the natural or biophysical environment. The researcher's concerns were also raised by the fact that various environmental education initiatives at the Fish Hoek Middle School, the main feeder school to the Senior High School, and those which were taking place at the Senior High School itself, had failed to shift student thinking and understanding towards a more holistic perspective of the environment. These observations and experiences prompted the researcher, a teacher with more than 15 years teaching experience at the Fish Senior High School, to investigate student understanding of and commitment to environmental issues.

The study attempts to establish what the students of Fish Hoek Senior High know and understand about the environment and environmental issues! It also seeks to establish how students feel about these issues and about their commitment to act. These broad aims were addressed more specifically by the following objectives:

- to investigate the relationship between what students know and how they feel about environmental issues

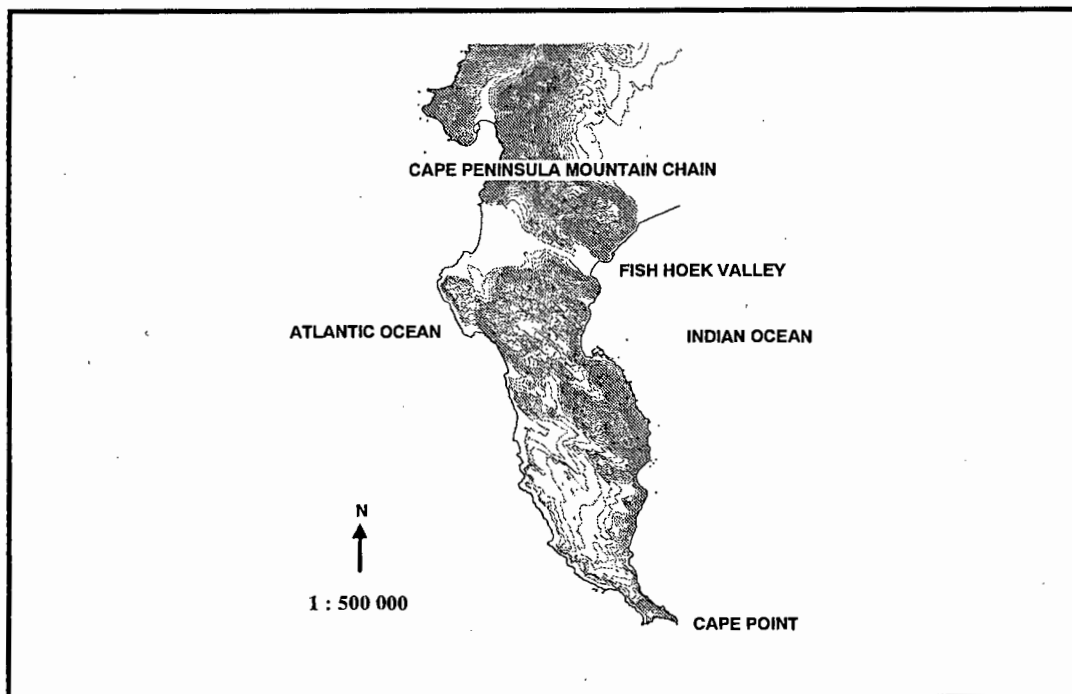
- to compare the student response to local environmental issues with that of national or global environmental issues and problems
- to clarify students' responses to situations where the interests of nature conflict with the needs of people (nature conservation vs. people conservation)
- to investigate the degree of personal commitment to the environment

Most of the information gathered to support the research question was obtained by administering a comprehensive questionnaire to students in Standards 8 and 9 (the equivalent to Grades 10 and 11) at Fish Hoek Senior High School during 1991. The research consists of a survey based on the case study of 286 students at Fish Hoek Senior High School.

## **1.2 The research in context**

Fish Hoek is a suburb of the Greater Metropolitan Area of Cape Town (see Figure 1.1). Until the 1996 local elections, Fish Hoek had its own local municipality and separate administrative structures from the Regional Services or Cape Town City Councils. Up until 1918 the Fish Hoek valley had been largely restricted to farming and fishing activities with very little residential development (Tredgold, 1985). This was because of the refusal of the landowner to sell or to allow the building of houses. After the landowner's death however, the land was divided up into plots and the village developed rapidly. The area at the time fell under the control of the Cape Divisional Council, but a group of local residents managed the village and by 1927 this group had been upgraded to a village management board (ibid). This spirit of independence grew as the board resisted attempts to persuade the village to link up with either the Cape Town or Simonstown municipalities. Eventually, in 1942 Fish Hoek became a fully independent municipality (ibid). Fish Hoek has over the years been self-reliant, having had to develop its own infrastructure and essential services. Its relative geographical isolation also meant that the residents had to develop their own sporting and cultural entertainment and all this promoted a community spirit in the valley as well as strong feelings on parochial issues.

The rapid development of the Fish Hoek Valley together with the rapid increase in population figures since 1960s have contributed to a variety of environmental issues in the area. During the 1980s and 1990s some of these issues included a kaolin mining controversy in Noordhoek, a dramatic increase in the number of squatters living in the valley and a number of housing developments. Given these circumstances, the researcher felt that it would be particularly pertinent to assess the students' awareness and degree of concern about these issues and to compare this degree of concern about local issues with those of a national and global dimension. At the time of the research, local issues in the Fish Hoek Valley were dominated by issues of pollution and resource depletion juxtaposed with the need for conservation. It is for this reason that a considerable proportion of the survey was devoted to establishing the students' knowledge of the sources and effects of pollutants, and their reaction to trade-offs designed to reduce pollution and conserve resources. There was also an attempt to establish the students' commitment to actions aimed at reducing pollution and conserving resources.



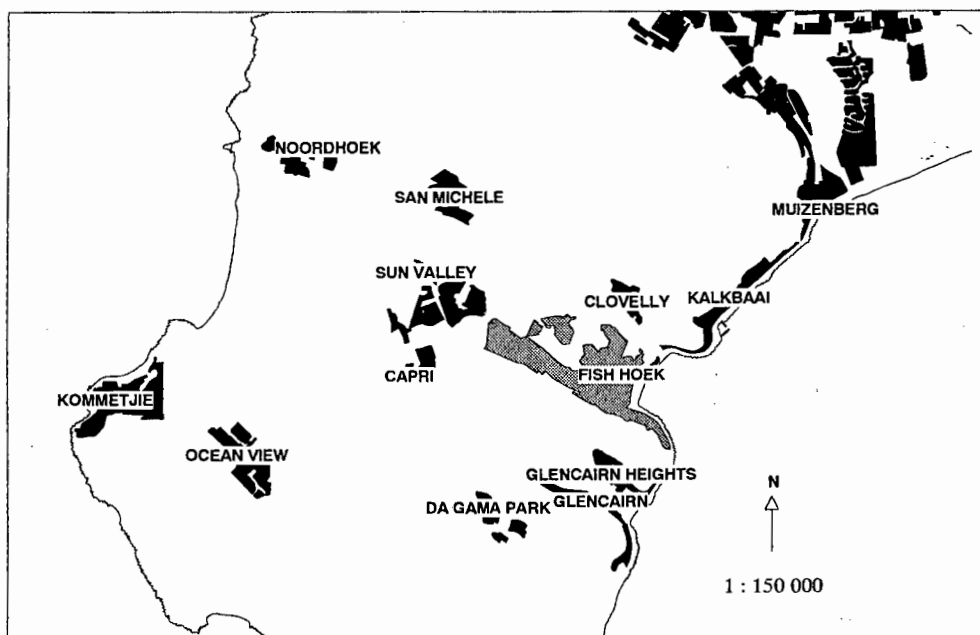
**Figure 1.1 : Fish Hoek Valley in relation to the Cape Peninsula, Cape Town**

The case study also presented an opportunity to investigate a range of independent variables that were likely to effect the students' response to environmental issues. These variables included the academic

performance of the student, previous schooling and the choice of school subjects being studied by the student, gender, age, family socio-economic status, location of residential area, media and parental influences. However, it is not within the scope of this study to investigate all of these variables, but to try to select those most likely to impact on student responses to environmental issues.

### 1.3 The geographic context of the school

Fish Hoek is situated approximately 30 km south of Cape Town. The suburb is flanked by mountains to the north and south, False Bay to the east and the Atlantic Ocean to the west. These geographic features have a tendency to isolate the valley from the rest of the Cape Peninsula and have also contributed towards the perception of a geographically bound residential community (Figure 1.2).



**Figure 1.2** The location of main residential areas of the valley

The Fish Hoek municipality, prior to the new sub-structures implemented in 1996, included the neighbouring suburb of Sun Valley. The suburb is well served with its own hospital, six schools and a library. The 1985 census show that 97% of the population were white and in the middle to upper middle class income group.

Students attending Fish Hoek Senior High School are drawn largely from Fish Hoek. Other feeder areas include Clovelly, Sun Valley and the area west of the Ou Kaapse Weg which includes the Coloured township of Ocean View, the seaside holiday village of Kommetjie and the rural community of Noordhoek.

The Fish Hoek valley has a diversity of natural habitats which includes the Silvermine stream with its associated reed beds, the dune systems of Fish Hoek and Noordhoek, the wetlands of the Noordhoek basin, the indigenous forests of the Noordhoek amphitheatre, and mountain fynbos as well as near pristine patches of coastal fynbos and strandveld. These habitats have been disturbed or are threatened by human impacts including residential development, mining, farming, alien vegetation and sewage works. These impacts are becoming more and more evident under the growing pressure of an expanding population.

#### **1.4 The school**

Fish Hoek High School was opened in 1954 (Rostrum : 1994). By 1980, the enrolment had reached more than 1000 students and this necessitated the establishment of a second high school. However, the Fish Hoek community was not in favour of this because it was feared that a second high school would create rivalry and friction in a close-knit community (ibid). It was eventually agreed that the original high school should become the Fish Hoek Middle School, catering for Standards 5, 6 and 7 ( Grades 7, 8 and 9), and that a new school should be built to cater for Standards 8 to 10 (Grades 10 to 12). Accordingly, in 1985, the Fish Hoek Senior High School was built. The two schools, although having separate teaching staffs, have a single governing body and work closely together.

Fish Hoek Middle School is responsible for the junior secondary phase of a child's education and, as such, deals exclusively with students from eleven to fifteen years. Part of the justification for establishing a Middle School was to establish a teaching programme and approach aimed at catering for the needs of this age group. The Middle School is the main feeder school to Fish Hoek Senior High.

The Senior High School, at the time of the survey had a population of approximately 470 students and a teaching staff of 30. The majority of these students (86%) live in Fish Hoek valley. The school population is largely homogeneous consisting of white students from middle income families. It was only in 1991 that the school has been allowed to determine its own admissions policy and immediately discarded race as a criterion for admission to the school (School Information booklet).

The school serves a community from a fairly confined geographical location. These geographic boundaries has made it easier for the school to incorporate the community by encouraging "an active involvement in community projects in the Fish Hoek Valley and beyond to foster an awareness of the value of service to society" (School Mission Statement). One of the ways in which this has been achieved is through a thriving adult education programme, which aims to "enrich the community, and the school" by opening the school's resources to a larger and broader population (School Information booklet).

## CHAPTER 2

### LITERATURE REVIEW

*"It has long been recognised that the root of environmental problems is human behaviour."  
(Newhouse 1990, pp 26.)*

The case study presented in this research deals with the tenuous interrelationship between knowledge, attitudes and behavioural orientations of school students. The discussion that follows is an attempt to clarify this relationship and to develop a theoretical framework for the research that follows.

The solution to many environmental problems lies in changing human behaviour. Behavioural change or actions need to be based on an ethic or set of values (Irwin,1990). Much has been written about values, attitudes and beliefs, with respect to the environment, however, much is inconclusive, ambiguous and contradictory. A brief discussion follows in an attempt to review the most important contributions to this study.

### 2.1 Values, beliefs and attitudes

#### 2.1.1 Values

Rokeach (1973) defines a value as "an endearing belief that a specific mode of conduct (instrumental value) or end state of existence (terminal value) is socially preferable to an opposite or converse mode of conduct or end state of existence" (pp 5). It serves as a standard by which alternative courses of action are judged and as such is a determinant of attitudes as well as behaviour. According to Stern and Dietz (1994) values are criteria for guiding actions and for developing attitudes. Individuals construct attitudes on the basis of how the attitude object will influence them or objects they value. Opie (1989) sees values as standards for measuring the personal worth of the attitudes, actions and behaviour of themselves and others. He suggests that values reflect one's judgement of moral issues and appreciation of the aesthetic qualities of the surroundings.

Stern and Dietz (1994) suggest that values can be arranged as a hierarchy to form a value system. Values also serve as reference point for norms, while a particular norm can be determined by a number of values. Norms differ from values in that they only refer to modes of behaviour and do not influence end states of existence (Rokeach 1973).

### **2.1.2 Beliefs and attitudes**

Rokeach (1973) defines belief as a simple proposition, conscious or unconscious, inferred from what a person says or does. He divides beliefs into three categories namely descriptive, that which can be judged true or false on factual evidence; evaluative, through which one makes judgements about the appropriateness of an idea, situation or action, and prescriptive, that which gives rise to an expression of an opinion underpinned by attitudes (Fien and Slater,1981). Newhouse (1990) understands beliefs as the information one has about a person, object or issue. These may be factual or based on personal opinion. The total of a person's beliefs about physical and social reality is called a belief system (Caduto,1985).

The beliefs expressed by an individual are perceived as an indicator of that individual's attitude (Morgan and Richmond, 1977). A similar view is expressed by Rokeach (1973) who sees an attitude as a cluster of beliefs all directed towards a given object or situation, forming the basis of an individual's likes and dislikes for other people and situations.

There is broad consensus amongst various researchers with regard to the components that characterise the nature of attitudes (Oppenheim;1966; Rokeach,1973; Schreuder, 1990; Triandis,1971). Attitudes are reinforced by beliefs (the cognitive component), often involve strong feelings (the affective or emotional component) and lead to particular forms of behaviour (conative component). While some researchers prefer to restrict attitude to the affective domain (Newhouse,1990), the cognitive concept of belief is closely related to attitude and some regard them as synonymous (Blum,1987 ). Morgan and Richmond, (1977) assumed that the beliefs expressed by an individual are an indicator of that individual's attitude. Caduto (1985) distinguishes attitudes from beliefs in that the former always has an emotional element, Tuan (1974) sees attitude as a cultural stance, towards certain sensory stimuli, formed from a long succession of perceptions, that is of life experience. It is the attitude which directs the perception towards a value.

Fien and Slater (1981) see attitudes as clusters of beliefs and beliefs are derived from values. As such attitudes are value expressive indicating one's reaction towards specific events and ideas. Changing one's attitudes requires the individual to change his/her underlying values.

### **2.2.2 Relationships between knowledge, attitudes and behaviour.**

Attempts to understand and explain the interaction between behaviour and environmental action are largely inconclusive. Students were found to be more emotionally involved than knowledgeable about the environment, but more knowledgeable than active with regard to its improvement. Knowledge was

found to be the most powerful predictor of environmental activity and that attitude showed a greater affinity with verbal commitment than with activity (Maloney, *et al*, 1975; Disposito, 1977). For example, Olsen (1981) found that broad attitudes and beliefs about the reality and seriousness of the energy crisis or the desirability of conservation practices bore little or no relationship to the actual adoption of energy saving activities. A number of studies have indicated strong positive relationships between higher environmental knowledge levels and positive attitudes (Fortner and Lyon, 1985). Others have found that levels of awareness and concern were significantly higher than that of knowledge (Hausbeck, *et al* 1992; Morgan and Richmond, 1977).

Morgan and Richmond (1977) in analysing the results from their survey concluded that poor knowledge of the environment accompanied by a positive attitude to the environment showed that the attitudes were not based on understanding and could not be regarded as linked to knowledge but were more likely to be what they call 'learned responses' which are not associated with true attitudes.

O' Riordan (1981) suggests that at the 'core' of an attitude are dominant cognitions which are closely bound to one's value system. This core is surrounded by more peripheral cognitions less strongly connected to values which may readily be exchanged for other equally peripheral cognitions. There is always the possibility of gathering irrelevant cognitions, that is cognitions which are important in the attitudinal testing situation, but are replaced by other cognitions in the behavioural situation. This could account for a low correlation between attitude and behaviour in certain cases.

Following a similar argument, Ajzen and Fishbein (1977) link the relationship between attitudes and behaviour to the nature of the measures used to evaluate them, indicating that the relationship will only be strong when both are directed at the same target and both involve the same action. Therefore if the object of an attitude is relatively stable and the associated behaviour uncomplicated, then correspondence between attitude and behaviour is highly probable.

There is a school of thought which believes that behaviour can influence attitudes and their underlying values (O' Riordan, 1981). Many environmental behaviourists are of the opinion that it is most cost effective to apply intervention strategies directly to environmentally relevant behaviours instead of trying to change attitudes and values as a measure of indirectly influencing behaviours (Geller and Scott, 1989).

### **2.3 Other determinants of behaviour**

Hungerford and Volk (1990) claim that it is too simplistic to assume the acquisition of knowledge is likely to develop favourable attitudes and in turn leads to a "desired" environmental behaviour. This does not mean to say that knowledge and attitudes are not significant contributors to behaviour, but it

does recognise the importance of knowledge, not only of an environmental problem, but also of possible solutions to that problem, which is essential for effective action (Newhouse, 1990). Furthermore, attitudes that have developed from life experiences contribute towards behaviour and behavioural change.

Wicker (1969) broadly considered personality and situational factors as key elements that are associated with behaviour. Personality factors could include gender, age, previous experiences and other attitudes. Hines (1987) defines one of these personality factors as the 'locus of control' which can be defined as one's perception of one's ability to bring about change in one's behaviour. Those with an internal locus of control believe that their action can bring about change whereas those with an external locus of control believe that nothing they do will make any difference. Another personality factor would be a sense of responsibility, that is they feel duty bound to carry out an action (Newhouse, 1990).

Situational factors relate to one's circumstances, status, the influence of peer groups and the normative standards of the society and one's culture. In relation to the influence of social norms, Fishbein (in Olsen, 1981) in his model, stipulates that the principal dependent variable is the intention to act and whether the action is carried out will depend on what one perceives as the (social) consequences of the action and how one evaluates those consequences. Heberlein (1972) takes this further by identifying three determinants of socially acceptable behaviour. Firstly, knowledge, which refers to the action itself and its consequences, and secondly, culpability, which refers to the attribution of blame for one's actions and the identification of alternatives which are less socially detrimental. For example, an individual will be less inclined to conserve water if nobody else in his/her neighbourhood is doing the same. Thirdly, there is the normative component which is an indication of how willing one is to comply with or to ignore the norms of society (O' Riordan, 1981).

Another important situational factor is socio-economic status. Those of the middle and higher income groups are, in general, more familiar with and more concerned about environmental issues than those of lower income (ibid). He suggests that these groups feel that they can be active about the environment without any major change in their income levels or their daily existence. By contrast, it is extremely difficult to develop positive attitudes and actions towards the environment when one is poverty stricken and one's primary concern is that of survival (Fien, 1993).

Other mitigating factors impacting on "environmentally-friendly" behaviour include:

- the inconvenience at changing one's lifestyle (Horsley, 1977)
- inconsistencies amongst professionals regarding the seriousness of the environmental situation e.g. disagreement over the effect of CFC's on the ozone layer (O' Riordan, 1983)

- satiation effects resulting from repetitive routine actions can discourage such actions particularly if those actions are time-consuming, for example sorting waste for recycling (Humphrey, *et al*, 1977)
- by contrast, positive environmental behaviour needs to be reinforced over time. (Hungerford and Volk, 1990).

Hungerford and Volk, (1990) after analysing the findings of a number of researchers, attempted to categorise those variables which could be associated with citizenship behaviour. Some discussion about the model is necessary because it provides a useful framework for this research. The model was organised to include three main variables which could be considered as underpinnings of citizenship behaviour. The first variable, the entry-level variable, is concerned with a feeling of understanding and sympathy for the environment. Variables of lesser importance in this category include knowledge of ecology, androgyny (those who show non-traditional sex role characteristics), and the nature of attitudes towards pollution, economics and technology.

The second group of variables, are the ownership variables which are those variables which make environmental issues very personal. Such issues are very important to the individual and appear to be crucial to environmentally responsible behaviour. There are two major variables in this category, namely in-depth knowledge where the individual has a thorough understanding of the nature of the issues as well as their human and ecological implications. Personal investment is where the individual has a proprietary interest in the issue. This interest could be economic or in the form of a strong personal need. Minor variables in this category would include knowledge of the consequences of behaviour and a personal commitment to resolve issues.

Empowerment variables in the third group are those variables which give individuals a sense that they can make changes and are able to resolve important environmental issues. There are three major variables in this category. Firstly, knowledge of and skills in using environmental action strategies. Knowledge and skills would complement each other in prompting responsible behaviour. Secondly, the 'locus of control' refers to the expectancy of reinforcement for responsible behaviour. Thirdly, the 'intention to act' which is when a person intends to take some sort of action and that the chances of that action occurring are increased.

#### **2.4 Alternative strategies for environmental education**

In the past, environmental educators implied that the acquisition of knowledge would most likely lead toward a positive environmental attitude which in turn would produce a "desired" behaviour (Fortner and Lyon, 1985). Heberlein (1972), in criticising this idea, points out that changing attitudes amounts to making various assumptions, for example, individuals will modify their values from that of self-

interest to altruism on the basis of new information; that by concentrating on one set of cognitions, other relevant cognitions will change; and that the attitudinal shift will be sufficiently large and enduring to influence behaviour.

In response to the lack of progress in this traditional thinking in environmental education, a number of alternative teaching strategies have been proposed, three of which will be considered here, namely, values education, experiential approaches and issue-based strategies.

#### 2.4.1 Values Education

The concept of values education seems to have arisen in reaction to the suppression of values because of a formal curriculum that has been dominated by content. According to Skolimowski (1984), one of the outcomes of the Positivist philosophy, which divorces values from the cognitive domain, is that values are often suppressed even if they are regarded as important.

In a similar way, Opie (1987) feels that the emphasis on knowledge ignores the values and feelings which contribute to the wisdom needed to make the right use of knowledge. Not much is known about how to promote the values of caring, concern, appreciation and commitment and as a result these qualities are largely neglected (ibid). Yet reference is made to the importance of values education in both international and local policy statements on environmental education as can be seen in Table 2.1

<p><i>Environmental education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness between man, his culture and his biophysical surroundings..</i></p> <p style="text-align: right;"><i>IUCN 1970</i></p>
<p><i>To help individuals and social groups acquire strong feelings of concern for the environment and the motivation for actively participating in its protection and improvement</i></p> <p style="text-align: right;"><i>Belgrade Charter 1975</i></p>
<p><i>To help individuals and social groups acquire social values and the ability to make sound choices, while developing in them a sensitivity to the environment.</i></p> <p style="text-align: right;"><i>Belgrade Charter 1975</i></p>
<p><i>Environmental education programmes should relate environmental sensitivity, knowledge, problem-solving and values clarification at every school level.</i></p> <p style="text-align: right;"><i>Tbilisi Declaration 1977</i></p>
<p><i>Environmental education is by nature holistic and contains a strong values and skills dimension</i></p> <p style="text-align: right;"><i>Council for the Environment 1993</i></p>

**Table 2.1** References to the importance of values education

Another objective of values education would be to encourage sensory awareness and aesthetic appreciation, thus laying the basis for care about the aesthetic quality of the environment (Boyden and O'Neill, 1971). Such aesthetic responses can be promoted as precursors of positive environmental behaviour (Opie, 1990).

The overall aim of values education is a holistic one in that it involves the development of an ethic consisting of a set of moral values and actions which will treat people and the earth, that is the total human environment in as loving and just a manner as possible (Caduto, 1985). Such actions will strive for social justice and the ecological integrity of the earth. Similar sentiments are expressed in the "earth love process" put forward by Opie (O'Donoghue, 1994). This process is based on a theory of 'feelings first'. According to Opie peak experiences of the beauty of nature (that is aesthetic responses), lead first to a feeling, then to an understanding of earth love and then to an informed commitment to action.

Caduto (1985) suggests that there are several forms which environmental values education could take:

*Laissez-faire* : this is based on the assumption that the provision of information about the environment, will lead to the development of a set of strong environmental values. This is regarded as the *de facto* situation in most schools.

*Value inculcation*: the aim here is to instil in the students certain chosen values, or to shift values by moralising, and by using incentives or disincentives as well as positive and negative reinforcement. This will be most effective with primary school children who are still morally dependent, that is those who have not yet developed higher powers of cognitive and moral reasoning or a personal system of ethics (Caduto, 1985).

*Values clarification* : this is the most widely used strategy which is characterised by a student centred approach. It is based on the process of valuing in daily life rather than developing particular sets of values (Fien and Slater, 1981). The students choose value positions from alternatives, and in so doing become personally content with their choice, will affirm their choices publicly, and will even act upon them. The advantages of value clarification are that it avoids moralising and criticism of individual choices; it helps students to become aware of and identify their own values and those of others; and to communicate openly and honestly with others about their values.

*Values analysis*: this applies the scientific logical thinking of deductive reasoning to the study of values. The method involves six steps which serve as a structured guide to the development of

logical reasoning on issues that are loaded with values. The procedure can help students to resolve most issues, logically analyse the positions of their peers and question them, and test the consistency of their own positions, and those held by others.

*Moral reasoning* : the students are faced with an issue in the form of a moral dilemma which contains a question that requires resolution. In essence, the process is similar to values analysis. Moral dilemma resolution was developed by Kohlberg who postulates that as people develop they go through various stages of moral reasoning in their reactions to people and situations. It is argued that this approach promotes interpersonal empathy and the students learn to make decisions on the basis of appropriate value positions rather than more objective considerations. Many environmental and social issues have been resolved in this manner.

*Behaviour modification*: this strategy is based on the theory mentioned earlier, that is that changes in attitudes and their underlying values can be induced by changes in behaviour (Caduto, 1985). This is controlled externally in that unsound environmental values and actions can be changed by exposing the students to new experiences and through the use of positive and negative reinforcement.

Other values education strategies include value probing, which integrates the features of values clarification; and value analysis and moral reasoning which focuses beyond the attitudinal level to deeper values underlying an issue (Fien and Slater, 1981). Action learning involves the development of values from real life experiences, while confluent education is a holistic approach aimed at linking the student's thinking or cognitive processes with his/her affective feelings and values (Caduto, 1985).

The concept of values education has not been without its critics. The approach has been criticised for promoting the idea that all values are subjective and are a matter of personal choice thereby claiming that self-interest and pleasure are the highest goods in life, a stance which contradicts many religious beliefs (Fien and Slater, 1981). A second criticism is that the strategy could lead to indoctrination whereby the teacher imposes his or her value system on the students (Baer, 1983). On the other hand, it has been argued that educators cannot remain objective and neutral, but should disclose their views on controversial issues, without imposing their values as being superior (Fien, 1993). Values pertaining to an environmental ethic or social equity should be actively promoted.

In the South African context there is a need to question the viability of values education in such a diverse society where there is such a multiplicity of diverse value systems. This applies particularly at secondary school level where the students are becoming morally autonomous, and most teachers lack the skills, resources or time to use the strategies described above. A further consideration is that the majority of the student population will have a value system directed at improving their quality of life.

For these students values such as aesthetic appreciation would be a low priority. This does not mean that there is no place for the teaching of values because it forms a vital part of education (Opie, 1990). Opie suggests that teachers need to integrate values into their teaching as much as possible, particularly at the primary school level.

#### **2.4.2 Experiential approaches**

The experiential or phenomenological approach to understanding the environment seeks to understand how an individual experiences space and place (Clacherty and Ballantyne, 1991). Tuan (1974) speaks of 'topophilia' or a 'sense of place' which he describes as the affective bond between people and place of setting. The concept itself may be vague, but the personal experience of a place is "vivid and concrete". Personal perception of a place is unique and will certainly reflect attitudinal and environmental values (ibid). Perceptions are not only influenced by the environment, but are deeply rooted in culture as are many of the underlying attitudes and values which predict behaviour. It is this 'sense of place' which makes each environment unique (Saarinen, *et al*, 1982). The nature of the environment as well as the values and experience of the individual need to be taken into account (ibid).

#### **2.4.3 Life World Approach**

This approach, which is based on an interpretative and phenomenological tradition, focuses on the life-world of an individual and from which one derives meaning. Such meaning, which Finger (1994) sees as socio-cultural and collective in nature, determines how an individual approaches a given environmental problem or issue and what he or she does about it.

According to this approach significant life experiences, in, with and of the environment, including value orientations in respect of environmental issues and environmental behaviour, are the key building blocks with respect to one's environment. Information and knowledge acquisition is seen as functional to providing meaning to environmental issues. Finger's research findings clearly indicated that environmental behaviour could almost exclusively be explained as a result of environmental life experiences. The type of life experiences cited by respondents in his study were nature experiences and various forms of environmental catastrophe.

Clacherty and Ballantyne (1991) used a phenomenological approach to evaluate an environmental education programme. Environmental education is concerned about changing attitudes and values leading towards changes in behaviour. The development of values and ethical codes is unique for each person and belongs to the area of human experience. A phenomenological approach exposes the

process by which change takes place as well as giving information about individual elements of a programme as these are experienced by the students.

Some of the findings of Clacherty and Ballantyne contradict some of the accepted principles of environmental education.

- It is the underlying emotional response which appears to make wilderness experiences effective. This involves pre-event insecurity or stress, the event and post event fulfilment.
- Environmental awareness can be developed without having to be exposed to a natural environment such as a nature reserve. A local environment can be very effective in creating environmental awareness if the experiences are well planned and implemented.
- Student-centred, active and experiential approaches to learning are important in almost all aspects of environmental education.

The following were found to be important in the development of attitudes and values.

Exposure to other peoples' ideas and opinions, as well as to a variety of possibilities from which unrestricted, subjective choice can be made. There should be no right or wrong answer.

When one's basic assumptions are challenged and one had to take a stance which had previously been opposed, there was a growing appreciation of the complexity of the issue being considered. This conceptual or cognitive conflict (Ballantyne and Bain, 1995) forms the basis of the structured controversy approach to conceptual enhancement which is discussed in the next section.

The study showed the importance of the personal nature of learning. The students themselves had to decide what was significant in their experiences. In this way they were able to express themselves, clarify their thinking, learn from others and experience personal growth openly.

Perhaps the most important point to come from this study was that in the learning situation one needs information or experiences which are perceived as personally relevant. The most valuable input in this regard would be those experiences drawn from real-life situations particularly if the students can identify with such experiences.

#### **2.4.4 Structured Controversy Approach**

The aim of this approach is to promote conceptual enhancement, that is a process whereby a student's understanding of a concept is challenged and enriched by being confronted with alternative viewpoints and evidence. The learning experience begins when a student is encouraged to adopt a particular stance on an issue. When the student realises that others hold different stances on that issue, a state of cognitive conflict is likely to develop. This conflict or uncertainty motivates the student to learn and

experience more about the issue in order to achieve a more holistic understanding. Such controversies encourage students to investigate problems in greater depth and often leads to a greater degree of emotional involvement and commitment. Ballantyne and Bain (1995) stresses that it is crucial that the controversy format is structured and managed constructively. Students with conflicting viewpoints should not see the conflict as a contest to be won or lost, but rather a problem to be solved collectively. For this approach to succeed, the issue has to be relevant and entertain a wide variety of viewpoints.

#### **2.4.5 Case Studies**

A case study is often a teacher-directed analysis of a particular environmental issue (Ramsey, *et al*, 1992). Such cases could be real or simulated. The teacher selects the issue and provides the student with information concerning the issue. This is followed by the class or group deciding on how to deal with the issue. The students then receive guidance on responsible behaviour or what Ramsey, *et al*, (1992) calls citizenship action and a proposed action plan is developed.

While the case study gives the teacher a great deal of flexibility and control, there are drawbacks. The format is issue specific and the chosen issue may not meet with the approval of the whole group. In addition the students are not exposed to a variety of issues and the problem solving skills learnt in dealing with one issue may not be applicable to other issues (Hungerford and Volk, 1990)

#### **2.4.6 Issue investigation**

The aim of this approach is to provide students with opportunities to learn and practice skills necessary to investigate issues (Ramsey, *et al*, 1992). This strategy differs from the case study format in that the students are trained in the process of investigation and issue resolution. The student then selects an issue of particular interest to him/her and investigates that issue in depth and develops an action plan for resolving the issue. This plan is evaluated to assess its cultural, social and ecological implications. The approach focuses attention on ecological knowledge, sensitivity and issue awareness, investigatory and evaluative skills, and citizenship responsibility (action skills).

The advantages of issue-based learning are particularly relevant in developing countries (Knamiller, 1983) as it enables students to become critically aware of issues and problems in their own community, and develops certain skills that are necessary for solving problems (Knamiller, 1983). There are however two major problems with issue-based learning. The first lies with the teacher, in that not only does he/she have to adapt from being a purveyor of information to a facilitator, but also, in all likelihood, he/she will have to select appropriate issues or case studies, design the format of each programme and obtain the necessary resource material. To do this effectively demands time, energy and skill (Ramsey, *et al*, 1992). The second lies with the students who, accustomed to an educational

diet of receiving, memorising and regurgitating information, might struggle to adjust to a system which involves uncertainties, value judgements and requires them to think for themselves (Knamiller, 1983).

## **2.5 Environmental education in the Secondary School Curriculum**

### **2.5.1 Historical Context**

The concept of environmental education arose in response to increasing pressure from society as a result of environmental degradation and a corresponding decline in the quality of life (O' Donoghue, *et al*, 1989). In the 1960s and 70s in South Africa, environmental education was characterised by 'conservation education' which initially focused on the preservation of animal and plant species, and later on the conservation and wise use of natural resources (Irwin 1990). The emphasis at this stage was almost exclusively on the natural environment. More recently, new terms have been introduced to provide a more holistic perspective and understand environmental education, but the concept remains the same. Many teachers and students still perceive environmental education to be about the conservation of the natural environment (Opie 1991).

Furthermore, the dominant emphasis on the cognitive domain provoked much criticism and there has been a call for alternative approaches which stressed the importance of attitudes and values (Ballantyne and Oelofse, 1989). One response has been a sentient approach (Bak, 1995) which emphasises the importance of fieldwork to enable students to experience nature and to develop feelings of wanting to care for the natural environment for its intrinsic value. This approach also has its critics and is regarded by some as a form of social engineering (O' Donoghue, 1994). Fien (1993), while acknowledging the positive aspects of nature experiences, 'earth love' and the student-centred approach, warns that such strategies ignore the issues and problems which may face the student and his/her community.

The rationalist and sentient approaches were also criticised for their respective emphases on facts and feelings, and for being far too narrow in their interpretation of environmental education (Irwin 1990). A more relevant approach, at least in theory, is the concept of 'realconserve' which acknowledges the importance of conservation and pollution, but gives attention to the plight of people and the issues relating to the battle for survival of the poor (*ibid*). Thus the emphasis is no longer on nature alone, but on a person-environment interaction (G. Clacherty, 1991). There has also been a call for a more reconstructionist or issue- based approach to environmental education (Fien, 1993). This does not involve totally discarding the factual transmission and values-oriented experiential encounters, but broadens the approach to include 'action research' strategies (EEPI, 1994). This involves the use of information and experience, and of finding out about issues and the skills for resolving these. Such an approach also calls for more participation not only from teachers, but also from local communities. Both of these points, that is action research and participation incorporate the Tbilisi principles of 1977.

The importance of a co-operative approach has recently been reiterated by Bak(1995) who points out that environmental education is viewed with great suspicion by those communities disadvantaged by apartheid. The following points are made:

- issues of redress, especially in terms of material compensation, are more important than those concerned with the conservation of natural resources
- what moral justification is there in worrying about the survival of future generations when the present generation is suffering as a result of lack of housing, food and health care
- environmental education is perceived as a concern of an affluent, largely white group
- and is in conflict with the needs of the largely black disadvantaged group. (Bak,1995)

It is thus essential that any environmental education curriculum needs to address environmental problems in their social, economic and political context (Bak,1995) . It also needs to examine issues in their historical context so as to expose the underlying causes for a particular environmental problem (Khan, 1989). Such curricula need to be as participatory-based as possible in order to commit students and community to the long-term sustainability of natural and social environments (Bak,1995).

### **2.5.2 Curriculum Development**

As is the case in many other countries environmental education is the neglected stepchild of educational authorities (Hungerford and Volk, 1990). Despite the publication of a White Paper on Environmental Education in 1989, no formal policy based on well-defined aims, objectives and principles of environmental education has been adopted in any of the Education Departments in South Africa. (Blignault, 1991). Blignault (1993) formulated a set of objectives and basic principles for environmental education. In South Africa, the principles are based largely on the Tibilisi principles which have been internationally accepted as the standard reference for such principles. The objectives have been listed in Table 2.2 and the principles in Table 2.3

Little came of the White Paper as its derivation gave it little legitimacy (EEPI, 1994). It did however promote the 'Tibilisi Principles' and as such was potentially a powerful tool for environmental education (Irwin,1990). Another possible reason why it was never implemented could be that its principles conflict in a number of areas with those of the present formal education system in South Africa (Blignault, 1993). One of the major constraints is that the formal education system is based on a reductionism philosophy which results in compartmentalised learning in separate subjects. This conflicts with the holistic and integrative approach of environmental education. In a wide ranging survey, Blignault has devised a comprehensive list of constraints which could influence the successful implementation of environmental education in schools. The list includes constraints relating to

education and school systems, teachers, students, concept, resources, community-school interactions, teaching methods, fieldwork, and issue-based learning. To overcome these constraints would probably involve changes to the formal education system, much consultation and certainly some compromise.

Some attempts have been made to develop curricular in recent years. In 1993 the Council for the Environment released a proposed core syllabus. However, this document was criticised in that there was insufficient participatory consultation (Taylor, *et al*, 1993; Schreuder, 1993). It was claimed that it had limited perspectives in some of the proposed topics, that it was directed at the middle-class group and that it ignored the real problems of the South African society.

Blignault (1993) proposed a number of curricula models and evaluated them against a number of variables including the principles of environmental education and ease of implementation into the formal school system. These models included the present knowledge and subject-based model, as well as models which included one or more of curriculum infusion, issue-based studies, a separate environmental 'integrated' subject, interdisciplinary modules and a model embracing all of the environmental principles and based on interaction between teacher and student. Recommendations were made, on the basis of the evaluations, on the implementation of models in the short, medium and long term for each teaching level.

*To develop an understanding of the environment through an awareness: of basic ecological, social, economic and political processes; of the interactions and interdependence of phenomena within the total biophysical and social environments and of the issues which arise from these interactions.*

*To develop sensitivity to and empathy for the environment through awareness of an individual's dependence on environmental quality, both in aesthetic and utilitarian terms.*

*To develop attitudes and values which will:*

*- develop tolerance of the views of others and a multicultural perspective in order to encourage positive social interaction.*

*- support and initiate responsible action directed towards sustainability of the total environment.*

*To encourage responsible individual and collective behaviour towards the local and global community and biophysical environment.*

*To encourage active participation in the solution of environmental problems and issues by developing the life skills necessary to accomplish these objectives.*

*Blignault 1993*

**Table 2.2 Objectives for environmental education**

At the international level the International Union for the Conservation of Nature, in the wake of the second World Conservation Strategy, proposed redefining environmental education as "Education for Sustainable Living." This would involve broadening environmental education and linking it with development education, human rights education and peace education (Fien, 1993).

In 1995 the Environmental Education Policy Initiative (EEPI) released a document outlining its environmental education policy options for formal education in South Africa. This document was the culmination of a consultative process of three years.

The document emphasises a curriculum that should not be prescriptive, but allow for flexibility, relevance and a local emphasis. It outlines four main policy options namely:

- Environmental education as local problem- solving curriculum action
- Environmental education as an integrated approach that is, an environmental perspective within separate subjects
- Environmental education as a component within a subject
- Environmental education as a separate subject.

#### **Principles for formal education**

*Formal education has a role to play in the life-long process of environmental education. Thus environmental education should be incorporated into formal education policy and the curriculum at all levels of education.*

*Environmental education should be seen as a process of education that should be merged or infused into the formal education system.*

*Environmental education is based on a holistic philosophy and therefore any element which is being studied should be seen as a 'whole' within a system of other wholes with which it interacts. Elements should not be studied in isolation but always within the context of these interactions.*

*The total environment (biophysical, social, economic and political) should be considered from a balanced integrated perspective. Thus curriculum structures which support an integrated and preferably interdisciplinary approach are necessary.*

*The process of environmental education is enriched by the use of diverse learning environments and a broad array of educational approaches, in particular those with a learner-centred focus.*

*The development of sensitivity, empathy, attitudes and values requires a greater emphasis on the development of the affective domain than is the case at present. This needs to be taken into account when programmes are structured and evaluated, and when students are assessed.*

*The understanding of general and subject specific environmental concepts and the development of thinking, communication and action skills should be promoted.*

*The skills of analytical and critical thinking should be coupled with synthesis and creative thinking in environmental problem-solving exercises in order to counteract critical negativism and promote positive action.*

*Global and environmental issues should be addressed, but environmental action projects should be based on local community issues. These projects develop and integrate the communication and thinking skills, acquired in the classroom, with the action skills and sense of responsibility required for individual action and public participation in environmental matters.*

*Opportunities should be provided for students to become empowered (that is self-confident enough to be able to act independently) by assisting in the planning of some of their own learning experiences, making decisions and accepting the consequences.*

*Blignault 1993*

**Table 2.3 Principles for formal education**

It is interesting to note that the last option runs contrary to all previous policies, including the White Paper of 1989, which have been emphatic that environmental education should not be offered as a separate subject. EEPI, however has been prepared to offer this as an option at the Middle School level where a precedent has been set in Namibia (EEPI, 1995) and at the Senior Secondary level as a vocationally- oriented subject. It is emphasised that these options can be used for various purposes and at any stage of the curriculum. This topic of curricular options together with the accompanying constraints will be discussed further in the final chapter.

## CHAPTER 3

### METHODOLOGY

#### 3.1 Design of the questionnaire

A questionnaire was developed to gather information concerning the level of environmental awareness and how the students felt about the various issues. While the questionnaire aimed to survey the students' opinions and reactions, the variety of questions attempted to examine student attitudes to a particular issue from several perspectives and to compare responses.

At this stage only a broad outline of the questionnaire will be given, because it will be dealt with in more detail in the relevant chapters. The questionnaire commences with a series of eleven line drawings each depicting an environmental concept (Question 1). These drawings were based on a similar instrument developed by Schreuder (1990) to act as visual stimuli and to elicit open responses from the students regarding their awareness of and attitude to each concept. It was hoped that the open responses would yield more information about the relationship between cognitions and values. (Schreuder, 1991).

The students were then given a list of 19 environmental and social issues which were regarded as problems at the global, national or regional scale. They were asked to give each a rating out of 10 according to the degree of concern they felt about each issue (Question 2). They were then asked to repeat the exercise with 13 local environmental issues (Question 3). The aims of these two questions was to assess how critically the students perceived various environmental problems and to find out whether they felt more concerned over global as opposed to local issues.

The main body of the questionnaire (Questions 5, 9, 15, 18 and 19) consisted of Likert-type statements which gave the students a choice of five responses ranging from *strongly agree* through *neutral* to *strongly disagree*. For the purposes of the analysis these items were divided into seven categories. Question 5 consisted of items relating mainly to *animal conservation*, Question 9 related to *local issues*, and Question 15 comprised items concerning *pollution* and *resource depletion*. Question 18 consisted mainly of items each of which represented a conflict situation between eco- or biocentric and anthropocentric conceptions. Some related directly to *nature versus human interest*, while others focused on *conservation versus development*. One of the objectives of this study was to establish how students would react to such conflict statements. In the pilot test it was found that the majority of the students opted for a neutral response and would not commit themselves. Consequently it was decided to remove the neutral option from Question 18. Question 19 is concerned chiefly with statements on *general issues* and statements relating to the environment in the school curriculum. None of the questions listed above dealt exclusively with a

single category. There were a number of items which could have fallen under more than one of the above categories. This is discussed further in Chapter 6.

Some questions (4, 7, 8, 11,12,13, and 14 ) tested student knowledge largely of topics which had been covered in some aspect of the school curriculum. These were designed to test the influence of subject choice on student knowledge. Other questions (6,10, and 20) made use of a multiple choice format to gauge student attitudes. Question 17, and 21 to 26 were aimed at exploring the students' degree of personal commitment both by intention and deed. In the analysis of the responses to these questions in Chapter 7, attempts will be made to link these responses to the attitudes expressed to the topic concerned.

The last part of the questionnaire was largely devoted to biographical data as recommended by Babbie (1973). Students were asked to supply information with respect to their age, gender, parents' occupation, residential area, previous school, subject choice, academic achievement, sports and hobbies, career choice, pets, whether they were Scouts or Guides and whether they belonged to a conservation society. It was never the intention to make use of all of these variables in the survey, but all were included in case they may have influence on student responses. The last five questions related to student sources of environmental information, and in particular the school and how the students felt about what they learnt about the environment at school. These questions and their responses are discussed in Chapter 8.

The items used in this study have largely been generated by this researcher, but a number have come from other sources, notably from the three studies carried out by Preston (1983, 1989 and 1995 together with Campbell). In the selection of items, every effort was made to avoid pitfalls such as double-barrelled, ambiguous or leading questions (Bailey, 1978).

## **3.2 Administration of the questionnaire**

### **3.2.1 Pilot Test**

Selecting the group for the pilot test presented a problem as the group needed to approximate the survey group as much as possible (Oppenheim, 1966). The Std 8 and Std 9 students from schools outside the valley are less likely to have had the same experience of local issues in Fish Hoek. Eventually it was decided to use a Standard 7 class (grade 9) from the Middle School. The test was conducted about two months before the main survey and was administered by the researcher. The group was comprised of 30 students. Minor changes were made to the final questionnaire prior to the main survey.

### 3.2.2 Main Survey

The administration of the questionnaires was supervised by class teachers during a specially allocated period in school hours. Only Std 8 and Std 9 students were surveyed. A total of 286 students completed the questionnaires. Three classes of each standard completed the questionnaire anonymously while the other three were asked to supply names. The latter group was assured that the names were for statistical purposes only and would not be linked to individual students. The average time taken to complete the questionnaire was between 35 and 40 minutes.

### 3.3 Analysis of questionnaire

All of the responses were coded and the data were captured on the Statistical Analysis System (SAS) application system operating on the University of Cape Town's main frame computer. The data were stored and analysed in the form of frequencies arranged in various categories. At a later stage, the data were transferred to a personal computer to facilitate a more flexible arrangement in the analysis of data. Individual student responses were not subjected to rigorous statistical analysis for the following reasons:

- individual items were not tested for reliability or validity in order to form part of a measuring scale (Oppenheim, 1966).
- the items in the questionnaire covered a wide range of issues and studies seem to indicate that there is not always much correlation between attitudes towards a particular issue or group of issues and attitudes towards other issues or the environment as a whole. (Van Liere and Dunlap, 1981)
- attempts were made to establish correlations within a category of Likert-type statements, for example *animal conservation*, but correlations were at best moderate and usually weak.
- there is no normality in the distribution of frequencies in all of the items, thus only non-parametric statistics could be used. This type of data is only suited to the identification of sub-groups rather than individual members of populations.

Thus the analysis of the responses of the student group as a whole is purely descriptive which does serve the purposes of this study. Statistical analysis was used in comparing the responses of the different student sub-groups, and here Pearson's chi-square test was used to test for significant differences between the sub-groups in their responses to individual items (Siegel, 1976). Significance was measured at the 95% and the 99% levels.

For analytical purposes the responses were collapsed from 5 to 3 categories except in the case of correspondence analysis (discussed in the next paragraph). In addition certain of the Likert

statements had their responses reversed in order to suit the form of analysis. These are discussed in more detail in the appropriate chapters that follow.

Apart from being graphically represented in the form of tables, histograms and pie charts, response patterns, where appropriate, were subjected to correspondence analysis and displayed as a 'perceptual map' (Preston, 1989). Correspondence analysis is a multivariate technique for displaying the rows and columns of a data matrix as points in two-dimensional vector space (Greenacre, 1984). The map presents a visual picture of the data and is therefore easier to interpret. In addition to analysing student responses as a whole, the responses of a number of student sub-groups were also analysed, as is shown in Table 3.1 below.

<p>Gender responses: to investigate the role of gender as an independent variable.</p> <p>Std 8 and Std 9's : to investigate the role of standard as an independent variable.</p> <p>Students who were previously at the Middle School compared to those who came from other schools.</p> <p>Students who put their names on their questionnaires compared to those who remained anonymous.</p> <p>Students who took, Biology, those who took Geography, those who took both Biology and Geography, and those who took neither subject, in order to investigate the effect of subject choice as an independent variable.</p> <p>The responses of students living in different parts of the Fish Hoek valley to local issues were also analysed in order to establish whether the residential area had any significant effect.</p> <p>The responses of students to the Likert-type items were also analysed on the basis of:</p> <ul style="list-style-type: none"><li>- frequency of reading environmental articles.</li><li>- frequency of watching environmental programmes on television.</li><li>- main source of environmental information.</li><li>- main source of environmental information within the school.</li></ul>
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**Table 3.1 List of student sub-groups whose responses were analysed**

## CHAPTER 4

### RELATIONSHIP BETWEEN KNOWLEDGE AND ATTITUDES

#### 4.1 Introduction

The first section of the questionnaire was based on an evaluation instrument devised by Schreuder (1990). The instrument was designed to "assess cognitions of, and values held towards certain aspects related to the natural environment and conservation " (ibid.).

The two main features of this instrument are that it relies on visual stimuli rather than text, and that it provides opportunities for open responses. Schreuder deemed the visual stimulus to be more suitable for the following reasons:

- responses to the stimuli would vary according to the respondent's perception of the environment;
- differentiation could be enhanced by concealing concepts to various degrees;
- the stimulus is less likely to contain elements which might bias the response; and reading fatigue is minimised.

#### 4.2 Format of stimulus and response

The visual stimuli took the form of line drawings, each drawing representing a particular ecological concept or environmental issue. For each visual stimulus the students had to answer the following two questions

- *What does the picture tell me?*
- *How do I feel about the picture?*

The first question was designed to elicit a cognitive response, that is to determine the student's perception of the stimulus, while the second question aimed to elicit an affective response that is to determine the student's feelings or values regarding the stimulus. The students were asked to answer each of the questions in a single short sentence.

#### 4.3 Selection of concepts

Eleven concepts were used. Four of these namely *water, endangered species, deforestation* and *pollution* were selected, with the author's permission, from Schreuder's instrument. The responses to these four items would serve as a basis for comparison between Schreuder's results and the findings of this survey. The other seven were selected by the researcher. Six of the concepts are also covered elsewhere in the questionnaire and they have been included in this section to evaluate the responses

to these concepts in different parts of the questionnaire. In Chapter 5 the students were asked to indicate the degree of concern they felt for *invader plants*, *global warming*, *soil erosion*, *air/noise pollution* and *informal settlements*. Student attitudes to local issues such as *invader plants* and *informal settlements*, as well as general issues like *global warming* and *noise pollution* were examined in Chapters 6 and 7, along with student commitment to *recycling*. The only concept not found elsewhere is *Cycads*. Illegal trading of these endangered plants had featured prominently in the news media in the weeks prior to this survey. The item was included to assess the extent to which the media coverage had generated an awareness of cycads amongst the students.

#### 4.4 Evaluation of responses

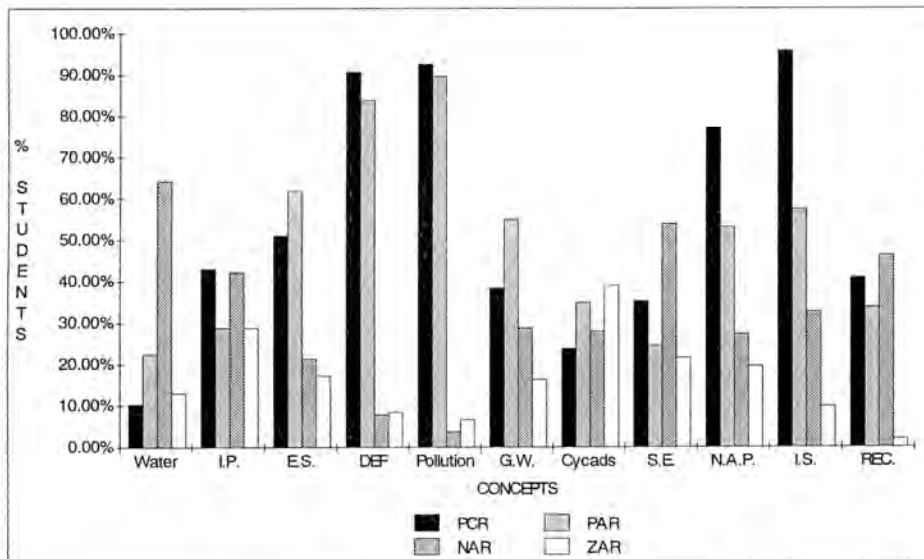
In evaluating the responses, the aim was not only to establish the number of students who recognised or reacted positively towards each concept, but also to establish the relationship between the cognitive and affective responses. This would involve assessing the correlation between positive or negative attitudes towards a concept and the degree of awareness of that concept. In addition Schreuder (1990) had found that many of his respondents had struggled to express their feelings. To determine the extent of this tendency amongst the Fish Hoek students it would be necessary to assign a code for those who did not offer an affective response. To meet the above requirements the following responses were coded for:

- 1 = correct perception (cognition) and positive attitude
- 2 = correct perception and negative attitude
- 3 = incorrect perception and positive attitude
- 4 = incorrect perception and negative attitude
- 5 = correct perception and no response
- 6 = incorrect perception and no response

A problem not encountered in the analysis of the pilot test but which became evident in the evaluation of the actual survey responses, was the number of respondents who were uncertain how to answer this section. Some students did not respond to any of the stimuli. It was also found that, as in Schreuder's research, many students found it difficult to express emotions or feelings about the concepts, even when correctly identified. In the analysis of the concepts which follows it should be borne in mind that the decision as to whether a response, cognitive or affective is rated positive or negative is a subjective decision taken by the researcher. The responses to each of the concepts will be discussed in more detail in the section that follows. The relevant illustration is included for each concept.

#### 4.5 Analysis of student responses

Figure 4.1 shows the relationship between cognitive and affective responses for each concept.



PCR = Positive Cognitive Response    PAR = Positive Affective Response:    NAR = Negative Affective Response  
 ZAR = Zero Affective Response

I.P. = Invasive plants; E.S. = Endangered species; DEF = Deforestation; G.W. = Global Warming,  
 S.E. = Soil Erosion; N.A.P. = Noise/Air/Pollution; I.S. = Informal Settlements; REC = Recycling.

**Figure 4.1 The relationship between cognitive and affective responses for each concept shown**

#### 4.5.1 Water



The ideal response to this illustration, according to Schreuder (1990) would be to recognise water as a natural resource and to express a concern for its conservation. Very few students recognised this concept in the context of the illustration. In this survey, reference to water in a natural setting, for example a lake or pond together with references to peace, serenity or other aesthetic qualities were accepted as positive.

Only 4% of the students identified the concept of water as a resource and all of these expressed concern about the fact that it is a limited resource. A further 6.3% recognised water in its natural setting. For the rest the responses were mainly descriptive "stone dropped into pond,"and "whirlpool" etc. A number of these respondents, however did show positive feelings and made comments such as "water is precious" , "keep the water unpolluted" or reflected on the peace and tranquillity of the scene. The overwhelming majority of the students (64.6%) gave negative responses in both categories. It would appear that the reason for this was that over and above the difficulty which

students seem to have in expressing their feelings, many were unable to understand the concept and made comments such as "thirsty," "so what," or simply "nothing." as an affective response.

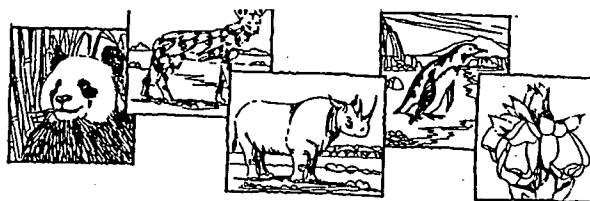
There are two possible reasons why such a low percentage of students identified water as a limited resource. Firstly the majority of students might not be aware of the fact that water is a scarce resource. This possibility loses much of its validity when the next section of the questionnaire is analysed as over 70% of the students show great concern over the future availability of water (discussed in Chapter 5). The second, and more likely explanation, is that the majority of the students were not able to associate the concept with the illustration. Perhaps the illustration could have been more explicit, for example showing a dam. On the other hand it could be argued that it was a good illustration in that it identified those environmentally-conscious few whose primary view of water is that of a scarce resource.

#### 4.5.2 Alien Invasive Plants



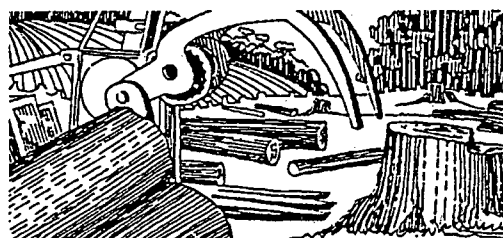
The illustration above shows pod-bearing branches of Rooikrans (*Acacia cyclops*) and Port Jackson (*Acacia saligna*), both of which are common in the Fish Hoek valley and which Biology students have encountered on field trips. An ideal response to this illustration would be to recognise the plants shown as alien invasives posing a threat to indigenous vegetation (cognition) coupled with concern for indigenous flora or the suggestion of eradicating these plants. 43% of the students recognised the concepts, but only 28.8% expressed concern about its impact on indigenous plants. A small percentage thought that the plants were indigenous and expressed concern for their survival. However the majority did not recognise the concept and described the illustration in purely descriptive terms such as "seeds", "leaves," and "pods."

#### 4.5.3 Endangered Species.



Students were expected to recognise all of the species shown as endangered and express concern for their future. The responses to this illustration indicates a strong biocentric conception. Figure 4.1 shows that a larger percentage of students gave a positive affective response than offered a positive cognitive response. While 22.2% of the students did not recognise the species as being endangered, they still suggested that they be protected because they were wildlife. A surprisingly large number of students identified animals only in spite of the fact that one of the illustrations depicted an endangered plant.

#### 4.5.4 Deforestation



The illustration could be interpreted as deforestation or it could also be seen as commercial logging in a plantation. Over 90% of the students recognised the concept of logging, and of these, 83.8% saw it as deforestation and expressed opposition for the practice. Responses included "destroying for human selfish needs," "using up natural resources," "look for alternative fuel source," and "replace trees." A few simply saw it as a machine cutting wood.

The degree of strong emotional reaction to deforestation was surprising and is also reflected in Chapter 5. It was evident from many of the responses that the reaction was in relation to the destruction of tropical rain forests. Had the illustration been viewed as a plantation, the responses would probably have been totally different. It is interesting to compare the responses to this illustration and to compare this to the water illustration. The former elicited strong emotion, despite the fact that what happens to the forests is not going to effect them directly. It appears that the students have been sensitised to the problems of deforestation and its effect on the fauna of those forests. On the other hand, *water* was certainly not seen as a scarce resource by the majority of the students, although, as shown in Chapter 5, they did express concern about the availability of water. It seems that water is taken for granted and that the students have not been sensitised to the implications of water scarcity.

#### 4.5.5 Pollution



To register a positive cognitive response, the students were required to recognise the concept of pollution and its consequences. Concern for the causes and effects of pollution would be an appropriate affective response. This item received the highest number of positive responses both in the cognitive and affective domains. Some of the positive comments included "animals suffer the consequences" and "destroy nature" reflecting the biocentric perspective and from the human centred perspective "affects the quality of drinking water." There were a few purely descriptive comments such as "bottle floating in water" and "someone trying to send a message."

It could be argued that the concept was too explicit and easily recognisable. Alternatively, it could also be argued that the students had been so sensitised to the concept of pollution that they were able to recognise it instantly. There was a high correlation between cognitive and affective responses in which 85% of the students reacted positively to both.

#### 4.5.6 Global Warming



This drawing illustrates the melting of ice as a possible consequence of global warming or the Greenhouse Effect. This item probed deeper into the understanding of a concept, as knowledge of the effects of global warming is needed for a positive cognitive response. Only 38.3% of the students gave positive responses in the cognitive domain as opposed to 55% in the affective area. Comments such as "ice and Eskimos," "cruelty to animals," and "feel sorry for the dog/bear," reflected the lack of knowledge shown by many in relation to this concept.

The main reason why there were more positive affective than cognitive responses is that many of the students, while expressing concern for the possible consequences of global warming, attributed its

cause directly to the destruction of the ozone layer. It appears that there is some confusion amongst many of the students regarding the Greenhouse Effect and ozone destruction. Some students regard the two processes as synonymous. This state of confusion was confirmed in the responses to items concerning the causes and effects of these two phenomena. It was of interest to note that some students expressed scepticism with respect to global warming.

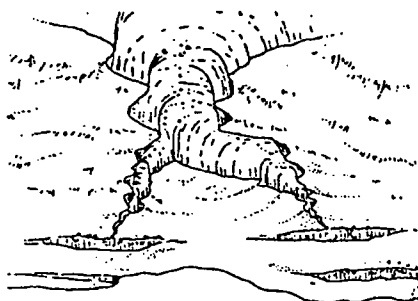
#### 4.5.7 Cycad



The cycads represent a group of endangered plants which had been in the news in the months preceding this survey because of illegal transfer and trade of these plants. This item was included to test the student's awareness and attitude on this issue.

Figure 4.1 shows that once again there were more positive affective than cognitive responses. Only 15.6% of the students responded positively in both categories, with just under 25% recognising the cycad. The discrepancy between positive affective and cognitive responses can be attributed to the fact that a number of students, while not recognising the plant as a cycad, perceived it as being endangered and accordingly expressed concern. Some identified the plant as a tree fern. Other responses included "tropical island," "palm tree," and "nice shade." The fact that over 70% of the students did not recognise the concept at all, indicates that these students had either not read or heard about cycads via the media, or that the information had no impact on either their degree of awareness or their attitudes.

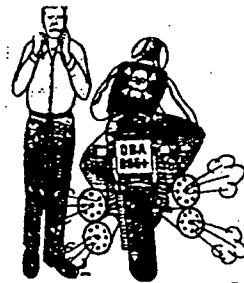
#### 4.5.8 Soil Erosion



Ideally this concept should be recognised in the context of poor farming methods, but merely indicating soil erosion was accepted as a positive cognitive response. In this particular example, it was felt that the affective response should be linked to soil erosion for it to be valid. Thus an expression of concern linked to drought would not be regarded as positive.

The concept was recognised by 35.2% of the students and of these, 24.6% showed concern regarding its causes and effects. A substantial percentage of students perceived the illustration to depict dry rivers or drought. These responses could indicate that the majority of students were not sensitive to the problem of soil erosion and its effects. This conclusion is given credence by the relatively low rating attributed to soil erosion as a cause for environmental concern which is discussed in Chapter 5. A possible reason for this is that soil erosion is most evident in rural areas and in other parts of the country, and that most of the students had not had experience of the effects of soil erosion. However, the fact that mountain mud slides had occurred in the Cape Peninsula during the winter prior to this survey reinforces the fact that soil erosion is also a local problem.

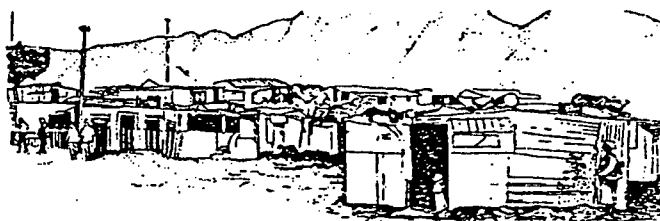
#### 4.5.9 Noise/air pollution



The illustration used here was one which could and did elicit a variety of responses. In the cognitive category, the concepts of both noise and air pollution apply and either is acceptable. Expressions of anger or concern were regarded as positive affective responses. Of the 77.2% who gave positive responses, 31.5% identified noise pollution, and 25.8% air pollution as what they perceived from the illustration, while 14.3% identified both forms of pollution, and a further 5.6% simply offered pollution. By comparison only 53.2% gave positive affective responses. These responses included comments such as "inconsiderate," "walk don't drive," and a call for the use of unleaded petrol. Negative cognitive comments included "robbery," "rebel," "nice motor bike" and "violence." A fair number (14.6%) of those who identified pollution were not particularly concerned about it.

The responses to this illustration were characterised by their variety in both cognitive and affective categories. This greater concern over noise conflicts with the responses discussed in Chapter 5 where noise is rated well below air pollution as a source of concern. It must be assumed that many students were reacting to noise in the context of motor cycles and not to noise in general. This is confirmed by their response to the playing of radios in public areas, discussed in Chapter 6.

#### 4.5.10 Informal Settlements



The intention of including this item was to test for the affective responses because the concept could be recognised easily. This item concerns the socio-economic environment and is designed to elicit the student's attitude to informal settlements or squatter camps.

As anticipated, 95.8% of the students recognised the concept. However, there was a wide variety of affective responses to this illustration, many of which gave substantial insight into the values of the students concerned. Many students expressed sadness at the poverty, and general concern for the underprivileged. Others suggested the need for better facilities, adequate housing, job creation and education facilities. One student demonstrated insight with the comment, "the rich get richer, the poor don't have a chance." A few students expressed appreciation for what they themselves had. On the negative side comments ranged from the extreme "shoot them," "burn their huts," to those that expressed concern about their impact on the natural environment and that these communities posed a health hazard. The predominant theme of the negative responses however, were concerns about overpopulation and the need for strict birth control. It was clear from the analysis of the responses that informal settlements is a very contentious issue. Student attitudes to this concept were assessed in several other parts of this questionnaire.

#### 4.5.11 Recycling



Students were required to recognise that the objects portrayed in the illustration were all suitable for recycling. The concept of recycling was recognised by 40.5% of the students, 33.7% of whom also responded positively in the affective category. Some 16% saw the items as litter or packaging and responded positively to those concepts.

It was encouraging to note that most of the students who recognised the concept of recycling showed their approval. Of those who did not recognise the recycling concept, apart from seeing the items as

rubbish or waste, many saw the items as food items. However, the main observation which one can make from this item is the fact that 60% of the students could not identify the concept of recycling.

#### 4.6 Analysis of Sub-Groups

Tables 4. 1 and 4.2 compares the cognitive and affective responses of the student sub-groups.

	Water	Invasives	Endg S	Deforestation	Pollution	Global Warming	Cycad	Soil Erosio	Air/Noise Pollution	Inform Sett	Recycling
Boys	9.2%	39.9%	44.1%	89.8%	88.1%	47.7%	26.7%	42.7%	78.6%	92.6%	35.0%
Girls	10.1%	46.4%	56.5%	91.4%	96.4%	31.0%	21.1%	28.2%	75.9%	98.5%	46.2%
Std 8	8.2%	50.0%	54.6%	91.6%	91.6%	37.8%	22.9%	29.1%	77.5%	96.4%	38.7%
Std 9	12.6%	36.0%	47.6%	90.0%	93.7%	39.1%	25.1%	41.5%	77.4%	95.7%	46.0%
Middle School	10.5%	47.4%	51.9%	90.8%	92.5%	40.9%	24.9%	35.9%	80.2%	95.2%	42.2%
Other School	4.4%	26.0%	50.1%	90.9%	92.7%	27.9%	19.6%	32.1%	67.2%	98.1%	35.3%
Named	14.1%	45.8%	55.9%	91.6%	93.0%	36.9%	21.7%	38.1%	76.5%	96.0%	45.1%
Anonymous	7.6%	40.4%	46.3%	90.0%	92.2%	39.4%	25.8%	32.5%	77.6%	95.6%	36.9%
Biology	8.4%	51.0%	54.2%	93.0%	93.7%	34.1%	25.4%	36.6%	75.1%	97.9%	42.5%
Geography	13.3%	41.1%	47.2%	92.9%	93.0%	42.4%	23.0%	37.7%	77.9%	96.7%	42.0%
No Bio/Geo	8.9%	38.9%	49.9%	85.1%	89.6%	41.0%	27.4%	37.1%	81.6%	92.4%	41.3%
Bio+Geo	8.1%	52.3%	49.3%	94.1%	92.6%	40.0%	29.3%	45.2%	78.7%	98.5%	47.6%

**Table 4.1 Percentages of positive cognitive responses of student sub-groups for each concept**

	Water	Invasives	Endg S	Deforestation	Pollution	Global Warming	Cycad	Soil Erosio	Air/Noise Pollution	Inform Sett	Recycling
Boys	15.1%	29.8%	53.9%	79.5%	86.6%	53.3%	35.3%	50.0%	46.1%	51.6%	38.7%
Girls	28.1%	35.5%	68.9%	87.1%	92.2%	56.6%	34.1%	47.7%	59.8%	62.7%	50.9%
Std 8	17.6%	33.0%	54.6%	81.7%	87.3%	48.2%	31.6%	40.1%	49.3%	57.5%	39.7%
Std 9	26.8%	32.0%	70.1%	86.1%	92.2%	62.2%	38.3%	58.4%	57.8%	57.4%	60.1%
Middle School	20.6%	34.3%	62.1%	83.8%	89.3%	56.6%	36.4%	52.2%	54.2%	56.9%	50.0%
Other School	24.4%	26.0%	61.1%	83.7%	90.9%	48.2%	29.4%	37.8%	50.9%	57.7%	47.0%
Named	24.1%	32.9%	67.9%	84.7%	90.7%	56.7%	34.8%	48.8%	53.1%	54.4%	53.3%
Anonymous	20.6%	32.3%	55.9%	82.9%	88.7%	53.2%	35.1%	49.6%	53.2%	60.1%	46.6%
Biology	23.9%	35.4%	64.8%	84.6%	88.8%	55.1%	35.7%	47.7%	55.3%	58.4%	52.2%
Geography	25.0%	33.8%	63.8%	85.9%	93.7%	56.0%	33.6%	50.0%	59.1%	61.4%	49.6%
No Bio/Geo	16.0%	26.9%	55.8%	80.6%	86.6%	51.6%	38.8%	51.6%	50.8%	50.0%	52.4%
Bio+Geo	22.6%	35.4%	65.7%	86.6%	92.6%	53.9%	37.9%	50.0%	68.1%	59.7%	57.4%

**Table 4.2 Percentages of positive affective responses of student sub-groups for each concept**

##### 4.6.1 Gender

The girls submitted more positive cognitive responses than the boys in seven of the eleven concepts, and more positive affective responses in nine of the eleven categories. In most of the concepts the difference between the two groups was greater in the affective responses than in the cognitive.

However, where the boys had produced more cognitive responses than the girls, the corresponding

affective response difference was far less or even reversed. Thus in the responses to *global warming*, 17% more of the boys gave positive cognitive responses ( $p < 0.01$ ), but 3% more of the girls were positive in the affective response. Similarly in the responses to *air/noise pollution*, there was a 3% difference in favour of the boys in terms of positive cognitive responses and a 13% difference in favour of the girls in positive affective responses ( $p < 0.05$ ). The greatest overall difference between the two groups was in the response to *endangered species* where the girls outscored the boys in terms of positive responses by 12% and 15% respectively in the cognitive and affective domains ( $p = 0.017$ ). Other significant differences in affective responses occurred in the responses to *soil erosion* where the boys were more positive ( $p < 0.05$ ), a difference probably linked to their substantially greater awareness of the concept, and in the responses to *informal settlements* and *recycling* where the girls were more positive ( $p < 0.01$  in both cases).

#### 4.6.2 Standard

With regard to the cognitive responses the two groups were within 3% of each other in six of the concepts. The major differences were found in the responses to: *endangered species* where 7% more of the Std 8's reacted positively. With regard to the concept of *invasive plants*, 50% of the Std 8's recognised the concept as opposed to 36% of the Std 9's ( $p = 0.025$ ). This could be due to the fact that the Std 8 Biology students had dealt with invasive plants both in class and in the field a month prior to this survey. The situation was reversed in the responses to *soil erosion* where 12% more Std 9's responded positively, and in the case of *recycling* where the difference was just under 8%.

With respect to the affective domain, the Std 9's recorded more positive responses in nine of the eleven concepts. Some of these differences were quite substantial for example 21% in *recycling*, ( $p < 0.01$ ), 16% for *endangered species* ( $p < 0.01$ ) and 14% for *global warming* ( $p < 0.01$ ). In regard to the two concepts where the Std 8's were the more positive, namely *invasive plants* and *informal settlements*, the difference was not more than 1%.

The overall conclusion that can be drawn from this section is that while there was no distinct trend in the cognitive area, the Std 9's exhibited a significantly more positive attitude towards these environmental concepts.

#### 4.6.3 Previous School

Students who had been to the Middle School proved to be more aware of the concepts shown than those who attended other schools prior to enrolling at Fish Hoek Senior High School, showing conclusively greater positive responses to seven of the concepts. The most significant of these was in respect of *invasive plants* where there was a difference of 21% ( $p < 0.01$ ). Three concepts elicited very similar responses and it was only one item namely *informal settlements* that students from other

schools gave more positive responses. The affective responses followed a similar pattern, except that students from other schools were more positive in their attitude to *water*. Thus, according to this instrument, students from the Middle School seem to be more positively oriented towards the environment than their counterparts who went to other schools.

#### 4.6.4 Anonymity

The cognitive responses of the named and anonymous groups were similar in eight of the concepts. The exceptions were *water*, *endangered species* and *recycling* where the named group gave between 6% and 9% more positive responses. The affective responses showed the same trend with the named group again being more positive towards *endangered species* (12% difference) and *recycling* (6% difference). There was thus an overall similarity in the responses to the concepts shown, with those to *endangered species* and *recycling* being the notable exceptions.

#### 4.6.5 Subject Choice

An analysis of the cognitive responses clearly indicates the influence of subject choice on these responses. Students taking Biology showed greater awareness of *invasive plants* (difference = 10%) and *endangered species* (difference = 7%). On the other hand those who take Geography were more familiar with the concepts of *water* (difference = 5%) and *global warming* (difference = 8.3%). The responses to the rest of the concepts showed minimal differences between the two groups. The affective responses of the two groups showed an even greater correlation where the largest disparity between them, namely that of *pollution*, was only 4.9%. The differences shown in the cognitive responses were neutralised by the affective responses. The most striking example of this was to be found in the Biology students' response to *invasive plants* where only 35.4% gave positive affective responses as opposed to the 51% who gave positive cognitive responses. This finding also shows that the affective response does not always have to correlate to the cognitive response which concurs with Schreuder (1990). None of these differences were statistically significant.

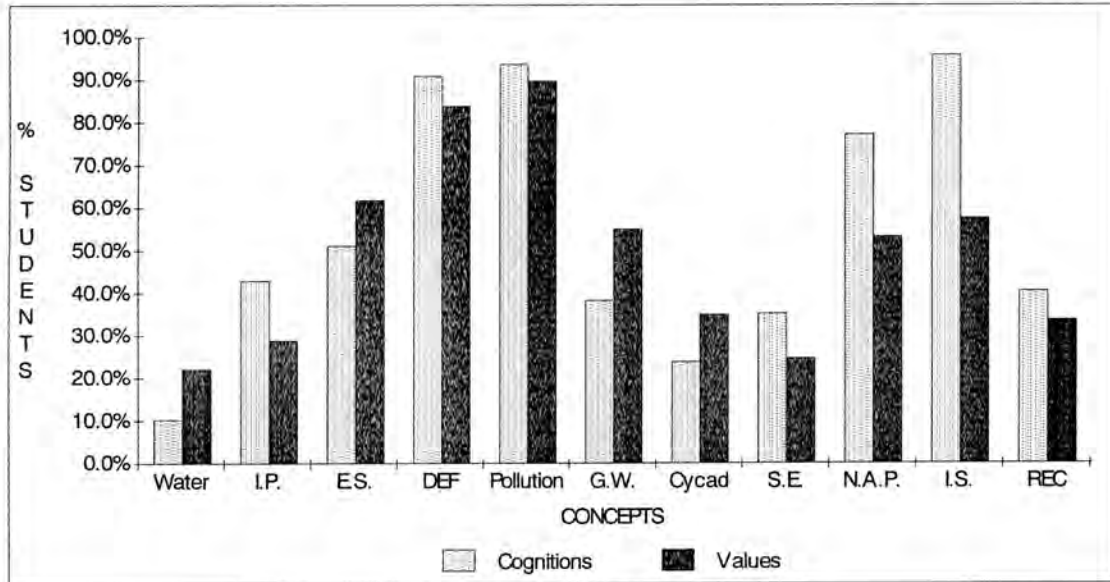
By comparing the cognitive responses of those students who take Biology and Geography with those who take neither of these subjects, the former group shows greater awareness in five of the concepts, with minimal differences being found in the other six. The affective responses indicated more positive responses to eight of the concepts from the Biology/Geography students (no difference less than 5%). The responses to the other three were similar although one would not expect the Non Biology/Geography students to show a greater concern, albeit slight for *cycads* and *soil erosion*. According to these responses students who take Biology and Geography show greater awareness and concern for environmental issues than those who take neither subject.

## 4.7 Discussion

An important feature of the responses to this section, was the inability of the majority of the students to recognise most of the concepts illustrated. Only four of the concepts were correctly identified by more than 50% of the students. Three of these, namely *deforestation*, *pollution* and *informal settlements* were recognised by more than 90% of the students. The question immediately arises as to whether the students were not sufficiently sensitised to the concept, or whether the concept was not adequately shown by the illustration. The latter reason would certainly apply to *water* and, to a lesser extent, *soil erosion* and *global warming* (here confusion between this concept and ozone depletion also influenced the response). Inadequate sensitisation was probably the main reason for the low cognitive responses for *invasive plants*, *cycads* and *recycling*.

Schreuder's (1990) research differed from the present study, in that he surveyed Standard 6 students and chose a far wider context of schools to participate in the study. Nevertheless there were marked similarities between the responses of this survey and those offered by 'White' students in his survey. The overwhelming majority of both groups did not recognise the concept implicit in *water*. Both groups recorded high percentages in respect of positive cognitive and affective responses to *deforestation* and *pollution*, and expressed strong emotional reaction against the removal of trees. The respondents to this survey seemed to be more aware of the concept of *endangered species*. Schreuder, using slightly different illustrations also found that the majority of the students did not recognise the concepts of *invasive plants* and *recycling*. It would appear that there is very little difference in the cognitions and values of the two groups, despite the two/three year gap in age and educational experience.

Figure: 4.2 shows the relationship between positive cognitive and positive affective responses for each of the concepts



**KEY:** I.P. = invasive plants, E.S. = Endangered species., DEF = Deforestation, G.W. = Global Warming  
 S.E. = Soil erosion, N.A.P. = Noise/air pollution; I.S. = Informal Settlements; REC = Recycling

**Figure 4.2 Positive cognitions and values of students for each concept**

In seven of the concepts, including those which were recognised by the majority of the students, the positive cognitive response was greater than the affective response. This is in accordance with Schreuder's findings. The difference was most marked in the responses to *informal settlements* (38%). Only in the responses to *water*, *endangered species*, *global warming* and *cycads* did values outscore cognitions. Herein lies a weakness in the instrument in that it is up to the discretion of the tester to decide as to whether the cognitive response has to be correct in order for the affective response to be scored. This is part of the problem of subjectivity in interpreting the responses.

In evaluating the responses as a whole, the following conclusions were drawn;

- that the choice of illustrations is critical if misconceptions are to be avoided
- many students have difficulty interpreting illustrations and their responses tend to be descriptive
- many students struggle to express feelings on paper

- there is not always a direct correlation between cognitive and affective responses
- open responses can reveal a great deal about a respondent's value systems
- interpretation and scoring of cognitive and affective responses is largely dependent on the subjectivity of the tester.

The survey broadly reveals that:

- the cognitive base of the students with regard to most of the concepts is low
- students can show positive attitudes towards certain concepts even if there are shortcomings in the level of awareness
- the cognitions and values expressed in this section are supported in other sections of the questionnaire. (See chapters 5 and 6)
- the relatively low cognitive and affective responses to the concept of *recycling* are reflected in the correspondingly low student commitment to the practice of recycling (See Chapter 7)
- that as independent variables, girls, Std 9's, ex Middle School students and students who take Biology and Geography tend to have greater knowledge and show greater concern for the environment.

The similarity of responses to overlapping items and in relation to Schreuder's survey suggests that many of the findings of this survey could be applied to other schools.

In conclusion, there are two further points to be made. Firstly, the responses might have been different had the survey not been at the start of the questionnaire, but in the middle or towards the end, where the students would have come across some of the concepts illustrated. This could mean that they would be more likely to recognise the concept. Secondly, the validity of the results of this section could be tested if the trends are reflected throughout the questionnaire.

## CHAPTER 5

### STUDENT AND TEACHER CONCERNS FOR ENVIRONMENTAL AND SOCIAL ISSUES

#### 5.1 Introduction

To find out which environmental issues were perceived as being the most critical, the students were asked to rate a list of issues according to how concerned he or she felt about that issue. A rating of 10 indicated that the issue was of critical concern, while a rating of 0 indicated that the issue was of no concern. The teachers also completed this section of the questionnaire in order to compare their perceptions with those of the students.

Three similar studies have been undertaken in this country. Adler and Ackermann (1981) published the results of a country-wide random survey of 5000 members of the general public in which they were asked to rank eleven categories. Preston (1989) carried out a survey on two specialised groups (professional ecologists and business leaders) to gauge their perceptions of the problems posed by 19 environmental issues. Preston and Campbell (1995) published the results of a similar survey involving 800 adult visitors to four game reserve camps. The visitors were asked to comment on the degree of seriousness of nine items concerning the environment.

#### 5.2 Selection of issues

The issues were divided into two groups. The first consisted of general issues which had relevance on a regional, national or global scale, while the second was confined to issues in the Fish Hoek valley and its immediate surrounds. The aim of this survey was to ascertain whether there was a greater overall concern for general issues or local ones. In addition it attempted to establish whether students who live in the vicinity of the source of a local environmental problem would show greater concern for that issue as opposed to those living in other parts of the valley.

The eleven categories selected by Adler and Ackermann (1981) were all related to environmental degradation and a number of them (namely *air, water and waste pollution, noise and soil erosion*) were included as issues in this survey. However issues which they omitted, such as *population growth* and

*water availability*, as well as some which have become more topical, such as *ozone depletion*, the *Greenhouse Effect* and *deforestation*, have also been included.

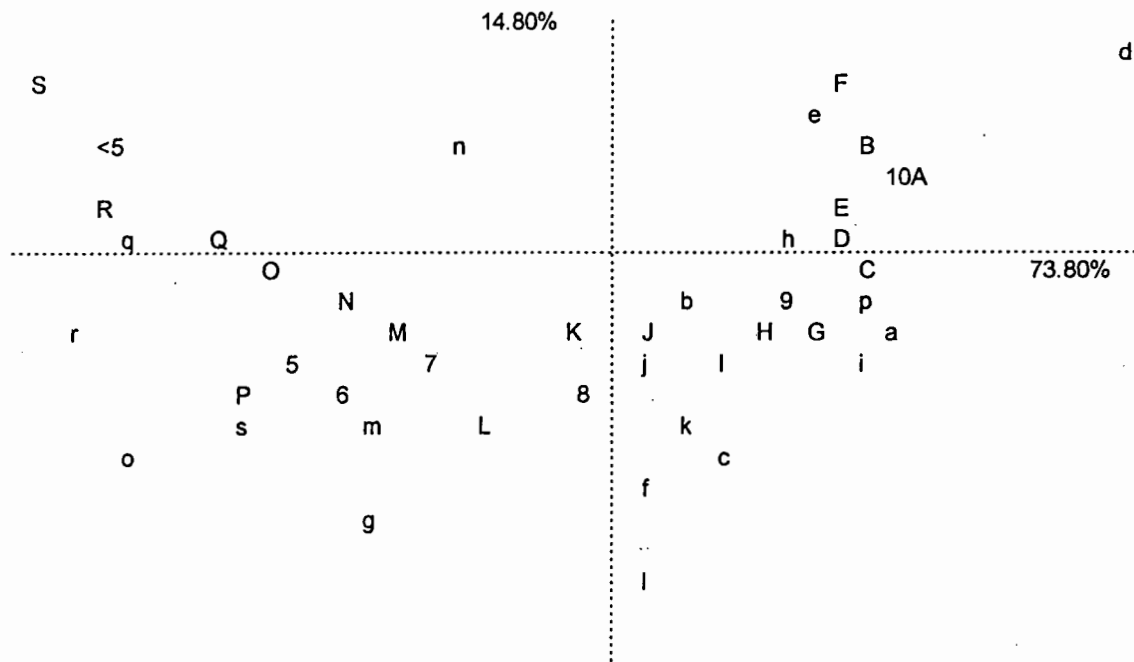
This present study also included a number of social issues which were particularly relevant to teenagers such as *drug abuse*, *teenage pregnancy*, *child molestation*, *AIDS* and *poverty*. The reason for including these social issues was an attempt to describe how environmental concerns were rated in relation to social issues.

The local issues used in this survey had received some publicity and caused concern to a number of people in the Fish Hoek area, the most emotive of these issues being the *kaolin mining* debate.

## **5.3 Results**

### **5.3.1 General Categories**

Figure 5.1 shows a perceptual map derived from correspondence analysis. It provides a picture of the overall ratings of teachers and students of general environmental and social issues. The legend is shown in Table 5.1. The X-axis explains 73,8% of the data and the corresponding positions on the map suggest that those symbols further to the right-hand side of the map indicate a greater degree of concern about the issue. The Y-axis accounts for 14,8% of the data. It reflects the degree of polarity in the responses, that is, the closer to the top of the Y-axis, the greater the divergence of opinion about that issue. For example, categories F, E, D and C are all of equal concern, but the polarity or extremes of opinion are greatest in F and the unanimity greatest in C. The categories in Table 5.1 are ranked in descending order according to the mean overall rating for each category.



**Figure 5.1 Perceptual Map (Greenacre, 1986) indicating the degree of concern felt towards general environmental and social issues.** The symbols are explained in Table 5.1. The lower case symbols refer to the responses of the teachers and the UPPER CASE symbols to those of the students.

The ratings for the two groups are similar with the teachers scoring an average mean of 7.4 as opposed to the students mean score of 7.1. The teachers' main environmental concern was population growth with 75% of the sample giving *Increasing human population* a rating of 10. The students also showed great concern for this issue, but have ranked the issue 4th with a mean of 8.1. The student's main concern was for '*loss of tropical forest*' which received similar support from the staff. There was a significant difference in the perceptions of *child molestation* ( $p = 0.02$ ) which was ranked 2nd by the students but only 10th by the staff. There was also a significant difference in the way the two groups rated the *destruction of the ozone layer* ( $p < 0.02$ ). But the most significant difference between the two groups was their attitude to *soil erosion* ( $p < 0.01$ ) where the staff regarded it as the third most serious issue, (mean 8.4) ahead of *future availability of water*. These findings were similar to those of Preston and Campbell (1995), but opposite to those of the ecologists and business leaders in Preston's study (1989).

		Of critical concern = 10				Of little or no concern = < 5					
		10	9	8	7	6	5	<5	No	Mean	
Students	Issue								Response		
Symbol											
A	Loss of tropical forest	141	43	30	25	10	12	17	8	8.5	
B	Child molestation	142	40	28	18	12	13	26	7	8.3	
C	Destruction of ozone layer	126	34	36	32	21	20	15	2	8.2	
D	Increasing human population	122	36	38	25	17	18	20	10	8.1	
E	Future availability of water	122	44	31	21	12	16	26	12	8.1	
F	AIDS	144	34	22	24	6	16	36	4	8.1	
G	Rising cost of living	102	43	33	31	28	24	15	10	8	
H	Water pollution	93	51	37	31	23	20	25	6	7.9	
I	Air pollution	89	47	38	36	24	18	25	9	7.8	
J	Solid waste pollution	79	42	47	31	22	15	37	13	7.6	
K	Greenhouse Effect	70	37	37	42	16	23	38	23	7.3	
L	Poverty	63	38	54	31	20	38	30	12	7.2	
M	Drug abuse	66	34	42	33	17	35	54	5	6.8	
N	Teenage pregnancy	61	30	34	31	30	31	63	6	6.4	
O	Road accidents	43	32	27	37	27	31	78	11	6.1	
P	Soil Erosion	31	19	40	31	37	47	64	17	6	
Q	Alcohol abuse	41	22	33	41	23	30	90	6	5.8	
R	Vandalism	32	13	28	33	24	39	107	10	5.2	
S	Noise	20	14	20	22	21	34	140	15	4.2	
<b>Teachers</b>											
<b>Symbols</b>											
d	Increasing human population	15	2	2	1	0	0	0	0	9.5	
a	Loss of tropical forest	8	3	6	2	0	0	1	0	8.6	
p	Soil erosion	7	6	3	0	2	0	2	0	8.4	
i	Air pollution	7	4	5	1	1	1	1	0	8.4	
e	Future availability of water	9	4	1	1	2	0	3	0	8.3	
c	Destruction of ozone layer	4	6	4	1	3	1	1	0	8	
k	Greenhouse Effect	5	3	4	4	0	2	1	1	7.9	
h	Water pollution	9	1	3	2	1	2	2	0	7.9	
l	Poverty	2	4	7	1	3	2	0	1	7.7	
b	Child molestation	8	0	2	3	1	4	1	1	7.7	
f	AIDS	4	3	5	2	2	2	1	1	7.7	
j	Solid waste pollution	6	1	4	4	1	1	2	0	7.7	
n	Teenage pregnancy	7	1	2	3	1	1	4	1	7.2	
g	Rising cost of living	3	0	6	4	2	2	2	1	7	
m	Drug abuse	4	1	4	3	2	3	3	0	6.8	
s	Noise	1	3	3	3	3	1	5	1	6	
q	Alcohol abuse	2	1	2	3	2	2	7	1	5.9	
o	Road accidents	0	1	4	4	3	2	6	0	5.6	
r	Vandalism	0	0	3	6	3	0	8	0	5.4	

Table 5.1 Student and teacher ratings on general environmental and social issues

The students on the other hand did not see *soil erosion* as a serious problem and it was ranked 16th with a mean of 6.0. It seems clear from this and the first section of the questionnaire that the majority

of the students are not aware of and consequently not really concerned about the problems resulting from soil erosion.

The students were not as concerned about pollution as other issues. The three types of pollution were clustered around the median position with *water pollution* regarded as slightly more serious than *air* and *solid waste pollution*. This contrasts with Adler and Ackermann's (1981) results which suggested that water and air pollution were two of the most serious environmental issues. The teachers on the other hand, whilst concurring with the students on *water* and *solid waste pollution*, saw *air pollution* as a far greater problem and rated this alongside *soil erosion*.

The students were the least bothered by *noise* however, the teachers were significantly more concerned about this issue than the students ( $p < 0.05$ ). The students on the whole tended to show more concern for the social issues than the teachers. The teachers showed the most concern about *poverty*, *child molestation* and *AIDS* which were all represented by the median, whereas the students in addition to *child molestation* rated *AIDS* and *cost of living* above the median value. The students were also more concerned about *road accidents*. The two groups gave similar responses to *drug abuse*, *alcohol abuse* and *vandalism* while the teachers showed greater concern for *poverty* and *teenage pregnancy*.

The teachers, in general, perceived environmental problems to be of greater concern than social ones. The same applies to a lesser extent to the students who showed greater concern about those social issues which do or could impact on themselves, notably *cost of living* and possibly *child molestation*, and, in the future, *AIDS*.

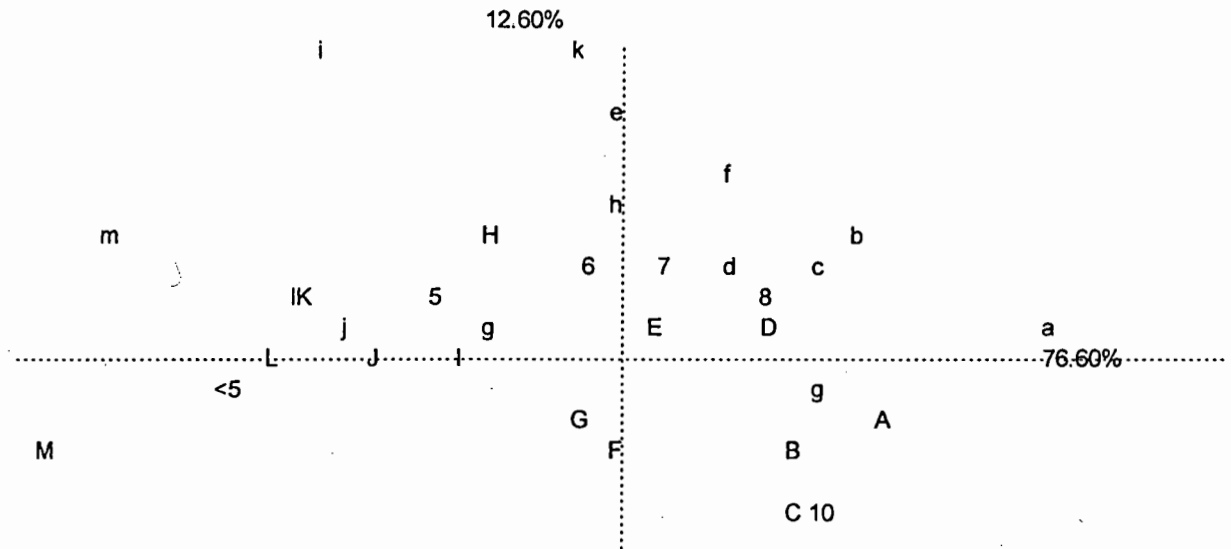
A summary of the overall means of the various student sub-groups is shown in Appendix B. The girls showed that they were generally more concerned about environmental and social issues than the boys, recording higher mean values in all categories except for *loss of tropical forest*. The differences were statistically significant in 10 of the categories namely *drug abuse* ( $p < 0.01$ ), *teenage pregnancy* ( $p < 0.01$ ), *child molestation* ( $p < 0.01$ ) which was the girls' major concern with a mean of 9.0, *road*

*accidents* ( $p < 0.01$ ), *vandalism* ( $p < 0.01$ ), *alcohol abuse* ( $p < 0.01$ ) *destruction of ozone layer* ( $p < 0.02$ ), *poverty* ( $p < 0.02$ ), *AIDS* ( $p < 0.05$ ) and *solid waste pollution* ( $p < 0.05$ ).

The Std 9's showed greater concern than the Std 8's in all categories except for that of *rising cost of living* where the ratings were identical. The differences were significant in only 4 of the categories, namely *Greenhouse Effect* ( $p < 0.01$ ), *air pollution* ( $p < 0.02$ ), *soil erosion* ( $p < 0.01$ ) and *increase of human population* ( $p < 0.01$ ). Surprisingly students who had previously attended schools other than the Middle School showed a greater concern than those who had attended the Middle School with a higher mean in 13 of the categories. However, only two of these namely, *destruction of the ozone layer* and *soil erosion* were statistically significant ( $p < 0.05$ ). The Middle School students showed greater concern in three of the categories. There were no statistically significant differences between named and anonymous students nor between students taking Biology compared to those taking Geography. Students taking Biology and Geography scored higher means than those taking neither subject in 17 of the categories. However, in only one of these namely, *soil erosion* ( $p < 0.05$ ), was the difference statistically significant.

### 5.3.2 Local Issues

The local categories were analysed in the same way as the general ones. Figure 5.2 presents the perceptual map derived from the correspondence analysis. Table 5.2 shows the ranking of the categories according to their overall mean. Contrary to what one would expect, both students and teachers are significantly less concerned about local issues than they are about the more widespread problems ( $p < 0.01$ ) with the students recording an average mean of 5.9 and the teachers 6.1



**Figure 5.2 Perceptual Map (Greenacre, 1986) indicating the degrees of concern for local environmental issues.** The symbols are explained in Table 5.2. The lower case symbols refer to the responses of the teachers and the UPPER CASE symbols to those of the students.

		Of critical concern = 10							Of little or no concern = <5			
Issue		10	9	8	7	6	5	< 5	No	Mean		
Students		Response										
Symbols												
A	Pollution in False Bay.	85	45	44	29	23	21	30	9	7.7		
B	Squatters	88	31	35	29	23	28	46	6	7.2		
C	Over-fishing in False Bay	94	26	31	22	18	25	47	23	7.2		
D	Littering	63	35	50	35	25	29	44	5	7.1		
E	State of the Silvermine River	47	33	35	29	19	30	51	42	6.6		
F	Housing development on dune	68	31	30	24	17	29	71	16	6.5		
G	Coastal development	63	18	23	26	19	29	69	39	6.2		
H	Invasive alien vegetation	35	15	42	36	31	35	69	23	6		
I	Kaolin mining	51	22	21	26	23	37	77	29	5.8		
J	Proposed roads	36	14	23	20	16	27	86	64	5.1		
K	Increase in traffic	20	14	19	31	26	35	121	20	4.5		
L	Overcrowding of beaches	29	13	21	18	20	37	135	13	4.3		
M	Dogs on beaches	15	5	5	6	13	27	203	12	2.6		
<b>Teachers</b>												
Symbols												
a	Pollution in False Bay	5	4	7	2	0	1	1	0	8.3		
c	Over-fishing in False Bay	4	3	3	2	3	2	2	1	7.4		
b	Squatters	4	3	4	2	4	1	2	0	7.3		
d	Littering	4	1	6	2	2	1	4	0	7.1		
f	Housing development on dune	2	4	3	3	4	1	3	0	6.7		
k	Increase in traffic	2	1	2	4	4	3	3	1	6.4		
h	Invasive alien vegetation	2	3	3	3	2	3	4	0	6.3		
g	Coastal development	4	2	0	2	4	3	5	0	6.3		
e	State of the Silvermine River	2	0	5	2	2	5	3	1	6		
j	Proposed roads	2	2	1	1	2	4	7	1	5.2		
i	Kaolin mining	0	0	2	5	1	5	7	0	4.8		
l	Overcrowding of beaches	1	1	3	0	3	2	9	1	4.8		
m	Dogs on beaches	0	0	1	2	2	4	11	0	3.5		

**Table 5.2 Student and teacher ratings on local environmental and social issues**

Secondly, Table 5.2 shows the large number of students who failed to respond to several of the categories notably, *proposed roads*, *state of the Silvermine River*, *coastal development* and to a lesser extent *kaolin mining*. This could be due to lack of interest, but is also due to lack of knowledge (there are students who do not know where the Silvermine River is) and the students did not feel competent to respond.

Another interesting feature represented by the perceptual map (Figure 5.2) is that in both groups, the majority of the categories elicited fairly similar overall degrees of concern. However, there was greater polarisation in the teacher responses compared to those of the students

Both groups rated *pollution in False Bay* as the most serious local problem with the teachers showing a slightly greater concern. This is followed by virtually identical ratings in both groups for *squatters*, *over-fishing in False Bay* and *littering*. Rating *littering* a more serious problem than *invasive alien vegetation*, (significantly so in the case of the students ( $p < 0.01$ ), suggests that aesthetic considerations were deemed more serious than ecological ones. This point was further emphasised by visitors to South African nature reserves (Preston and Campbell, 1995) who rated *litter* as their most serious environmental problem after *population growth*, and ahead of *water pollution*, *soil erosion* and *availability of water*.

The next two categories of concern for the students were the *state of the Silvermine River* and *housing development on the sand dunes*. The teachers felt more concerned about the latter category (mean = 6.7) with the *Silvermine River* four places below (mean = 6.0). There was no statistical significance in this difference. Both of these categories were marked by the degree of polarisation amongst the teachers (See Figure 5.2). The next two concerns for the students, the *coastal development in Kommetjie/Noordhoek* and *invasive alien vegetation*, were given similar ratings by both groups. There was a greater degree of polarisation amongst the students with respect to alien vegetation. However, of greater concern to the teachers than either of the previous two categories was the *increase in traffic* (mean = 6.4). This differed significantly from the students' perception ( $p < 0.04$ ) who rated it far lower (mean = 4.5). The fact that very few of the students tested were eligible to drive could account for their lack of concern.

Both groups rated the *kaolin mining* controversy fairly low on their list of concerns. The mean rating for the students was 5.8 while the teachers were even less concerned and scored a mean of only 4.8. The teachers' mean score was significantly lower than that of the students ( $p < 0.04$ ). The students who lived in Noordhoek in the near vicinity of the mine were far more concerned than students living elsewhere. The remaining categories namely, *proposed roads*, *overcrowding of beaches* and *dogs on beaches* were of rather moderate concern to both groups and therefore of minor significance.

The student sub-groups ratings of local issues, ( see Appendix B for comparison of mean values) shows relatively few significant differences. Girls showed a tendency to be more concerned than the boys, but the only statistically significant differences were in the responses to *squatters* ( $p < 0.05$ ) and *littering* ( $p < 0.01$ ). The Std 9's tended to show more concern than the Std 8's, but the difference was only significant in the response to *pollution in False Bay* ( $p = 0.02$ ). The significant differences between the students from the Middle School and those from other schools occurred in those 3 categories which were of least concern to the students, namely *increase in traffic* ( $p < 0.05$ ), *overcrowding of beaches* ( $p < 0.02$ ) and *dogs on beaches* ( $p = 0.02$ ). In all 3 cases, it was the students from schools other than the Fish Hoek Middle School who rated the category more seriously. The only significant difference between the named and anonymous groups occurred in the category *overcrowding of beaches* where the anonymous group was more concerned ( $p < 0.01$ ). Biology and Geography students recorded similar ratings for all the categories, but students who took both subjects tended to show greater concern than those who took neither. However these differences were only statistically different in two categories, namely *housing development on sand dunes* ( $p < 0.01$ ) and *over-fishing in False Bay* ( $p < 0.05$ ).

Students showed more concern about issues in their immediate vicinity than students from other areas. However, the only statistically significant example is that of the students living in Kommetjie and Noordhoek who show significantly greater concern over *coastal development* in that area with mean rating of 8.3 compared to an overall student mean of 6.3 ( $p < 0.01$ ). Noordhoek students also recorded higher mean ratings than the overall student body for *Kaolin mining* (7.5 to 5.8), while students of Clovelly had higher mean ratings for *housing development on sand dunes* (8.5 to 6.5), *state of the Silvermine River* (7.8 to 6.6) and *proposed roads* (8.3 to 5.1).

#### 5.4 Discussion

A dominant feature of this section of the questionnaire is the greater concern shown by the students over general or global issues as opposed to local issues. The local issue which concerned the students the most would only have been ranked eleventh in the general issues.

Similar findings have emerged from studies in Israel and England (Blum, 1987). In Israel each of nine environmental problems was rated higher on the national compared to the local scale. In England, the study showed that 16% of the respondents felt that there were no local environmental problems at all, a frequency of responses higher than the responses of concern shown for any of the specific problems listed (Morgan and Richmond, 1977). The same group rated population density as the major national problem, but locally it was only ranked eighth (ibid). Blum (1987) attributes the Israeli finding to the effect of mass media which conveys the seriousness of the national problems. However, the students had not experienced any of the problems in the area where they lived. The mass media probably also influenced the students in this survey. For instance the issue that caused the greatest concern was the *loss of tropical forest*, a topic which has not been taught in detail at school.

Another feature of this survey was the relative high rating given to social issues. While Preston (1989) did not directly compare environmental and social issues, both the ecologists and business leaders felt that issues such as education, job creation, housing and health were more critical than all of the environmental issues. None of these issues were given as options to the students in this study. The countries surveyed by Blum (1987) also combined environmental and social issues and some of the findings contrasted sharply with those of this study. *Road accidents* were regarded as the most serious problem in Australia and Israel, ranked third in the United States and fourth in England (Blum, 1987). Yet in this survey it was ranked only fifteenth. *Vandalism* was ranked seventeenth in this study, but in Israel it was ranked fourth out of nine problems. In this study and in both of Preston's surveys, water pollution was ranked more serious than air pollution. The situation was reversed in Adler & Ackermann's (1981) survey, and in the Israel (Blum, 1987) and England (Morgan and Richmond, 1977) surveys.

With reference to the local issues the major point which emerges from this survey is, as mentioned earlier, the relatively high number of "no responses" which seems to imply a fairly substantial lack of awareness concerning several of the issues; despite the local publicity which these issues had enjoyed.

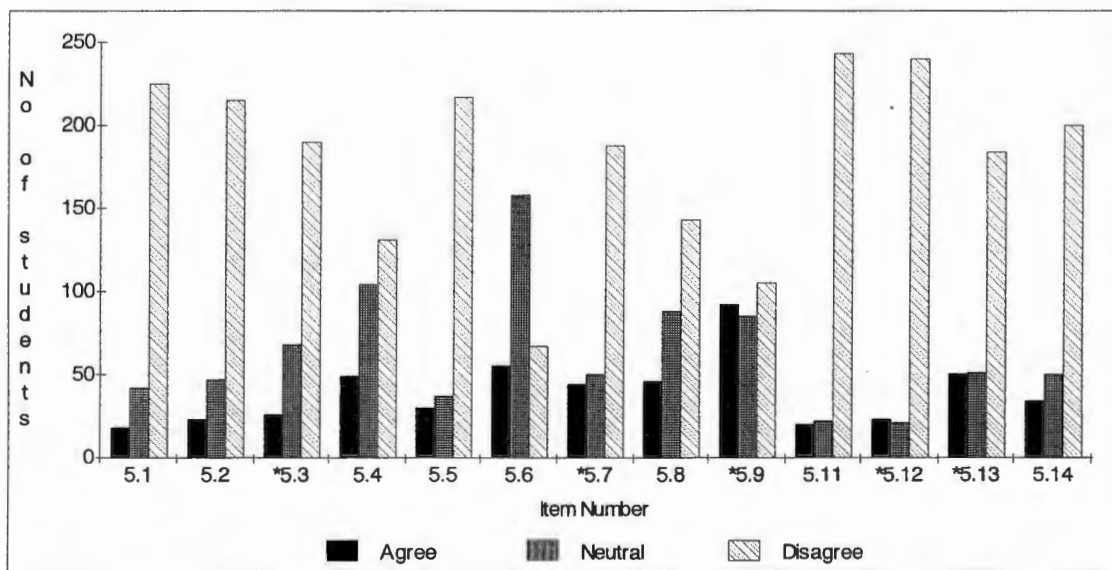
Most of the issues rated were covered later on in the questionnaire and are discussed in greater detail in Chapter 6 and presented in Appendix D.

## CHAPTER 6

### ANALYSIS OF STUDENT RESPONSES TO ENVIRONMENTAL ISSUES

#### 6.1 Animal Conservation

Graphic representation of the student responses to the sixteen Likert statements relating to animal conservation are shown in Figures 6.1 and 6.2. The responses to Items 5.3, 5.7, 5.9, 5.12 and 5.13 (all indicated by an asterisk in Figure 6.1) as well as Items 18.10 and 18.14 from Figure 6.2 have been reversed so that in each of the items a response of *Disagree* or *Strongly Disagree* reflects a biocentric value orientation. A more detailed analysis of each item is given in Appendix C.

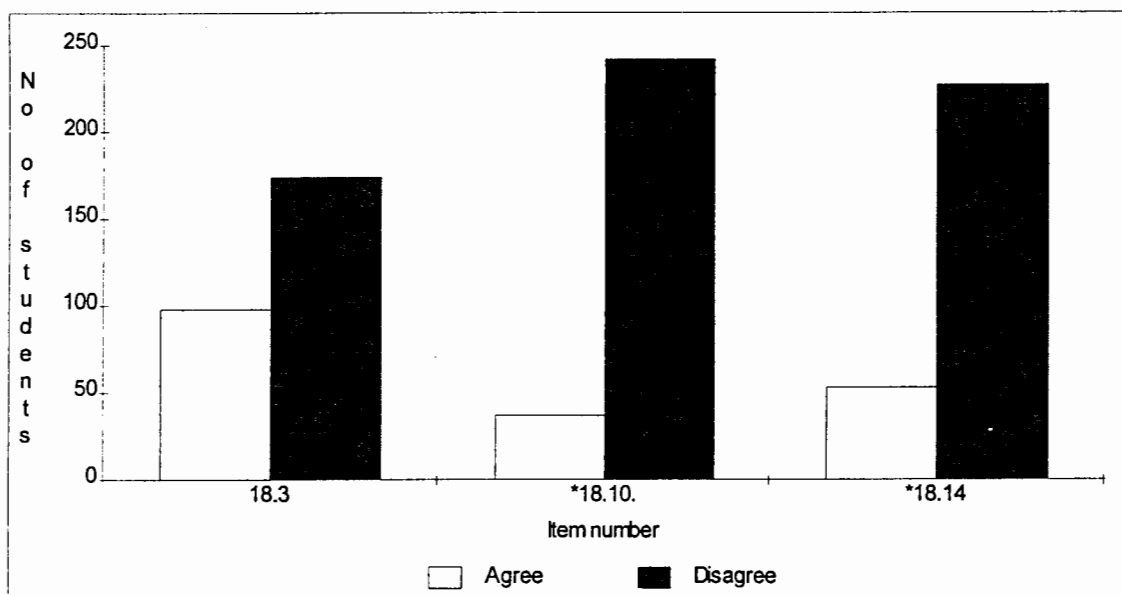


#### KEY TO LIKERT STATEMENTS

- 5.1 I couldn't care less whether whales come into Fish Hoek Bay or not.
- 5.2 I don't see any point in trying to save the Great White Shark.
- 5.3 More game animals should be introduced into the Cape Point Nature Reserve.
- 5.4 Seals are a threat to the fishing industry.
- 5.5 Seal culling should be allowed, as it provides much needed employment.
- 5.6 The increase in the seal populations is threatening the survival of sea birds such as the Jackass penguin.
- 5.7 I am opposed to seal culling.
- 5.8 Seals represent a resource and as such should be harvested.
- 5.9 Disease causing animals such as the malarial mosquito have a right to exist.
- 5.11 There is no harm in feeding wild baboons as long as one is careful.
- 5.12 Trade in ivory should be banned.
- 5.13 A "giraffe braai" was held recently. This should not be allowed.
- 5.14 Any dangerous puff adders found outside nature reserves should be killed.

**Figure 6.1 Student responses to Likert-type statements on animal conservation.**

The most striking feature of this section is the animal centred or biocentric perspective of the majority of the students. Any statement which implies any killing of animals has been strongly opposed. This opposition is clearly indicated in the responses to Item 6. This value orientation is not restricted to the "cute and cuddly", but also extends to animals like the great white shark (Item 5.2) and the puff adder (Item 5.14). For many, however, this biocentrism does not extend to the malarial mosquito (Item 5.9). The students view animals that do not serve any useful purpose either ecologically or aesthetically, as having no right to exist.



#### KEY TO LIKERT STATEMENTS

- 18.3 The preservation of habitats is more important than the preservation of species.
- 18.10 We owe it to future generations to prevent the extinction of animals such as the black rhino.
- 18.14 I feel that hunting for sport is morally wrong.

**Figure 6.2 Student responses to Likert-type statements on animal conservation with no neutral option**

The responses to Items 5.3 and 18.3, where the majority have taken a biocentric rather than an ecocentric view, seem to indicate poor ecological knowledge. The high neutral response to Item 5.6 suggests a lack of awareness of the ecological relationships between seals and sea birds. On the other hand 74% of the students correctly identified the Southern Right whale as the regular spring visitor to Fish Hoek (Item 4) and this correlates well with the positive attitude towards whales (Item 5.1).

Items 5.4 to 5.8 all relate to the seal culling/harvesting controversy. The student responses to these statements revealed the following:

- at least a third of the students have no knowledge with regard to the impact of seals on fishing and sea birds
- more students find culling of seals as a means of providing employment unacceptable than the concept of culling itself
- a significant number of students were unfamiliar with the concept of harvesting.

The total rejection of trade in ivory (Item 5.12), sport hunting (Item 18.14) and, to a slightly lesser extent, seal harvesting (Item 5.8) and the "giraffe braai" (Item 5.13) by an overwhelming majority of the students, indicate that the students do not accept the concept of sustainable utilisation. This could be because many were unaware of the concept or of its benefits.

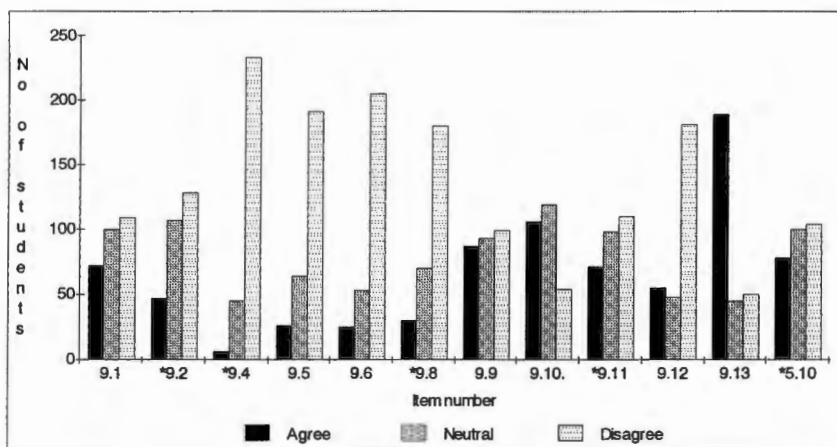
## **6.2 Local Environmental Issues**

Item 6 refers to a recent incident when a number of baboons were shot near Kommetjie shortly before this survey was undertaken. 74% of the students chose the relocation option, that is moving the baboons to another area, 24% opted for the status quo and only 1.8% endorsed the killing of baboons. When comparing the responses of those who lived closest to the baboons and were thus more likely to have contact with them, it was found that with one exception all of the Ocean View students favoured relocation, whereas the Kommetjie students were evenly divided between the relocation and no action options. It would thus appear that the Ocean View students, on the whole, are less tolerant of the presence of the baboons than are their Kommetjie counterparts. This difference in response, however, is not statistically significant ( $p=0.08$ )

Items 7 and 8 were designed to test the student's knowledge of indigenous plants and the ecological relationship between fynbos and fire. The student's responses show that their knowledge of indigenous plants is poor. There did seem to be a greater awareness of the role of fire in fynbos,

particularly amongst the Biology students. However, the overall number of correct responses was still low.

Responses of the students to the twelve Likert statements relating to local environmental issues are shown graphically in Figure 6.3.



#### KEY TO LIKERT STATEMENTS

- 9.1 In spite of the fact that Rooikrans is a threat to the local fynbos, it should not be eradicated because, as firewood it provides an important source of income for the unemployed in the valley.
- 9.2 I feel that all invasive plants in the valley should be removed.
- 9.4 The dunes are a feature of Fish Hoek valley and I would like them to be there for my children to enjoy.
- 9.5 I support housing development on the sand dunes, as the rates that will be paid, will provide more money for the Fish Hoek Town Council to be used for the benefit of the community.
- 9.6 Developing the Kommetjie/Noordhoek coastline for tourism is desirable, even if it results in the destruction of rare plant communities.
- 9.8 The proposed kaolin mine in Noordhoek will destroy a large area of indigenous flora and fauna.
- 9.9 I feel that the existing kaolin mine has little impact on the environment.
- 9.10 Too many local people would become unemployed if Serina (the kaolin mining company) had to stop mining in the valley.
- 9.11 It would be preferable for the proposed site at Noordhoek to remain covered with alien vegetation than for it to be mined for kaolin.
- 9.12 I feel that vehicles should be allowed onto Noordhoek beach.
- 9.13 Rotting kelp should be regularly removed from Long beach.
- 5.10 Trek fishermen should be banned from Fish Hoek beach.

**Figure 6.3 Student responses to Likert statements on local issues.**

Those statements indicated by an asterisk have had their scoring reversed so that any response of *agree* reflects a human centred value orientation while a response of *disagree* reflects an eco-centred value orientation.

The most striking feature of these responses is the empathy felt by the vast majority of the students for the retention of the natural aesthetic features of the valley, namely the sand dunes (Items 9.4 and 9.5) and Noordhoek beach (Items 9.6 and 9.12). A similar feeling is expressed in the response to Item 9.8, although here there is also a lack of knowledge as the proposed kaolin mining site is largely covered by alien vegetation as is indicated in Item 9.11. The students are opposed to any development which might impinge on or alter these scenic landmarks.

Another feature in this section was the large number of neutral responses, particularly those statements relating to alien vegetation (Items 9.1 and 9.2), kaolin mining (Items 9.9, 9.10 and 9.11) and to fishermen (Item 5.10). This could be because the students, owing to their lack of knowledge, did not feel qualified to take a stand, or simply that they did not wish to commit themselves in a conflict situation. Nevertheless, in ten of the twelve statements, a majority of the students, albeit a small one, favoured the ecocentric option. The two exceptions were to Items 9.10 and 9.13. The responses to 9.10 proved to be an anomaly although the majority remained neutral, 38% agreed that too many people would become unemployed if kaolin mining had to stop as opposed to the 19% who disagreed. Yet in the next statement 39% expressed opposition to kaolin mining. A number of students felt that a loss of jobs is a necessary trade-off to prevent mining.

In the response to 9.13 the vast majority of students objected to the decomposition of kelp lying on the beaches. It would appear that most students were not aware of the ecological role played by decomposing kelp, or if they were aware, showed a preference for an aesthetically clean beach at the expense of a natural ecosystem.

There was no statistically significant difference in the responses to the statements from students living in different parts of the valley. For example, students living in Noordhoek did not differ significantly in their responses to kaolin mining, from that of the total student response.

In Item 10, the students were asked to select from a list what they felt were the best options for the undeveloped land on either side of the Silvermine River. The two most popular choices were for it to be made into a nature area and, secondly, for no action to be taken.

In Item 20 students were asked to select one of four options for the fate of the squatter community of Noordhoek and the smaller group living along the Silvermine River. Table 6.1 shows the student response to these options. Virtually 40% of the students clearly indicated that they wanted the squatters out of the valley. This disturbingly high percentage could be attributed to feelings of prejudice or insecurity, and as can be seen from Table 6.1, the concern is, with one exception, greatest amongst those communities who live in close proximity to the squatters.

AREA	% STUDENTS
<i>Fish Hoek</i>	33.6
<i>Sun Valley</i>	43.5
<i>Noordhoek</i>	67
<i>Kommetjie</i>	67
<i>Ocean View</i>	23

**Table 6.1** The percentage of students per geographical area who felt that squatters should be removed from the valley.

The responses of the Noordhoek and Kommetjie students differed significantly from those of Fish Hoek and Ocean View students ( $p < 0.01$  in both cases). The positive response of most of the Ocean View students towards the squatters is interesting as they live fairly close to the squatters. A possible reason for this is that the Ocean View students identified with the squatters.

It can be concluded from this section that students seemed to show a greater concern for global rather than local issues. This is in accordance with the findings of Blum (1987) which were discussed in Chapter 5. The large number of neutral responses to many of the statements point strongly to the fact that many of the students have very little idea or at least, a rather narrow view of local issues. A more detailed analysis of the individual items in this section will be found in Appendix D.

### 6.3 Pollution and Resource Conservation

In addition to finding out what the students know and feel about pollution and resource conservation, the study also attempted to establish the kinds of student actions they were likely to take with respect to reducing pollution and conserving resources.

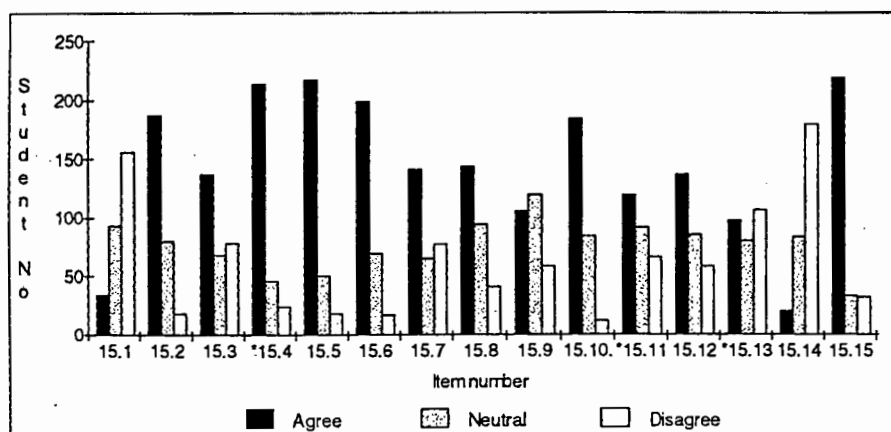
Item 11 comprised a multiple choice question concerning the cause of atmospheric lead pollution. 56,2% correctly identified motor vehicles as the main culprit.

Item 12 related to the causes and effects of *ozone depletion, Greenhouse Effect, acid rain* and *plastic pollution*. The responses to these questions are discussed in detail in Appendix E, but the following three findings were noted:

- students are more aware of the causes of ozone depletion than the effects
- many students were confused about the difference between ozone depletion and the Greenhouse Effect
- there was a relatively high 'no response' to this question, particularly from the Std 8's.

Items 13 and 14 dealt with garbage and sewage disposal at the local level. In both cases only slightly more than a quarter of the students knew the correct answer. This was particularly surprising in the case of the Std 9's as the whole group had been involved in a cross-curriculum project on waste disposal in the Fish Hoek valley during the previous year and many of them had visited the sites involved. Ignorance with reference to sewage and garbage disposal has also been shown in similar studies undertaken in Vancouver (O' Riordan, 1981) and in Spain (Membiela, *et al*, 1993). O' Riordan (*ibid*) cites evidence which suggests that people prefer not to consider "distasteful" subjects such as sewage. Nevertheless ignorance about such topics amongst the students is a cause for concern, especially as the students rated both water and solid waste pollution highly as environmental problems. In his survey of Hout Bay residents, Stevens (1994) found that 84% of respondents did not know what happens to their garbage once it was collected.

Item 15 consisted of 15 Likert-type statements. The responses to these statements are reflected in Figure 6.4 and a detailed discussion of each statement can be found in Appendix E.



**KEY TO LIKERT STATEMENTS**

- 15.1 I am bothered by people playing their radios at public recreation areas.
- 15.2 I get angry when I see litter lying around the school.
- 15.3 I ought to pick up litter dropped by other people.
- 15.4 People who worry about pollution have nothing else to worry about.
- 15.5 I get angry when I see graffiti on mountain rocks.
- 15.6 Oil tankers should not be allowed into False Bay.
- 15.7 Smoking should be banned in public places.
- 15.8 Reducing environmental damage is more important than increasing our living standards.
- 15.9 It worries me that there is a nuclear plant so close to Cape Town.
- 15.10 There is conclusive evidence that the Greenhouse Effect is going to change our climate.
- 15.11 The benefits of pesticides far exceed their threat to wildlife and health.
- 15.12 Convenience foods with individual throw-away containers should be heavily taxed to pay the costs of eliminating their effects on the environment.
- 15.13 I find the prospect of using sewage water unacceptable.
- 15.14 The price of electricity should be increased to cover the cost of pollution control.
- 15.15 Deposits should be paid on all glass bottles.

**Figure 6.4 Student responses to Likert statements on pollution and resource conservation**

The responses to Items 15.4, 15.11 and 15.13 have been reversed so that for each item a response of *Agree* would indicate environmental responsibility.

The student response to Item 15.1 showed that the majority are not bothered by noise from radios.

Only 12.7% of the students objected to radios.

The attitude reflected by the students to the two litter statements was also fascinating. In their response to 15.2, 65.7% of them supported the statement with only 6.6% in disagreement. The large positive response could be partly due to a feeling of obligation, that is bowing to social norms (O'Riordan, 1981). The response to 15.3 however, was markedly different with only 48.9% supporting the statement and 27.2% rejecting it.

This discrepancy in the responses to the two statements suggests that although the students were angered by litter, they did not feel obliged to clean it up themselves.

Only half of the students supported the ban on smoking (Item 15.7) either because they disliked the habit or were aware of the health risk. There was however a fairly substantial minority who opposed the statement (27.3%). Just over half of the students also agreed with Item 15.8 while a further third remained neutral. While the response to this statement was encouraging, it should be noted that students were not making any personal commitment in support of this statement. It would be interesting to ascertain whether students would be prepared to make sacrifices in order to reduce environmental damage.

There was a diverse response to the issue of the nuclear power station near Cape Town, with the largest percentage of students (41.7%) not committing themselves, which could suggest that they did not have the knowledge with which to express an opinion. For the rest, 37.4% agreed with the statement, while 20.8% disagreed.

The response to Item 15.10 showed that a large percentage of the students showed little or no knowledge of the Greenhouse Effect (see Appendix E). Two thirds of the students agreed with the statement, while very few opposed it. There was, however, a substantial neutral group (30%) who did not feel qualified to express an opinion.

Approximately 50% of the students supported the idea of taxing throw-away containers as opposed to the 7.4% who supported an increase in the electricity price. Similarly 21.1% opposed the taxing of throw-away containers, while 63.9% were against the electricity price increase. The increased electricity price could affect the students and their families directly and could involve some sort of personal sacrifice in order to save electricity.

The vast majority of the students were in favour of deposits being paid on glass bottles (Item 15.15) indicating some measure of support for glass recycling. Whether this support would be extended to

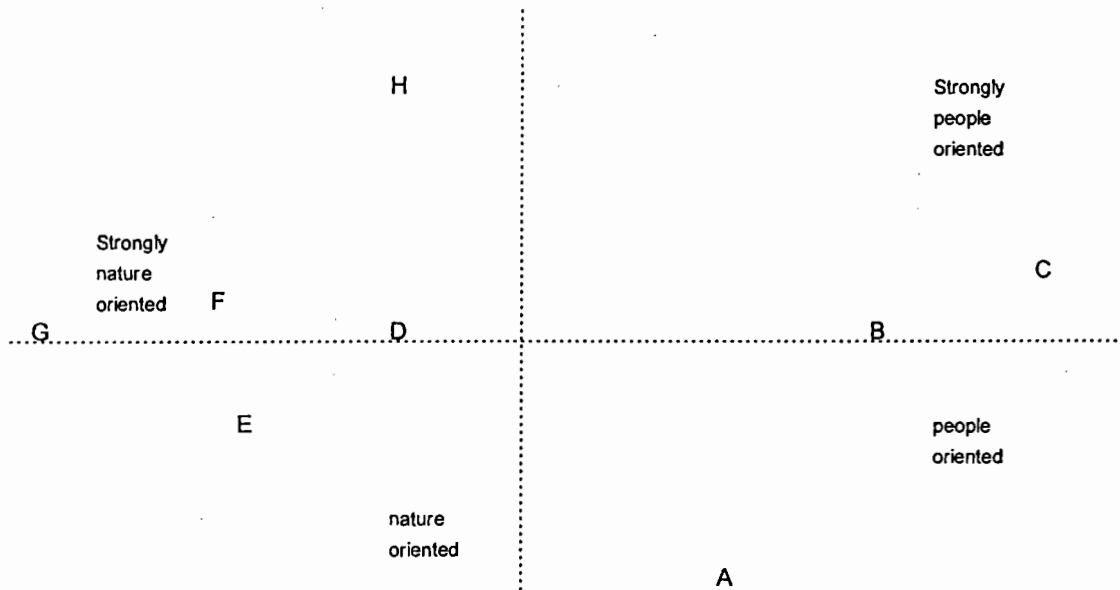
actually returning bottles to claim the deposit or to recycle non-returnable bottles will be examined in Chapter 7.

Item 16 dealt with the area of water resource usage. Less than a quarter of the students identified farmers as the main users of water, most opted for city residents as the highest consumers of water.

The responses to this section reveal that the students have a positive attitude towards combating pollution and conserving resources. However the general ignorance of the issues indicates shortcomings which need to be addressed in the school curriculum.

#### **6.4 Conservation for nature vs conservation for people**

In this section the students were presented with statements, each of which represented a conflict between the interests of nature and those of people. As a result of an exceptionally high neutral response in the pilot test, it was decided not to offer this option in these statements, so that students were forced to choose between the human-centred and nature-centred viewpoint. The responses to two of the statements (Items 18.8 and 18.20) were reversed so that for each statement, agreement indicated a human centred or anthropocentric orientation while disagreement represented a nature or ecocentric orientation. These responses have been subjected to correspondence analysis and are illustrated as a perceptual map in Figure 6.5.



**Key to symbols**

- A. It is far more important to attend to social problems such as poverty than to protect threatened habitats. (Item 18.1)
- B. It is wrong to remove people from an area in order to establish a nature reserve. (Item 18.4)
- C. The managers of game reserves which are bordered by poverty stricken people cannot ignore the needs of these people (Item 18.5).
- D. The purpose of conservation is to protect nature from people. (Item 18.8)
- E. Money spent on wildlife conservation should be reallocated to provide housing for the homeless. (Item 18.11)
- F. Wilderness areas should be utilised to provide food and space for crowded hungry populations (Item 18.12).
- G. Conservation should be for the benefit of people not animals (Item 18.13).
- H. Environmental issues should not be linked to political issues (Item 18.20).

**Figure 6.5 Perceptual Map indicating the orientation of students responses to items reflecting conflict between the interests of people and the interests of nature**

The first statement presented students with the choice between poverty and threatened habitats. 56% of the students showed an orientation toward an ecocentric perspective or "perceived conservationist viewpoint" (Khan, 1990). However, a significant minority (44%) did support the statement. The position of this statement on the perceptual map also indicates that not many students took an extreme stand on this issue (29% in all). It is possible that some of the students were influenced by the word "far" and had it been left out they might have been more likely to support the statement. The removal of people in order to establish a nature reserve was the issue which caused the most division amongst the students. There have been numerous examples of this in recent history (see Appendix F). A small majority (53%) of the students supported the statement while 47% opposed it.

Just over a third of the students felt strongly about the issue and these were equally divided between the two viewpoints.

The only statement to which a significant majority of the students gave an anthropocentric response was the issue relating to the needs of poverty stricken people bordering on game reserves (Item 18.5). Two thirds of the students accepted the principle that the needs of neighbouring communities should be addressed by game managers.

This view is confirmed by the response to Item 18.8 where 69% of the students demonstrated an adherence to the "protectionist" viewpoint of conservation by endorsing the statement that the main purpose of conservation was to protect nature from people. Over half of these felt strongly about the issue.

Statements 18.11 and 18.12 both elicited a strongly ecocentric response with three students rejecting each statement for every one that showed support. An overwhelming majority of students found it unacceptable, firstly, that money should be diverted from conservation to housing, and secondly, that wilderness areas should be sacrificed to provide more food for starving people. More students felt strongly about the wilderness issue possibly because they perceived the loss of wilderness as irreversible whereas other alternative means could be found to provide food.

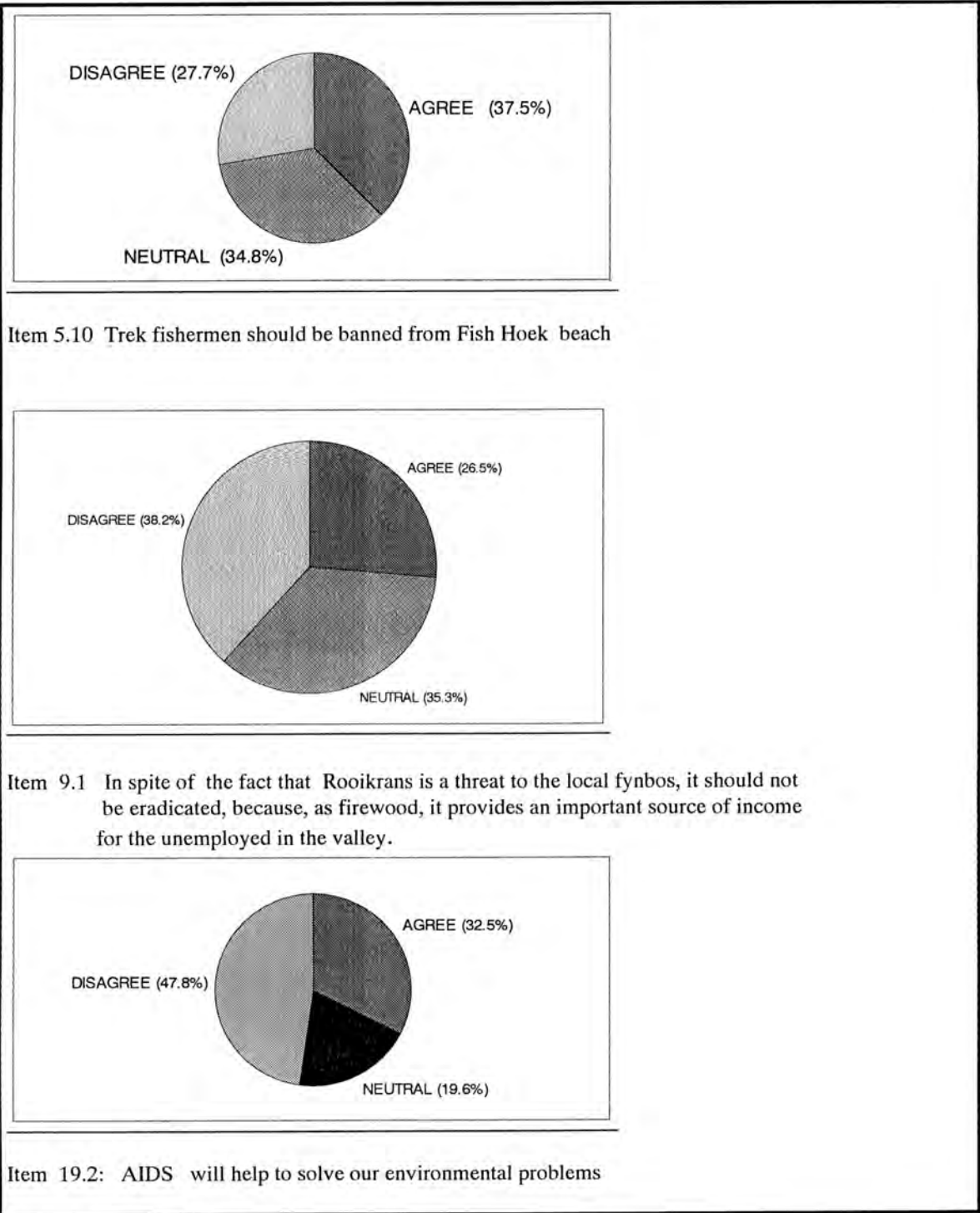
The ecocentric orientation of the vast majority of the students is most clearly illustrated in their response to Item 18.13 where 83% of the respondents rejected the statement that conservation should be for the benefit of people and not animals. Thus the students still see the main purpose of conservation as the protection of wildlife to the exclusion of people and seem unaware of the UNEP/IUCN/WWF definition of conservation as formulated in the *World Conservation Strategy* (1980) which emphasises the management and use of resources for the benefit of people.

The final item shown on the perceptual map links environmental and political issues. This item exhibited the most polarised responses amongst the students with 66% following the "authoritarian

conservation perspective," Of these 43% felt strongly on the topic. Of the 33% who rejected the statement, 16% expressed strong opposition. The responses to these last two items are indicative of the students' perception of the environment, that is limited to the natural environment, and that conservation implies the preservation of animals and plants as well as wilderness areas. Social, economic and political issues were regarded as human issues and as such had little to do with the natural environment.

Three other statements involving a conflict between the interests of humans and those of nature were placed in other sections of the questionnaire where a neutral option was available. The responses to these questions are displayed in Figure 6.6. Items 5.10 and 9.1 were concerned with local issues. Item 5.10 dealt with the issue of the trek fishermen on Fish Hoek beach who had been accused of over-exploitation by anglers and some conservationists (Yeld and Gubb, 1992) and there were calls for them to be banned from the beach. The students were asked to select between the perceived over-exploitation of fish and the livelihood of the fishermen. The students were divided on this issue with over a third choosing a neutral response. A small majority did however support the ban on trek fishing and a significant proportion of these (23%) felt strongly over the issue. The majority took the view that the fish were being over-exploited, although studies have indicated that the impact of the trek fishermen on fish populations is negligible (ibid).

Item 9.1 had a higher neutral response than 5.10, but of those who did commit themselves, the majority opposed the statement believing that the eradication of the threat to fynbos should have a greater priority over any income it might provide for disadvantaged communities in the valley.



**Figure 6.6 Student responses to items 5.10, 9.1 and 19.2.**

Item 19.2 was selected as a general issue to see how the students saw the relationship between AIDS and the environment. A simplistic view suggests that the root cause of environmental problems is increasing human populations, and that AIDS will reverse the trend and thereby ease the pressure on

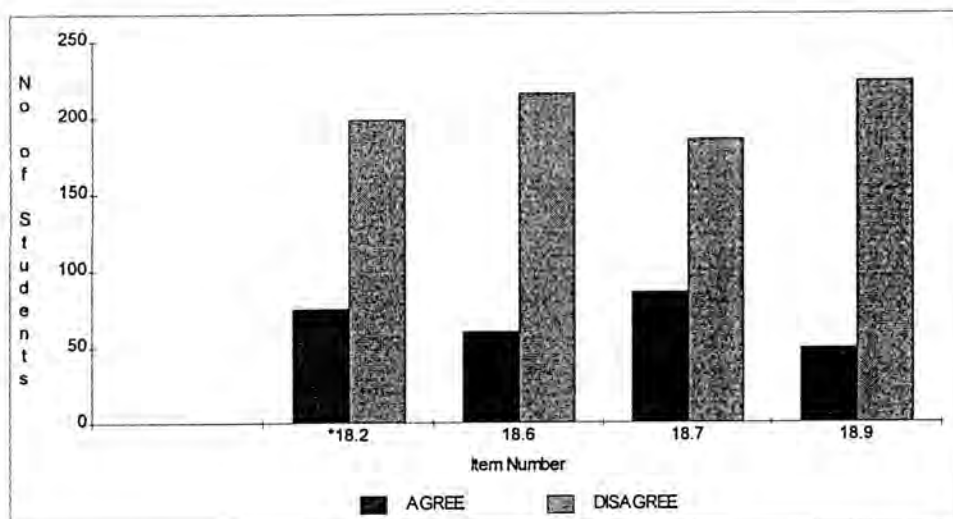
the environment. The increase in human population is a critical environmental problem in South Africa. (Huntley *et al*, 1989). In addition to children, the prime targets of AIDS are the sexually active members of society who are also the most economically active members, and the implications of losing such people bodes ill for environmental management. The major environmental agencies in the world condemn AIDS as an environmental disaster, particularly in developing countries (Clarke,1991).

More of the students (48%) were of the opinion that AIDS will not help to solve our environmental problems, while 33% thought that it will help and 20% were neutral.

The student responses to this section rate the interests of nature above those of people. High neutral responses were submitted in those items where this option was given, and one suspects that this would have been the trend in most of the items, had neutral responses been accepted, as was found in the pilot test. Most of the students were unaware of the possibility of integrating the interests of nature and humans to the benefit of both. The students need to be exposed to the viewpoints of those people who are directly affected by the issues covered in this section so that they can make their decision after having considered all aspects of an issue. The response might still be the same, but at least it would have been made from a broader perspective, a perspective gained from a thorough knowledge of a particular issue.

## **6.5 Conservation and development**

An analysis of the student responses to the four items relating to conservation and development is shown in Figure 6.7 below



#### KEY TO ITEMS REFERRED TO IN GRAPH

- 18.2 The aim of conservation is to protect a natural area from any sort of development.
- 18.6 People have the right to decide how to modify the natural environment to suit their needs
- 18.7 Environmentalists needlessly interfere with development projects
- 18.8 Development on a piece of land should not be stopped to protect an endangered species.

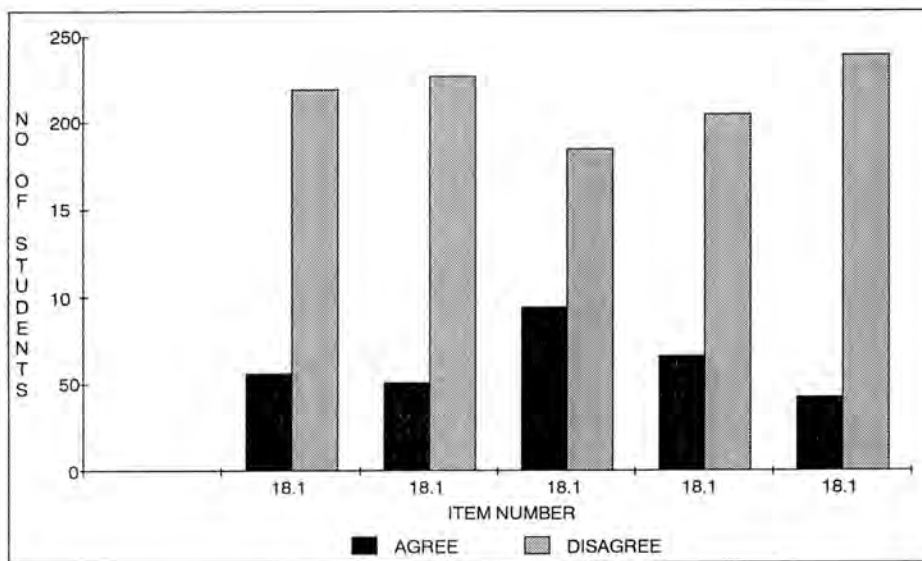
**Figure 6.7 An analysis of the student responses to the four Likert-type statements relating to conservation and development**

The responses to Item 18.2 have been reversed so that a response of *agree* indicates a pro-development stance while *disagree* implies anti-development sentiments. This has been indicated by an asterisk. All four of the items elicited a strong anti-development response with over 70% of the students rejecting the developer's viewpoint in each item. The students are suggesting that conservation and development are incompatible and that the interests of nature and rare species must take precedence over any developments. This value orientation is clearly expressed in the response to (Item 18.9) where 82% of the students opposed any development which could threaten an endangered species. Of these, 52% felt strongly about the issue. The students hold a protectionist philosophy which is in sharp contrast to the viewpoint of the *World Conservation Strategy* (1980) and its follow up *Caring for the Earth* (1991). In these documents it is pointed out that development will only succeed if it is sustainable and this can only be achieved if the development is based on conservation principles. Similarly conservation of areas bordered by impoverished communities will fail unless it is linked to development which will benefit those people. As in the previous section the impression is given that the students lack the knowledge to make informed decisions on some of these

issues. Two local conflicts relating to the housing developments on the Fish Hoek sand dunes (Item 9.5) and the Noordhoek coastline (Item 9.6) have been dealt with in 6.2.

## 6.6 General Issues

A number of items were included which did not qualify for any of the foregoing categories thus far described in this chapter and with one exception were designed to examine how the students felt about the environment in general. Five of these items did not offer a neutral option. The responses are shown in Figure 6.8 below. In all of the items disagreement with the statement represented a positive environmental response.



### KEY TO ITEM NUMBERS

- 18.15 It is the government's responsibility to look after the environment, not mine.
- 18.16 Too much fuss is made about beautiful scenery
- 18.17 I am sick and tired of hearing about the problems of the environment.
- 18.18 I would prefer planned open spaces geared to human recreation rather than areas of natural vegetation.
- 18.19 I am not really concerned about the state of the world in a hundred year's time as I won't be there to see it.

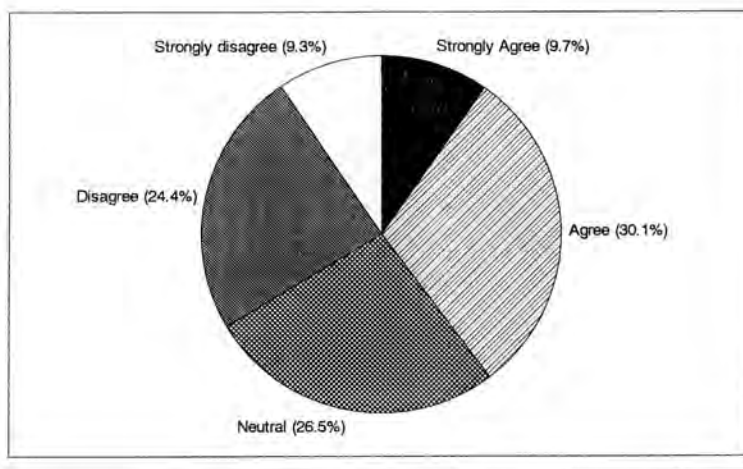
**Figure 6.8 Student responses to five general environmental issues.**

All of the statements shown in Figure 6.8 were rejected by a large majority of the students. Of those who rejected each statement, the majority strongly disagreed. Thus 78% of the students acknowledged his or her responsibility towards the environment, 80% endorsed the aesthetic importance of the environment, 75% rated natural areas above human recreational areas, and 85% showed concern

for future generations. A rather reduced, but still substantial majority of students (66%), disagreed that they were sick and tired of environmental problems, however, a third of the students supported the statement which raises concern about the message or lack of any message which the students are receiving, with respect to environmental issues.

This concern is given further impetus when one looks at the response to (Item 19.6)

*I find environmental discussions depressing.* This response is shown in Figure 6.9.

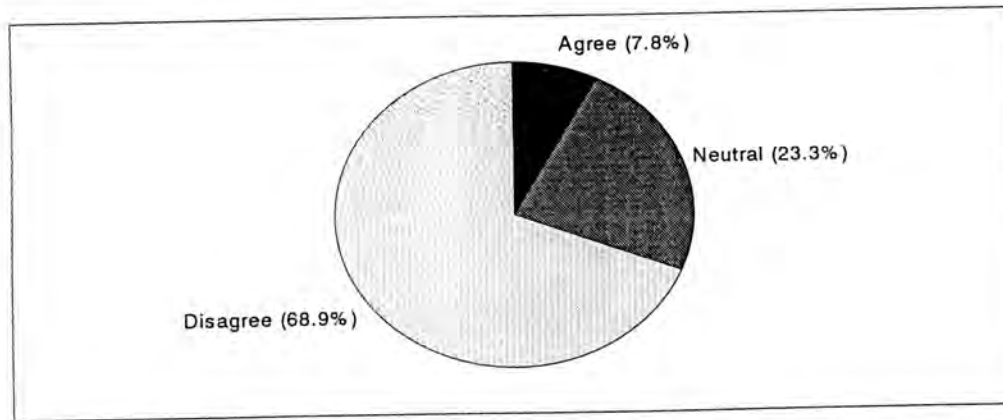


**Figure 6.9 STUDENT RESPONSES TO THE STATEMENT *I FIND ENVIRONMENTAL DISCUSSIONS DEPRESSING.***

Figure 6.9 shows that virtually 40% of the students perceive the environmental message as a message of "doom and gloom", with only a third disagreeing with the statement.

The danger of such a perception is that it promotes a feeling of helplessness and that the idea suggests that there is no point in individual action as it is not going to make any difference in preventing any environmental disaster.

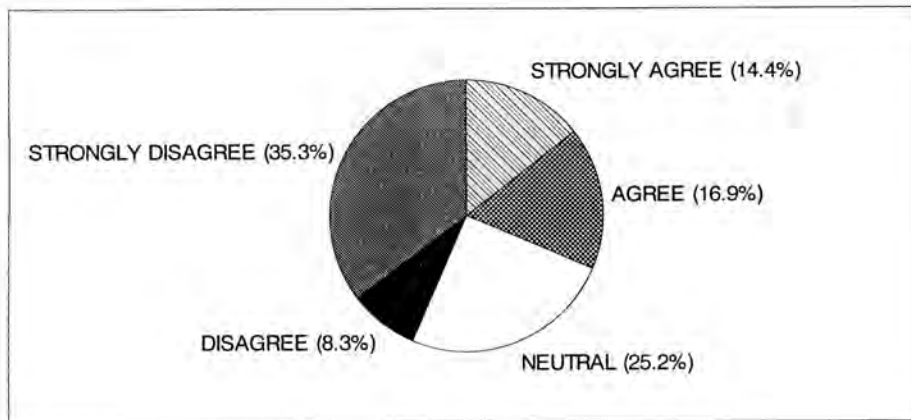
Two other items were placed into this section. (Item 9.7) explores student attitudes to environmental issues outside the Fish Hoek valley. The responses are shown in Figure 6.10.



**Figure 6.10** Student response to the statement *i am not really interested in environmental issues outside the fish hoek/noordhoek valleys.*

Less than 10% of the students supported the statement and this finding is not unexpected when viewed in the light of other sections of the questionnaire, notably Chapter 5, where the students showed far greater concern for broader environmental issues than for local ones.

(Item 19.1) probes the respondent's belief in the theory of evolution. Rejection of this theory is generally associated with the Judaeo-Christian tradition and its belief of special creation (Clayton, 1982). The student responses are shown in Figure 6.11 below. The Judaeo-Christian tradition has often been associated with negative environmental perspectives in which people see themselves as separate from and superior to nature (Hooker, 1992). This attitude is not the only one in this tradition. There is also the stewardship concept where one has a responsibility to God to look after nature in its own right (Hooker, 1992).



**Figure 6.11** Student responses to the statement *human beings have evolved from animal ancestors.*

While there did not appear to be any correlation between student response to this item and environmental attitudes and degree of commitment, Preston, (pers comm) asked the same question of visitors of four nature reserves in South Africa, and was surprised to find that those disagreeing with the statement were more positive about many of the environmentally sensitive options for the country than were those who agreed with the statement. There was a fairly divergent response from the students with most being opposed to or neutral about the statement. What is noticeable is the high proportion of students who "strongly" disagreed with the statement.

## 6.7 Discussion

There are two features which largely dominate the student responses to the Likert-type statements and those items testing student knowledge. The first is the low level of knowledge which is evident in all sections, and the second, is the largely biocentric value system and the protectionist view of nature and conservation.

This combination of a weak knowledge base and concern for the natural environment has been found in a number of similar studies. Hausbeck, *et al*, (1992) found that New York students knew of and

were concerned about environmental problems, but had little knowledge as to how environmental systems operate, how human actions impact on the environment or how environmental problems affect society. Gigliotti (1990) argues that while people might be positively inclined towards the environment, they lack basic ecological knowledge.

In South Africa, Van der Westhuizen (1990) in a study of Std 10 Biology students, found that many had misconceptions with respect to basic ecological concepts. Some of these misconceptions extended to their teachers. Brody, (1991) defines misconceptions as a partial understanding based on a lack of knowledge and adds that they are not necessarily formed from incorrect information. Preston & Fuggle (1986), in a survey of South African visitors to three nature reserves, found that these visitors had very little understanding of ecological functioning, conservation management or environmental interrelationships.

Gigliotti (1990) accepts that positive attitudes are a prerequisite for environmental action. The students in this survey knew very little about the *World Conservation Strategy* (1980), particularly with regard to how this strategy defined the concepts of conservation, development and sustainability. The students need to be given some insight into these revised concepts to serve as an alternative to their present viewpoints, not necessarily to replace them, but to compare and evaluate the ecocentric and anthropocentric positions, and then to make an informed decision as to which worldview they accept (Jickling 1992). Ballantyne and Parker (1996) stress the fact that the teaching of either knowledge or attitudes in isolation will not result in responsible environmental action. Knowledge and positive values however, can be a key element in promoting such actions (Brody 1991).

The strong biocentric/ ecocentric worldview shown by the students in this survey has also been reported in several studies. For example, Szagun and Mesenholl (1993) in a study of West German adolescents found that the majority showed sympathy for animals and concern for the preservation of ecosystems. The respondents in Preston's surveys (1983 and 1989) expressed similar sentiments. However, examining some of the responses in this survey, there is a suggestion of an underlying

egocentrism in many of the responses. Those who support the extinction of the malarial mosquito cannot be regarded as ecocentric, as such a step would have social and ecological consequences (Preston and Fuggle, 1986). The same applies to those who want rotting kelp to be removed from beaches, as well as those who have reacted negatively towards the squatter issue, or those who would not be prepared to drink purified sewage water. Even those who are opposed to development could be motivated by an egocentric or possibly an anthropocentric perspective rather than an ecocentric one. Such a perspective could be influenced by social norms. An egocentric worldview could also account for the lack of awareness of those issues particularly at the local level which are not seen as relevant. Finally, an egocentric worldview might also influence a student's commitment or lack of it, to environmental actions. This will be considered in the next chapter.

The main points arising from this chapter are:

- the biocentric viewpoint expressed by most of the students in their opposition to the killing or harming of animal species
- the positive attitudes shown towards the natural environment and its protection
- the lack of knowledge and misconceptions regarding ecological concepts
- the lack of knowledge and interest of many local environmental issues
- the lack of substantive knowledge as well as misconceptions, regarding aspects of pollution and resource conservation
- the nature-centred or ecocentric worldview takes priority over the human-centred or anthropocentric worldview where the two are involved in conflict situations.
- the student perception that conservation and development are incompatible. This is linked to the protectionist concept of conservation
- the view expressed that humans are separate from nature and that environmental issues are not linked to political or social issues.

## CHAPTER 7

### STUDENT COMMITMENT

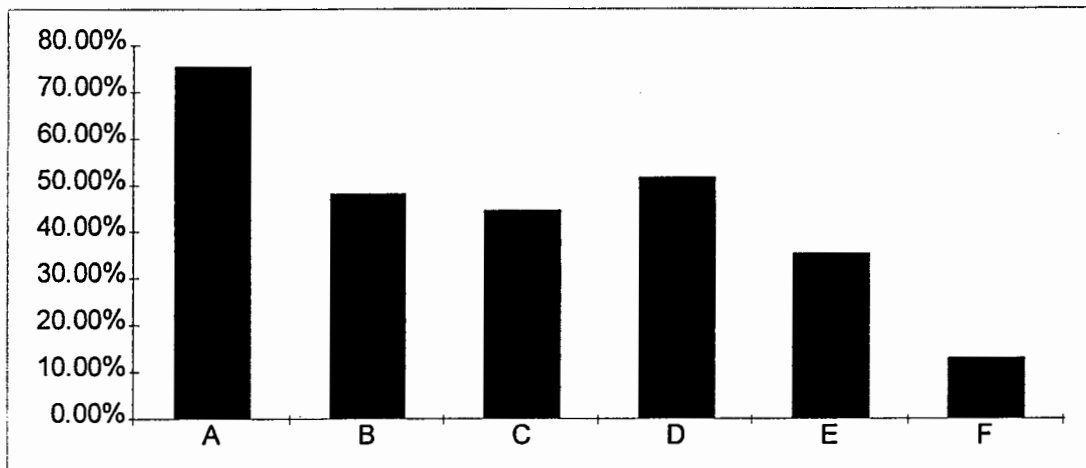
#### 7.1 Introduction

The commitment of students to environmental action has two components, namely verbal commitment, where the student states what he or she is willing to do in reference to environmental issues (Maloney, *et al*, 1975) which is referred to as the 'intention to act' (Hungerford and Volk, 1990), and actual commitment which refers to what the students actually do in relation to environmental issues (Maloney, *et al*, 1975) which is identified as 'responsible environmental or citizenship behaviour' (Hungerford and Volk, 1990). In this survey the understanding of student commitment was approached in several ways. In some cases commitment was linked to student attitudes towards certain topics such as the protection of the Great White Shark, invasive alien vegetation, indigenous plants and litter. In the case of the Great White Shark, the link between verbal and actual commitment was also investigated. Students were also questioned on their actions with regard to reducing pollution and conserving resources with an emphasis on recycling. Verbal commitment was also investigated in that the students were questioned on their willingness to help raise funds for a range of projects.

#### 7.2 Relationship between student attitudes and student commitment

##### 7.2.1 Protection of the Great White Shark

The student attitude towards this issue was tested in Item 5.2 and the response was discussed in Chapter 6. Approximately six months before this survey, the school was involved in a fund-raising campaign run by the Shark Research Institute of the South African Museum in Cape Town. Each student was asked to sell two tickets at R1.50 each. In this survey the students were asked firstly, how many tickets they had sold (Item 24), secondly, how many they had bought (Item 25), and thirdly, whether they would take part in a similar campaign in the future (Item 26). The responses are shown in Figure 7.1 below



Code to letters on X-axis of graph:

- A - Students who favour the protection of the Great White Shark i.e. a positive attitude
- B - Students who sold shark tickets.
- C - Students who bought shark tickets
- D - Students who will support future shark campaigns
- E - Students who may support future shark campaigns
- F - Students who will not support future shark campaigns

**Figure 7.1 Student attitude and commitment towards the Great White Shark**

Figure 7.1 shows a marked difference between those who support the protection of sharks (75.5%) and those who actually sold tickets (48.3%). The graph also indicates that the majority of those who sold tickets in fact bought the tickets themselves. This would seem to suggest that these students preferred to donate the money themselves rather than spend time and effort in selling them to other people. However, 22% of the students sold more than the required two tickets thus showing an extra commitment.

With regard to future campaigns just over half committed themselves, which is only marginally higher than the percentage which actively sold tickets, while 35% were unsure. It appears that the latter did not support the original campaign, while 13% expressed no interest in future campaigns. The responses to the items on the Great White Shark, while illustrating the gap between positive attitude and positive action, do not show much difference between verbal commitment and actual commitment, at least not in the context of the action involved in this issue.

### 7.2.2 Invasive alien vegetation

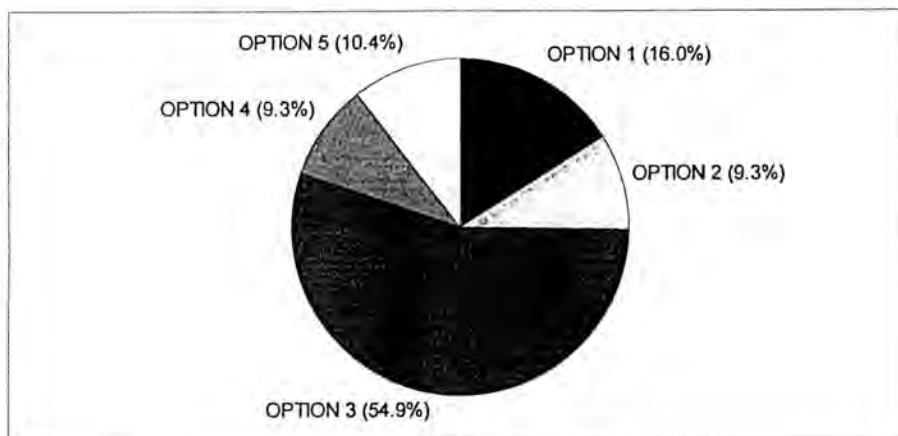
This issue was investigated in Items 9.2 which attempted to clarify student attitudes, and 9.3 which assessed verbal commitment. The responses are given in Table 7.1 below.

ITEM NO	STATEMENT	AGREE	NEUTRAL	DISAGREE
9.2	I feel that all invasive plants in the valley should be removed	45.1 %	37.70%	17.20%
9.3	I would not like to spend any of my free time chopping down alien vegetation	37.40%	36.70%	25.80%

**Table 7.1 Comparison of student attitude and verbal commitment with respect to invasive alien vegetation**

The high neutral response indicates that the students do not feel as strongly about alien vegetation as they do about other issues. Nevertheless, there is a marked difference between those who feel that invasive plants should be removed and those who are prepared to spend time to assist this process. A small minority (12%) felt strongly about the issue, but only 7.4% gave a strong commitment to hacking. In this issue at any rate there was no strong correlation between positive attitude and verbal commitment as has been found in other research (Maloney, *et al*, 1975).

The student's commitment to cutting down alien invasives was tested in Item 22, where they were given a number of options regarding Conservation Day (schools have permission from the Cape Education Department to devote one school day to conservation activities). The purpose here, was to assess the level of student commitment for actions which did not involve them sacrificing their own free time. The responses are given in Figure 7.2 below.



#### KEY TO OPTIONS

1. Hacking alien vegetation up the mountain
2. Clearing alien vegetation along the Silvermine River
3. Cleaning up one of the beaches.
4. Having lectures, discussions, films etc. on conservation issues
5. As a normal school day.

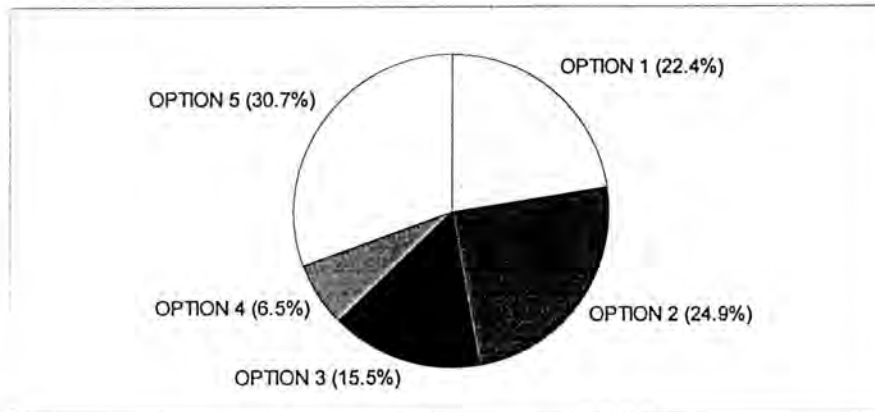
**Figure 7.2 Student responses to five alternatives for Conservation Day**

Whilst 80% of the students chose some active form of activity for this day, it was surprising that over 10% preferred not to have such a Conservation Day. Over half of the students opted for the beach activity, one which would entail the least effort, both in getting there and the nature of the activity. The percentage of students favouring the clearing of alien vegetation is virtually the same as those who would be prepared to hack in their free time. It suggests that it is the activity itself rather than the time sacrificed which does not appeal to the majority of students. The main reason why more students preferred to work on the mountain rather than the Silvermine River, according to student members of the Hack Group and personal observations, is that it is aesthetically more rewarding to hack on the mountain.

#### 7.2.3 Indigenous plants in the school grounds

In response to Item 19.3 about 70% of the students indicated that they would like to see more indigenous plants in the school grounds, with 27% remaining neutral and only 3.6% disagreeing with the statement. In Item 23, students were asked to make a verbal commitment regarding the amount of

time they would be prepared to spend in establishing an indigenous garden. The responses are given in Figure 7.3 below.



#### KEY TO OPTIONS

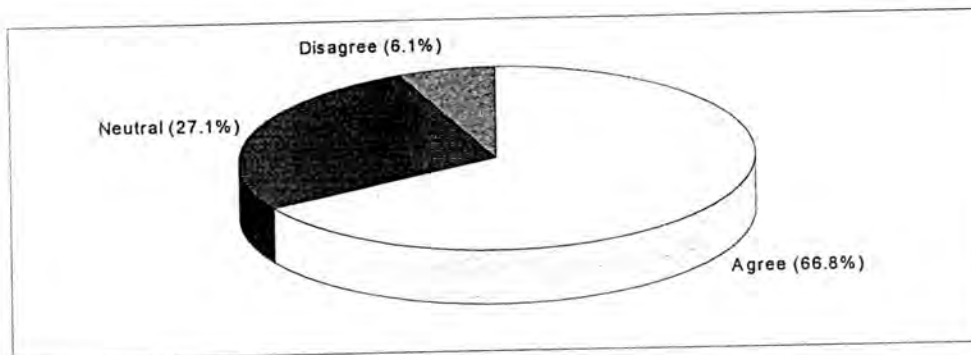
1. One afternoon a week.
2. One afternoon a month.
3. One afternoon a term.
4. Over a week-end, once a term.
5. Not at all.

**Figure 7.3** The time students are prepared to spend in establishing an indigenous school garden

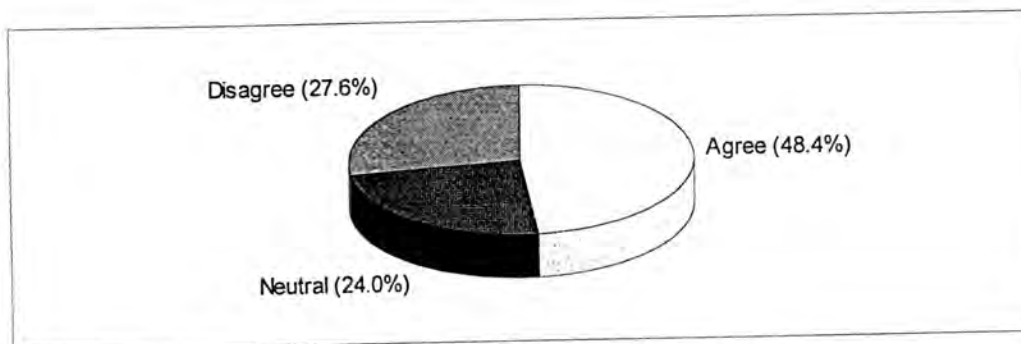
About a third of the students were not prepared to give any time to establishing an indigenous garden. This is equal to the percentage who did not support the idea of an indigenous garden. Conversely, the same percentage of students who wanted an indigenous garden were prepared to spend some time in establishing one. There appears to be a correlation between positive attitude and verbal commitment. Of those students who did commit themselves, very few were prepared to give up time over a week-end. Most students opted for once a month, although a significant percentage were prepared to work on a weekly basis. It is assumed that the more frequently a person is prepared to give up time, the more likely they are to be committed to the establishment of the garden. While 70% of the students want an indigenous garden, less than a third of those students are prepared to devote a significant amount of time to establishing one.

### 7.2.4 Litter

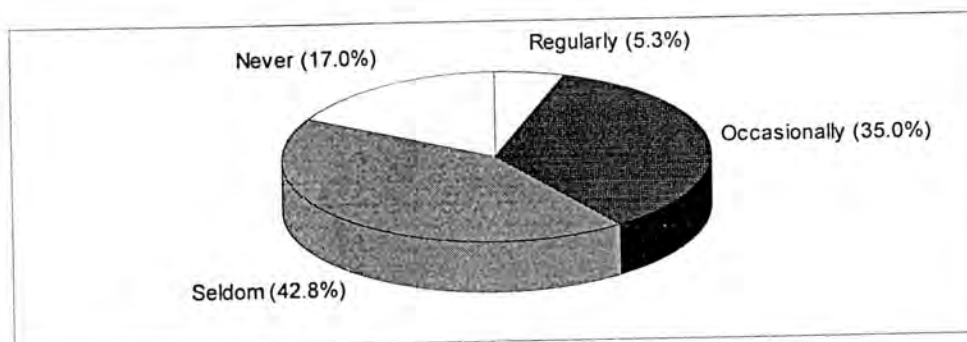
There were three items which referred to litter in the survey. Item 15.2 tests the respondent's attitude to litter; Item 15.3 tests for any feeling of obligation on the part of the respondent to pick up litter; and Item 17.2 looks at the respondent's behaviour regarding the picking up of litter. The responses to these three items are shown in Figure 7.4



7.4.1 I get angry when I see litter lying around the school (Item 15.2)



7.4.2 I ought to pick up litter dropped by other people (Item 15.3)



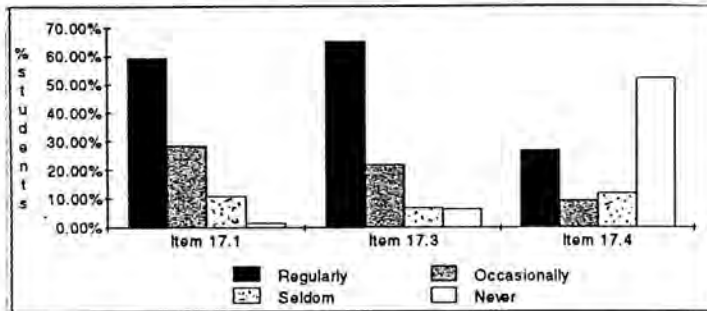
7.4.3 You voluntarily pick up other people's litter. (Item 17.2)

**Figure 7.4 Student responses to three items on litter**

## 7.3 Student actions relating to resource conservation and the reduction of pollution

### 7.3.1 Actions to conserve resources

In Item 17, students were tested as to the frequency with which they or their families carried out what could best be described as environment-friendly actions. Three of these items related to resource conservation or recycling. The responses are shown in Figure 7.5 below.



#### KEY TO ITEMS

17.1 You switch off lights when nobody needs them on.

17.3 You put waste paper into the recycling bags at school.

17.4 At home, organic waste (vegetable peels etc.) are put onto a compost heap.

**Figure 7.5 The frequency of student actions relating to resource conservation**

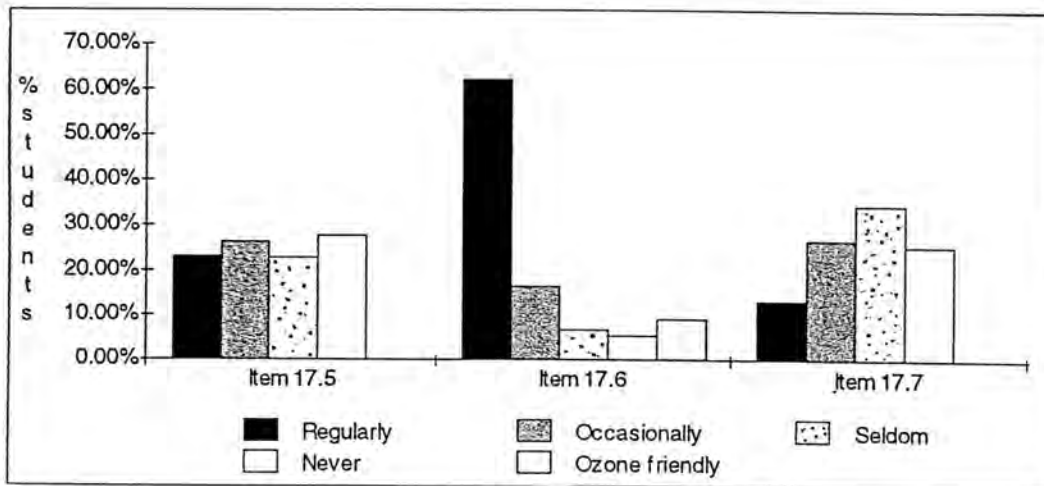
Item 17.1 was to see whether students consciously save on electricity consumption thereby conserving the energy source and at the same time reducing pollution. From Figure 7.5 it became clear that nearly 90% act responsibly in this regard. This is an encouraging response, although it must be borne in mind that the motivation to switch off lights regularly may be economic rather than environmental and more as a result of parental pressure than intrinsic motivation on the part of the students.

Item 17.3 refers to the practice whereby large bags are placed in all of the classrooms to collect waste paper from teachers and students. The full bags are stored and periodically collected for recycling. This provides the opportunity for the students to get rid of their litter with minimal effort. The majority of the students do use these bags. There is the minority who do not even avail themselves of the convenience provided to get rid of their litter. There is also a minority who place items other than paper into the bags, thus creating unnecessary problems for the sorters at the recycling depot.

Item 17.4 concerns the use of compost heaps. Connett (1991) defines compostibles as all substances which are biodegradable and not recyclable, and include food and garden waste. Just over a quarter of the students make regular use of a compost heap, while almost two thirds hardly ever dispose of their organic waste in this manner, although some of these may not have the opportunity to do so. It would appear from the students' perspective that it is far more convenient to put waste into the dustbin.

### 7.3.2 Actions to reduce pollution

The students were asked to comment on their method of disposing of waste liquids, and on their use of aerosols and insecticides. The responses are shown in Figure 7.6.



#### KEY TO ITEMS

Item 17.5 Waste liquids such as oils are thrown down the drain.

Item 17.6 You use aerosol products e.g. deodorants.

Item 17.7 You use insecticides in your house or garden.

Figure 7.6 The frequency of student actions aimed at reducing pollution

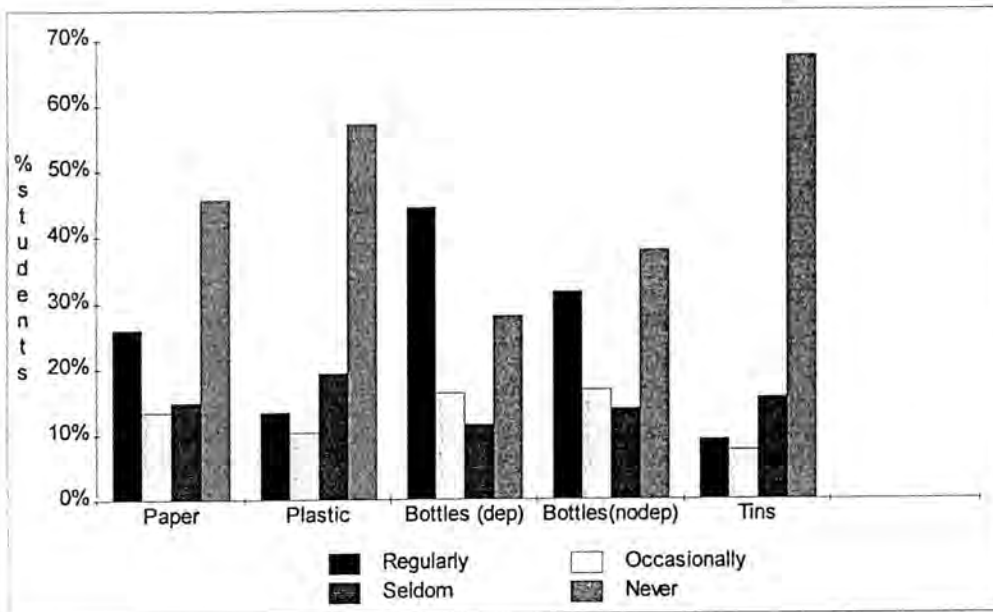
The students were evenly split on Item 17.5 with 49% who claimed that they poured liquids down the drain regularly or occasionally while 51% claimed not at all or at least seldom. The fact that half of the students or their families do carry out this practice is a cause for concern.

At the time of the administering the questionnaire, "ozone friendly" deodorants were not fashionable in South Africa and were more expensive than the conventional CFC driven aerosols. The responses to Item 17.6 show that the bulk (88%) of the students do use aerosol sprays, and of those, only 9% stipulated that they specifically used the "ozone friendly" forms. It must therefore be assumed that, although some of the other 79% of the students may indeed use "ozone friendly" sprays, none of them were environmentally conscious enough to emphasise the fact. From this it must be concluded that, although the students may be concerned about the depletion of the ozone layer, the majority were either unaware of the link between deodorant sprays and the ozone layer or insufficiently concerned to actively acquire "ozone friendly" forms or to persuade their parents to buy them.

With reference to Item 17.7, it is encouraging to note that the majority (60%) of the students seldom or never use insecticides and that only 13% used them on a regular basis.

### **7.3.3 Recycling**

The advantages of recycling included a reduction of pollution, cost saving on waste disposal, a reduction in the volume of solid waste, a prolonged life of landfill sites and energy saving (Tyler Miller, 1990). The students were asked to indicate the frequency with which a number of materials were recycled. An analysis of the responses is given in Figure 7.7.



KEY: Dep = Bottle with deposit. Nodep = Bottles without deposit.

**Figure 7.7 The frequency with which students recycle items at home**

Figure 7.7 shows the level of recycling amongst the students. The degree of paper recycling was most disappointing since this form of recycling is encouraged by the school and, as mentioned above, over 65% indicated that they used the recycling bags in the classroom. The students show even less inclination to recycle plastic, with only 13% doing so on a regular basis. This is in spite of the fact that over 60% of the students were aware of the harmful effects of plastics on marine life. This could, in part, be attributed to logistical problems associated with plastic recycling, due to the large diversity in forms, and much of which is not suitable for recycling. However, it is unlikely that many of the students are aware of these problems.

The most efficient method of saving a resource is reuse of the item. A deposit on a returnable bottle should create an incentive to return the bottle. The student response was disappointing, especially when 76% of them supported the concept of paying deposits on bottles (Item 15.15). In spite of the incentive, only 61% of the students return such bottles regularly or occasionally, and over a quarter (28%) not at all.

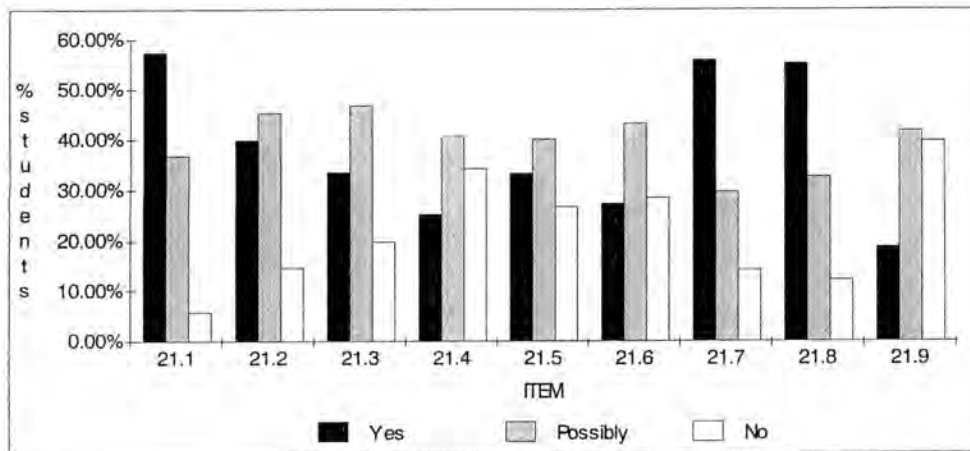
The degree of recycling of non-returnable bottles amongst the students is substantially less than that on returnable bottles, with only 48% doing so regularly or occasionally and 38% not at all. This is in spite of the fact that glass igloos for the receipt of bottles and broken glass can be found in most areas. This attitude to the recycling of bottles was illustrated by the rather indifferent support given to a bottle recycling drive conducted at the school in the year following this survey.

The recycling of tin cans has very little student support and 83% of the respondents claimed never or seldom to do so, and only 9% on a regular basis. It is clear that if this level of support applies to the public at large, then a great deal more needs to be done to promote the recycling of this commodity.

Students appear to be either unaware of the benefits of recycling, or, even if they are aware of them, are not prepared to make the necessary effort to recycle. They do not see any direct benefit to themselves in recycling.

#### **7.4 Fund Raising**

In Item 21 students were asked whether they would be willing to help raise funds for certain projects. The responses are indicated in Figure 7.8.



#### KEY TO ITEMS

- 21.1. To save or protect an endangered species such as the Black Rhino.
- 21.2. To establish a nature reserve at Noordhoek.
- 21.3. To save a threatened habitat such as a wetland.
- 21.4. To improve the standard of living of the squatters.
- 21.5. To stop kaolin mining.
- 21.6. To develop an environmental education centre and coastal trail at Kommetjie.
- 21.7. To establish a recreational centre for the teenagers of Fish Hoek
- 21.8. To erect a fence to protect the penguin colony at the Boulders.
- 21.9. To eliminate the Himalayan Thar ( an introduced mountain goat ) which is destroying indigenous vegetation on Table Mountain.

**Figure 7.8 Willingness of students to fundraise for environmental causes.**

The most striking feature of Figure 7.8 is the large percentage of students who would not commit themselves either way ( over 40% in six of the nine items). The biocentric or species oriented view of the students was once again highlighted with the plight of the Black Rhino receiving the most support while the support of the penguins being superseded by the rather egocentric (in the sense that the students are supporting a project that fulfils a personal need) pledge to raise funds for a recreational centre. The bias towards the rights of animals is also underlined in that funding for the elimination of the Himalayan Thar received the least support and the highest rejection, clearly illustrating student opposition to the eradication of an animal species, despite its role in habitat destruction. Habitat protection does not seem to be regarded as a priority, and in line with the attitude shown in other sections of this survey, the same applies to kaolin mining.

Only 25% committed themselves to raise funds for squatters, with just over a third of the students giving an emphatic 'no.'

## 7.5 Discussion

If the main aim of environmental education is towards the development of responsible environmental behaviour (Hungerford and Volk, 1990), then the students of Fish Hoek fall well short of this ultimate goal in terms of their commitment towards positive environmental actions. However, they are not unique in this regard. Opie (1979) found that the students in his survey were not prepared to be involved in any environmental improvement which might involve sacrifice of their time. Iozzi (1989) cites a study which found that students were not in favour of being involved in any environmental improvement initiatives which curtailed their personal freedom or their existing lifestyle. Gigliotti (1990) feels that most people are not prepared to make personal sacrifices for the environment and would rather accept those environmental concepts which would support their value systems, rather than alter their lifestyle. Studies carried out by Gigliotti (1993) and Thompson and Gasteiger (1985) both indicated that students were becoming increasingly reluctant to give up food or household items in order to improve environmental quality. This aspect has not been included in this survey, but informal discussions with students at Fish Hoek point to a similar reluctance to sacrifice items. What the students certainly have demonstrated is that the majority are not prepared to sacrifice time on environmental activities or to support recycling which can become a tedious activity (Humphrey, *et al*, 1987). Stevens (1994) found an extremely positive attitude towards recycling amongst Hout Bay residents. Yet only a small percentage of recyclable items are taken to the local recycling depot. This overall lack of commitment to positive environmental action seems to indicate an egocentric or egoistic conception whereby they would want to protect those aspects of the environment which they perceive as personally beneficial and to oppose those aspects of the environment where the personal costs of protection are seen as high (Stern & Dietz, 1994). Hooker (1992) refers to such environmental responsibility as prudentially based. Egocentric people will carry out positive environmental actions, not because they see an intrinsic value in the environment, but because it is in their self-interest to do so. Following this line of argument the lack of commitment to actions shown by the majority of the students at Fish Hoek is indicative of their egocentrism in that they do not believe that such actions will be of any benefit to themselves.

Heberlein (1972) cites littering as an example. Carrying litter or looking for a bin involves more personal cost than simply throwing it away. The decision to litter or not to litter would involve the individual in balancing this personal cost against the cost of not following the social norms of society. Such social norms will influence an action when individuals are aware of the consequences of their actions. It follows that the development of strong social norms in support of responsible environmental behaviour would result in positive actions, even if the individual was not committed to or even felt negative about such an action.

Environmental education needs to address the situation by helping students to see that positive environmental actions are in that individual's self-interest.

The main points which have emerged from this section on student commitment are:

- the biocentric stance towards animals is confirmed
- the correlation between student attitude, verbal commitment and actual commitment varies according to the nature of the commitment, but in general the level of actual commitment is low
- the majority of students are not prepared to sacrifice personal time for environmental actions
- most of the students have an apathetic approach to recycling, the exception being with glass bottles where the deposit offers an economic incentive
- with regard to environmental commitment, the students appear to be egocentric and will be more likely to act responsibly if they perceive their action to be in their self-interest.

## CHAPTER 8

### ENVIRONMENTAL EDUCATION IN THE SCHOOL CURRICULUM

#### 8.1 The environment in the school curriculum

At the Senior Secondary level, ecology and environmental concepts are taught in Biology and Geography and various issues and themes are developed in Languages in the form of essays and oral topics, or various presentations in Art.

Ecology forms a significant part of the Std 8 Biology syllabus, and at Fish Hoek Senior High the ecology of fynbos is emphasised including the effects of human impact and invasive alien vegetation. The module includes an excursion to observe mountain fynbos and a study of the impact of invasive aliens. In Std 9 the animals of the rocky shore are examined from an ecological perspective and the module also incorporates fieldwork.

Environmental aspects taught in Std 8 Geography include the Greenhouse Effect and Ozone depletion by CFC's, the effect of increasing human population on the natural environment and basic ecology. Some of the environmental impacts of economic activities such as farming and mining are also discussed. Where appropriate, environmental issues are covered in the Regional Geography of South Africa. In both standards, fieldwork is undertaken, but this tends to focus on the Physical Geography in the syllabus. In both Biology and Geography, students are required to undertake projects or research assignments, many of which involve environmental issues.

The school also runs a Life Skills programme for each standard. At the Standard 8 level this includes an environmental module comprising 3 one hour periods per class. During these periods various environmental issues are discussed, usually after some audio-visual input.

During the third term of each year the Std 8's are assigned a cross-curriculum project which can be regarded as an interdisciplinary, issue-based learning project (Blignault, 1993). The students are divided into groups of about 15. These groups are carefully selected to include students from all subjects and varying academic ability. Each group has a teacher as a facilitator and has four days to complete their project. These are later presented to their peers and a panel of judges on the fifth day. The whole idea of the project is to encourage students to think holistically and to break out of the confines of their subject choices. Of the two groups involved in this study, the Std 9's in the year prior to this study, carried out a project on the various means of waste disposal which operate in the Fish Hoek valley, while the Std 8's had to develop an interpretative trail covering the whole of the Kommetjie coastline.

## 8.2 Other Sources of Environmental Education

Students were asked to select, from a list of sources about the environment, one from which they had learnt the most about the environment. The responses are given in Figure 8.1 below.

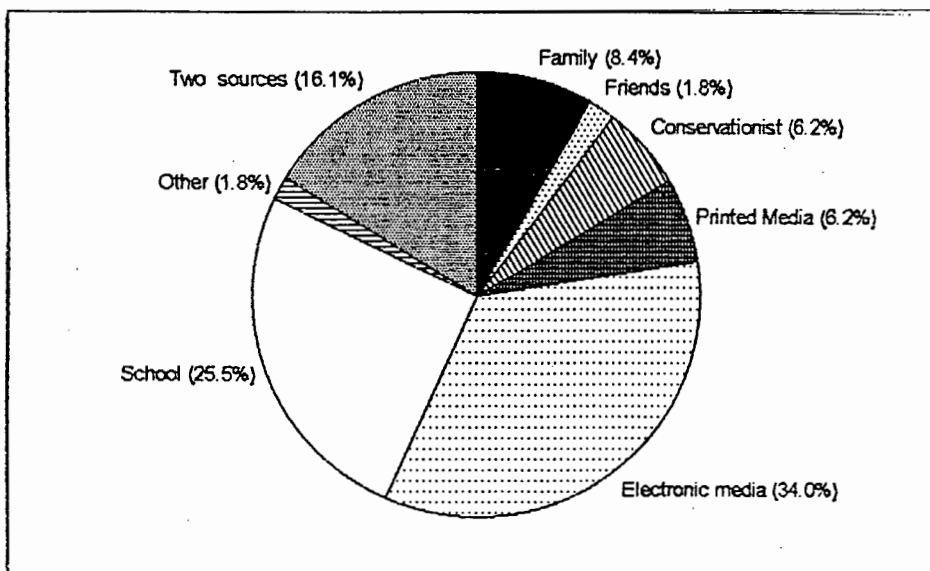


Figure 8.1 Students' main sources of environmental information

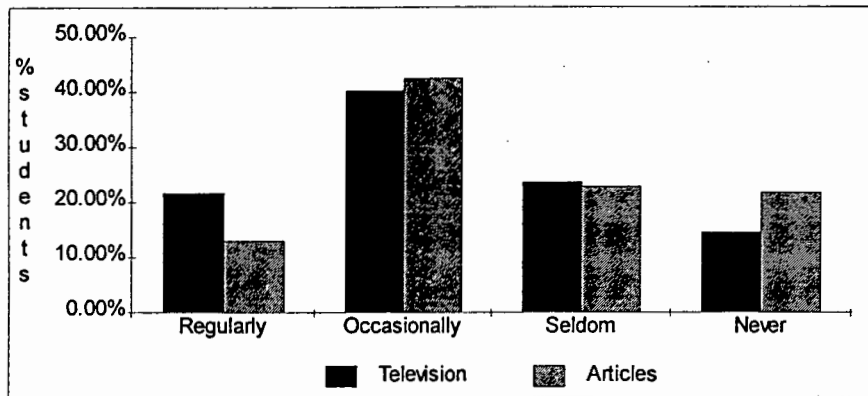
In organising the data for Figure 8.1 it was decided to combine *parents* and *siblings* to form *Family*. As there was only a single student who selected *Radio*, this was combined with *Television* to form *Electronic media*, while *Books and magazines* are referred to as *Printed Media*.

In spite of the fact that respondents were asked to select only one source, a significant percentage could not decide between television and school, and thus indicated both. As can be seen from Figure 8.1 the electronic media, and more specifically television, was the most popular source of environmental information amongst the students. This is in accordance with the findings of Irwin (1982); Hausbeck, *et al* (1992); Blum (1987) and a number of research findings cited by Fortner and Lyon (1985) that television is the primary source of environmental knowledge of most students. Blum (1987) however included printed and electronic media in a single category. In their study of New York 11th grade students, Hausbeck, *et al* (1992) found that school was ranked third after electronic and printed media as a source of environmental information.

At Fish Hoek, most students chose television as their main source of environmental information, but the school seems to have greater influence than in the studies cited above. The printed media has had much less impact at Fish Hoek with only 17 students choosing books and magazines as their chief source of environmental knowledge. The five students who chose the *other sources* option gave visits to game parks/nature reserves as their main source of knowledge about the environment. While television is the main source of knowledge for most of the students, its importance and that of the printed media as a medium for environmental instruction is dependent on the frequency with which environmental programmes are watched or articles are read. Figure 8.2 below gives some insight on this issue.

The outstanding features of Figure 8.2 are the low percentage of students who regularly watch environmental programmes and the even lower percentage who read environmental articles. Accepting from Figure 8.1 that television is the main source of environmental information, there must be a significant percentage of students who at best are only occasionally exposed to environmental programmes and who regard this occasional exposure as their main source of environmental

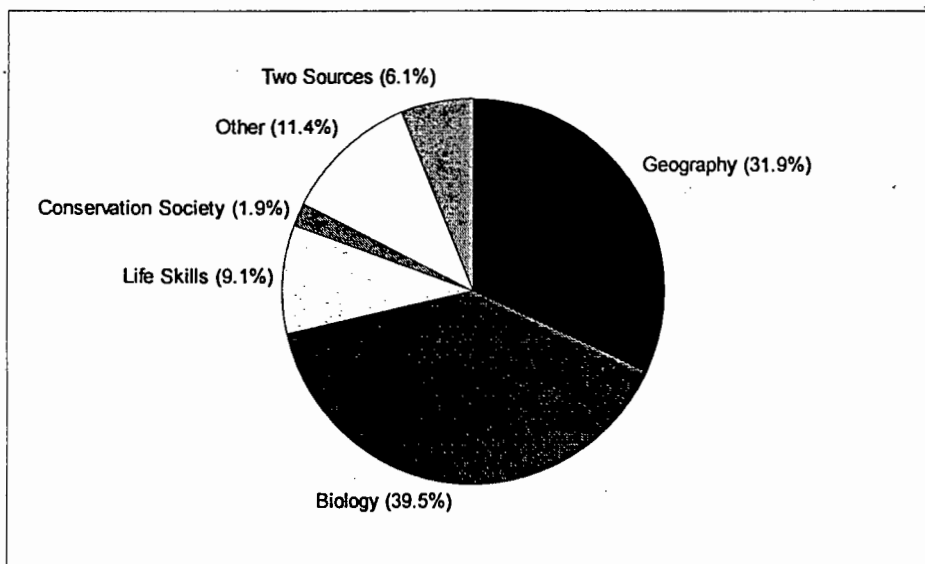
knowledge. While it is generally acknowledged that the electronic media can be highly effective in altering student attitudes, their potential in the environmental context would be reduced by low frequency viewing patterns. It is also a cause for concern that so few students read environmental articles on a regular basis.



**Figure 8.2** Frequency with which students watch environmental programmes on television and read environmental articles

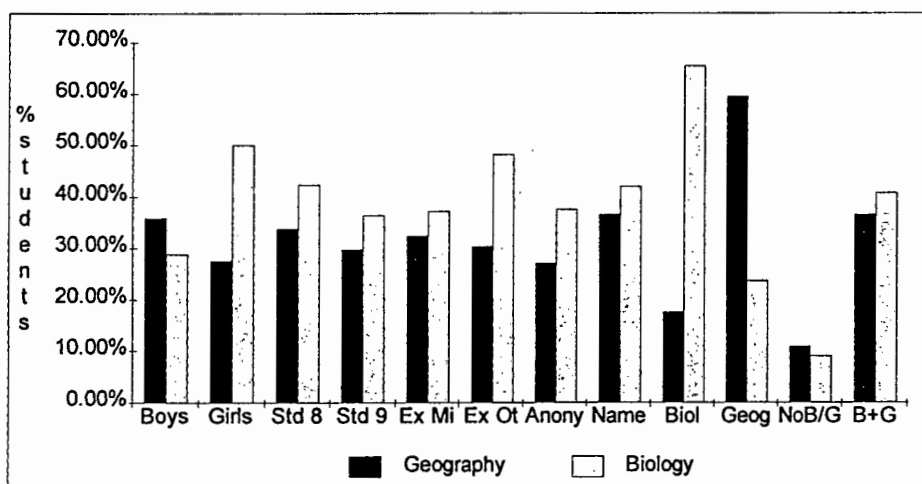
### 8.3 Source of environmental education within the school

Students were asked to select the most important source of learning within the context of the school curriculum. The responses are shown in Figure 8.3 below.



**Figure 8.3** Student responses concerning the main source of learning about the environment, at school

From Figure 8.3 it can be seen that over 70% of the students rate either Geography or Biology as their prime source of environmental information at school, with Biology receiving more support because of a larger number of students taking the subject. Those students who selected the 'other' option indicated that they learnt most from the Cross Curriculum Project mentioned earlier. The 6.1% who selected *two sources* all selected Geography and Biology, indicating that they were unable to decide which of the two subjects was the more informative. With Geography and Biology generally regarded as the "environmental" subjects, a comparison of the degree of support for these two subjects amongst the student sub-groups was carried out and is shown in Figure 8.4.



Ex Mi = Ex Middle School    Ex Ot = Ex Other Schools  
 NoB/G = Takes neither Biology nor Geography.  
 B+G = Takes both Biology and Geography.

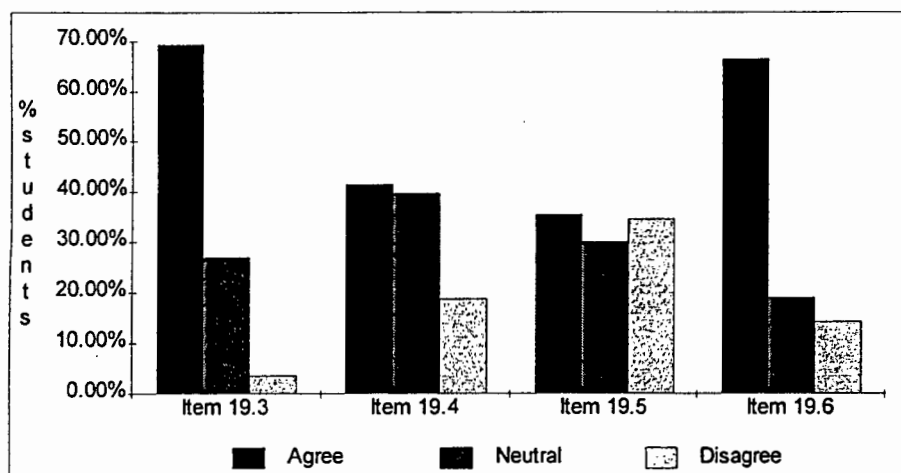
**Figure 8.4** The percentage of each student sub-group which rates Geography or Biology as their main source of environmental information

Excluding those students taking Geography only, all of the sub-groups except two opted for Biology as their chief source of environmental knowledge. One of the two who selected Geography was the boys sub-group who differed significantly from the girls ( $p = 0.012$ ). A probable reason for this result, is that boys comprise 55% of the Geography students and only 35% of the Biology students, therefore it is unlikely to be a significant factor. The other sub-group which preferred Geography was the group who take neither subject. It was surprising to note the number of students who take Biology and not Geography and vice versa who selected the subject they don't take as their main environmental source. For these students it is quite clear that they underwent most of their

environmental learning prior to coming to the Senior High School. Most students choose Biology above Geography as their main source of environmental information at school. This conclusion is strengthened by a survey carried out on 807 first year university students by Jordaan (1990). He found that 92% of his respondents rated Biology as a popular subject choice during the Senior Secondary phase of the high school. More significantly in the context of this study, he found that most students choose Biology because they are interested in nature, and they perceive that they will learn more about nature from Biology. One of the subject choice options at Fish Hoek offers both Biology and Geography as an alternative to Physical Science (both subjects can also be taken in addition to Science). The ratio of Biology to Geography students in this grouping is approximately 4:1. This reflects the greater popularity of Biology at the school. There could be reasons other than interest in nature for this popularity, for example, it could be perceived by the less academically inclined as an easier subject. The fact remains however, that most of the students saw Biology as their main source of environmental information. While it could be argued that this is because more students take Biology than Geography, Jordaan's (ibid.) findings seem to indicate that this could be because of an interest in nature. This survey confirms the fact that most students see the environment only in terms of the natural environment..

#### **8.4 Student attitudes towards environmental education at the school**

The students were asked to consider statements relating to the environmental awareness/learning provided by the school. The responses to these statements are given in Figure 8.5 below.



**Key to items:**

- 19.3 I would like to see more indigenous plants in our school grounds.
- 19.4 I feel that there should be more emphasis on environmental issues in the classroom.
- 19.5 I would like to go on a school-organised hiking trail sometime during the holidays.
- 19.6 I feel that there should be more field trips into nature areas.

**Figure 8.5 Student responses to four statements relating to environmental issues in the school**

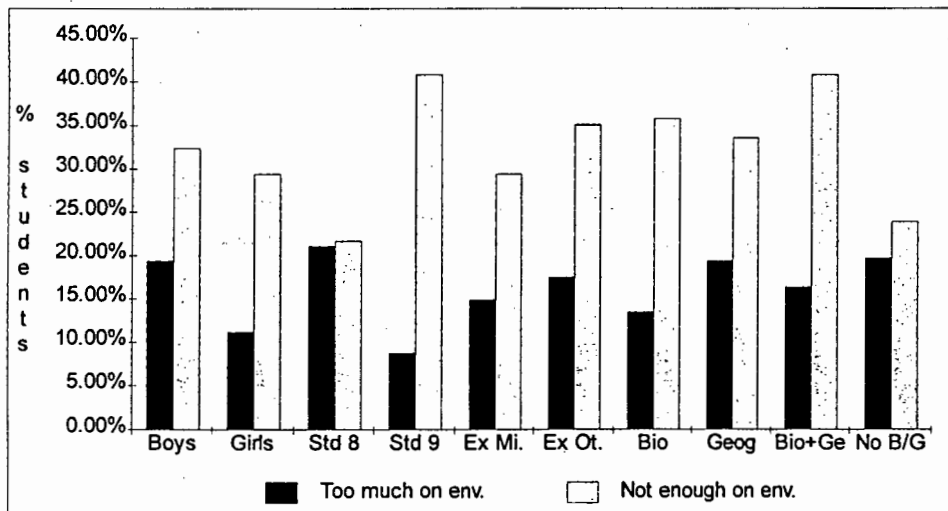
About 70% of the students supported the idea of indigenous plants in the school grounds, while only 3.6% expressed opposition. However, as has already been discussed in Chapter 7, the majority of these students were not too keen to sacrifice much of their time to help develop an indigenous garden. There was also large scale support for field excursions, with two thirds of the students agreeing with the statement. This was predictable as most students appreciate field-based learning. However, only 35% of the students supported hiking during the holidays, which would lead one to conclude that the majority of students, while showing concern for the protection of the natural environment, are not generally prepared to experience this environment during their own free time. This perception is reinforced by the lack of interest shown by the students in hikes that have been organised. This applies both to day hikes and those lasting several days. Alternatively some may feel that hiking requires too much physical effort. In response to Item 19.4, 39% of the students remained neutral on the question of environmental issues, with only 41% supporting the idea of more coverage of environmental issues. This question of the time spent on the environment also formed the basis of the last five items of the questionnaire.

At the end of the personal data section, students were given five statements with respect to the environmental education at school. The students were asked to indicate whether they agreed with each statement. The responses are shown in Table 8.1 below.

Item	Statement	Percentage of pupils in agreement
34.1	We hear too much about the environment at school	15.50%
34.2	We do not do enough on the environment at school	30.60%
34.3	I find studying the environment at school boring.	24.10%
34.4	I found the cross-curriculum project done in Std 8 highly stimulating	45.70%
34.5	We need to learn more about social issues	49.10%

Table 8.1 Student responses to statements on environmental aspects of the school curriculum.

Table 8.1 shows that 70% of the students are satisfied with the amount of environmental information that they receive at school. Figure 8.6 to 8.9 below shows the responses of the student sub-groups in relation to the statements tabled in Table 8.1. It should be noted that the *Named* and *Anonymous* sub-groups were not included in these analyses as there were no significant differences between the responses of the two groups.

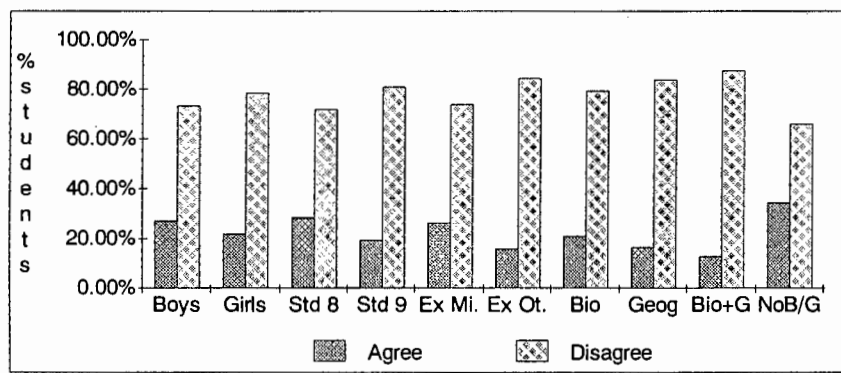


Ex Mi = students who went to Middle School: Ex Ot = students who went to other schools  
 No B/G = students who take neither Biology nor Geography.

Figure 8.6 Analysis of student sub-group opinions on the amount of environmental learning in the school curriculum (Items 34.1 and 34.2)

There is a significant difference in response to Items 34.1 and 34.2 between the Std 8's and Std 9's ( $p < 0.01$  in both items). This variance highlights a negative perception of environmental issues amongst the Std 8's. This will be discussed further in Chapter 9.

The responses to Item 34.3 (see figure 8.7 below) reveal that virtually a quarter of the respondents were bored by the environmental input provided by the school. The student sub-group, which showed the greatest support for the statement, was the group who take neither Biology nor Geography, and thus receives the least exposure to environmental education. Their response contrasts significantly from the group who take both Biology and Geography which shows the least support for the statement ( $p < 0.01$ ).

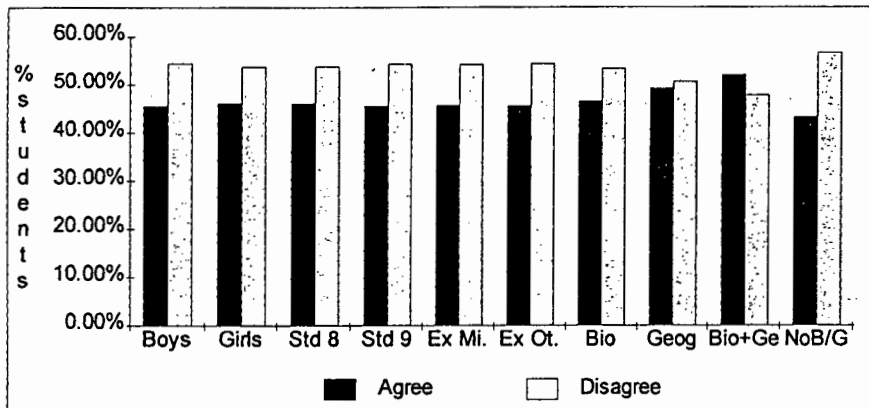


Ex Mi = students who went to Middle School: Ex Ot = students who went to other schools:  
 NoB/G = students who take neither Biology nor Geography.  
 Bio +G = students who take both Biology and Geography.

**Figure 8.7 Analysis of student sub-groups responses to Item 34.3 “I find studying the environment at school boring.”**

The fact that less than half of the students supported the statement in Item 34.4 (see Figure 8.8 below) is rather surprising, but could be attributed to logistic factors during the running of the cross-curricular projects, including the fact that the group size was too large (this was determined by the number of teacher facilitators available and the average group size was 18 students); the lack of cohesion within groups as well as many students not being able to cope with the demands made on their initiative and ability to adapt to the relatively unstructured nature of the project.

Comments made included "only a few members of the group did any work", "there was nothing for me to do," "we got no help from the teacher." Again it was the students taking both Biology and Geography who showed the most support for the statement.

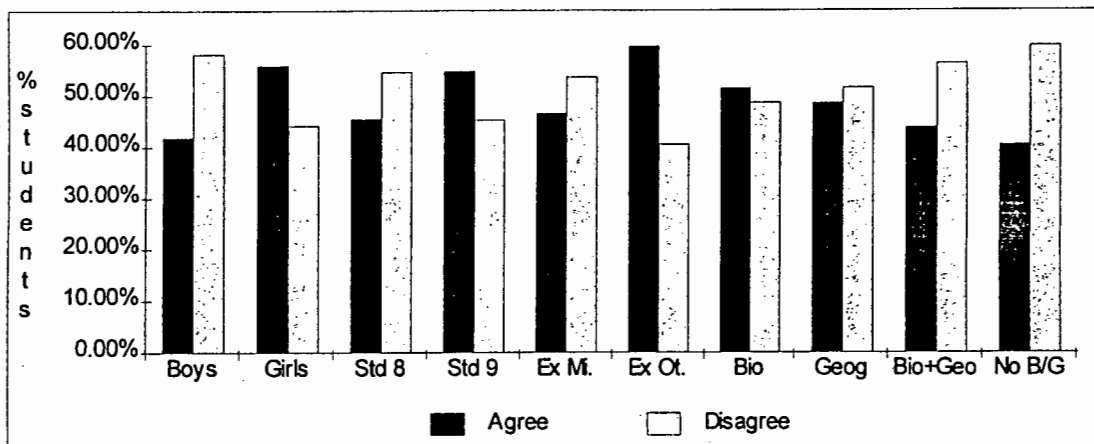


Ex Mi = students who went to Middle School.; Ex Ot = students who went to other schools.  
 NoB/G = students who take neither Biology nor Geography

**Figure 8.8** Analysis of student sub-group responses to Item 34.4 "I found the cross-curriculum project done in Std 8, highly stimulating."

Half of the students felt that there was a need for more social issues (Item 34.5) to be included in the school curriculum. This is significant even if many of the students do not see the link between social and environmental issues.

This desire to learn more about social issues applied particularly to the girls who differed significantly from the boys in their response to this item ( $p < 0.05$ ). This difference augments the findings described in Chapter 5 where the girls showed significantly greater concern for social issues than the boys.



Ex Mi = students who went to the Middle School: Ex Ot = students who went to other schools.  
 No B/G = students who take neither Biology nor Geography.

**Figure 8.9 Analysis of student sub-group responses to Item 34.5 “ We need to learn more about social issues.”**

From the responses shown in Table 8.1 and Figures 8.6 to 8.9, it would appear that, from the student's perspective, there is room for improvement in both the content and methodology of environmental education that these students have been exposed to. This problem will be analysed further in Chapter 10.

The main points which have emerged from the student's view of environmental education in the formal setting of school are:

- the school is rated second to television as a source of environmental information
- just over 20% of students watch environmental programmes on a regular basis
- Biology is regarded by most as the chief source of environmental knowledge within the school
- the majority of students are in favour of field excursions, but not during the holidays
- the majority of students do not see the need for more or less curricular time to be spent on the environment
- about half of the students feel that there is a need for a greater emphasis on social issues in the school curriculum.

## CHAPTER 9

### THE INFLUENCE OF SOME INDEPENDENT VARIABLES ON STUDENT RESPONSES

#### 9.1 Introduction

There are a number of independent variables which could influence a student's attitude towards environmental issues, and commitment towards positive environmental actions. Opie (1990) in his study on the aesthetic responses of students towards the natural environment, grouped some of these variables into clusters. Variables such as ethnicity, age, language and peer group influences were grouped together as cultural experiences, gender and level of formal education formed the educational experiences, while family income, parents occupation and place of residence were grouped together as socio-economic status variables. It is rather surprising to see gender classified as an educational variable, as it would seem to be more appropriate to group it with a cultural variable like age. Opie also had a clustering of personality variables which included environmental sensitivity and perceptions, which in this survey form the dependent variables because these are two variables which are reflected in the response to an item. A variable such as environmental perception can be influenced by gender, but it has no influence on gender and is thus regarded as a dependent variable. (Bailey, 1978).

The variables discussed in this chapter are *gender*, *level of education*, that is *standard or grade*, *previous school*, and *subject choice*. Some of the other variables which were partly or not covered in this survey will be discussed at the end of the chapter.

#### 9.2 Gender as an independent variable

The literature gives conflicting viewpoints on the effect of gender on environmental attitudes and actions. Blum (1977) and Arbuthnot (1977) both indicated that gender did not rate as a factor in determining environmental attitudes. Blum, however did find gender differences which correlated with academic achievement and in his view could be linked to environmental knowledge and

different interests. Van Liere and Dunlap (1981) report similar findings with significant cognitive differences and no differences in the affective domain.

Morgan and Richmond (1977) however, found clear gender differences in the responses to their survey of fifth year students in secondary schools. Kellert *et al*, (1987) in a survey of the knowledge, attitudes and behaviour of over 3000 American adults towards wildlife reported marked gender differences and concluded that women and men value animals for different reasons. Their view is that women have a more humane attitude towards animals, especially domestic pets and to large and aesthetically attractive species. Women also show greater concern for any activities which involve the killing or suffering of animals. Men, according to Kellert, *et al* (ibid), had a greater knowledge of animal and wildlife issues, and were more concerned about ecosystems than individual species. They are also more likely to condone the exploitation of animals for material gain showing a utilitarian bias and demonstrating a dominionistic attitude, that is one of mastery and control over animals.

Szagan and Mesenholl (1993) carried out a study of 830 West German adolescents in which their ethical and emotional concern towards nature and environmental destruction were assessed. They found that the degree of ethical and emotional concern was stronger in adolescent females and attributed this to an extension of the caring and pro-social behaviour which women and girls often show towards other humans. This pro-social attitude, illustrated in Chapter 5 of this study showed that girls were far more concerned about social issues than boys. Stern and Dietz (1994) found that women have different values and beliefs from men and that they believed more strongly that environmental conditions can have negative effects on themselves, others and the biosphere. They also found that the only significant gender difference in values was that women have stronger biospheric-altruistic values. Women did, however, exhibit stronger commitment towards positive environmental actions.

There is very little research on gender as an independent variable in the local literature. However, Opie (1990) cites Reynolds (1988) who suggests that gender did not have a significant influence on

environmental concern. Opie (ibid) found that females from advantaged communities showed a higher aesthetic response to the environment than males from a similar community. Joyce (1991) observed that females tended to show "desirable" attitudes and behavioural intentions more frequently than did their male counterparts.

Comment has been made on gender differences with respect to Chapters 4 and 5. Table 9.1 shows significant gender differences in the responses discussed earlier in Chapter 6. The responses of the girls differed significantly from those of the boys in five of the sixteen items on *animal conservation*. All five of the items related to the killing of animals and the girls expressed significantly greater opposition than the boys. Three out of the twelve *local issues*, which showed gender differences were all significant at the 95% level of confidence. In expressing greater opposition than the boys to Items 9.5 and 9.12, the girls indicated a higher degree of environmental concern. However, their greater support for Item 9.13 reflects a preference for aesthetic quality over ecological balance, although inadequate knowledge of the latter could have influenced the response.

There were significant differences in four of the fifteen items on *pollution and resource conservation*. Significantly, more support for Item 15.4 came from the boys than from the girls, although the overall support was low. The girls were more concerned about the environmental effects of oil tankers and nuclear reactors than the boys. The boys, however, were significantly more in favour of the deposits on glass bottles than the girls.

There were gender differences in only three of the items relating to conflict between the interests of nature and those of people. In Item 9.1 the boys were evenly split on the issue. The girls however, indicated that in their view, preserving fynbos was more important than generating income for the unemployed. By contrast, in Item 20, the girls were more sympathetic to the plight of the squatters than were the boys. Only 29% of them opted for the removal of the squatters from the valley compared to the 47% of the boys. The girls were also more concerned about the implications of AIDS than the boys.

		Boys	Girls	
<i>Animal Conservation</i>				
Item 5.5	Seal culling should be allowed as it provides much needed employment	A=15% D = 66%	A = 6% D = 84%	p < 0.01
Item 5.7	I am opposed to seal culling	A = 60% D = 18%	A = 74% D = 11%	p = 0.01
Item 5.13	A giraffe braai was held recently. This should not be allowed	A = 56% D = 23%	A = 74% D = 12%	p < 0.01
Item 5.14	Any dangerous puff adders found outside nature reserves should be killed.	A = 10% D = 74%	A = 13% D = 67%	p < 0.05
*18.14	I feel that hunting for sport is morally wrong.	A = 72.5% D = 27.5%	A = 93% D = 7%	p < 0.01
<i>Local Issues</i>				
Item 9.5	I support housing development on the sand dunes, as the rates that will be paid will provide more money for the Fish Hoek Town Council to use for the benefit of the community	A = 13% D = 63%	A = 6% D = 76%	p < 0.05
Item 9.12	I feel that vehicles should be allowed onto Noordhoek beach	A = 23% D = 55%	A = 14% D = 72%	p < 0.05
Item 9.13	Rotting kelp should be regularly removed from Long Beach.	A = 60% D = 24%	A = 75% D = 12%	p < 0.05
<i>Pollution</i>				
Item 15.4	People who worry about pollution have nothing else to worry about	A = 11% D = 66%	A = 6% D = 83%	p < 0.01
Item 15.6	Oil tankers should not be allowed into False Bay	A = 61% D = 9%	A = 77% D = 4%	p < 0.01
Item 15.9	It worries me that there is a nuclear power plant so close to Cape Town.	A = 28% D = 30%	A = 44% D = 13%	p < 0.01
Item 15.15	Deposits should be paid on all glass bottles	A = 84% D = 7%	A = 70% D = 14%	p < 0.05
<i>Nature vs people.</i>				
Item 9.1	In spite of the fact that Rooikrans is a threat to the local fynbos, it should not be eradicated, because, as firewood, it provides an important source of income for the unemployed in the valley.	A = 32% D = 32%	A = 20% D = 44%	p < 0.05
Item 19.2	AIDS will help to solve our environmental problems	A = 39% D = 41%	A = 26% D = 55%	p < 0.05
<i>Conservation vs Development</i>				
*Item 18.9	Development on a piece of land should not be stopped to protect an endangered species.	A = 26% D = 74%	A = 9% D = 91%	p < 0.01

\*= Item did not offer a neutral response: A = Agree: D = Disagree..

**Table 9.1** List of responses to items which showed gender differences that were statistically significant

Only one item on *Conservation vs. development* showed any significant gender difference. The girls gave far greater support for the protection of endangered species against development, thereby reinforcing their opposition to the destruction of life. A similar finding was established amongst Finnish students (Kuitunen, *et al*, 1993). As far as the 'knowledge items' were concerned, there were

only two items of significance, namely concerns about the destruction of the ozone layer and the effect of acid rain. In both cases the boys showed greater knowledge than the girls.

Chapter 4 has already discussed the fact that the girls were generally more positive in both their cognitive and affective responses than the boys. In Chapter 5 it was revealed that the girls were generally more concerned about the environment, and in particular social issues, than the boys. This applies to both global and local issues.

The main gender differences were apparent in those items dealing with student commitment such as the picking up of litter (see Table 9.2 below).

<i>Litter</i>		Boys	Girls	
Item 15.3	I ought to pick up litter dropped by other people	41.90%	55.80%	p < 0.05
Item 17.2	You voluntarily pick up other people's litter	26.10%	51.10%	p < 0.01
<i>Aerosols</i>				
Item 17.6	You use aerosol products e.g. deodorants	70.10%	55.20%	p = 0.01
<i>Recycling</i>				
Item 17.3	You put waste paper into the recycling bags at school	56.40%	73.10%	p < 0.01
Item 17.8	Recycling of paper	35.10%	44%	p < 0.05
Item 17.9	Recycling of plastic	17.30%	30%	p < 0.05
<i>Willing to help raise funds</i>				
Item 21.1	To save or protect an endangered species such as the Black Rhino.	43.70%	71.20 %	p < 0.01
Item 21.2	To establish a nature reserve at Noordhoek	30.40%	48.60%	p < 0.01
Item 21.4	To improve the standard of living of the squatters	16.30%	34.30%	p < 0.01
Item 21.5	To stop kaolin mining	28.90%	36.70%	p < 0.01
Item 21.7	To establish a recreational centre for the teenager of Fish Hoek	48.10%	62.40%	p < 0.05
Item 24	Sold tickets in Great White Shark Campaign	41.10%	56.10%	p < 0.05
Item 26	Willing to sell tickets in a future campaign	41.80%	61%	p < 0.01

**Table 9.2 Significant gender differences in items relating to student commitment to environmental actions**

The percentages shown in Item 15.3 reflect the degree of agreement with the statement, while those in Item 17.2 reflect those who pick up litter regularly or occasionally. These percentages demonstrate that the difference between positive attitude and appropriate action is substantially greater in boys than for girls. The percentages in Item 17.6 refer to the regular use of aerosols. The girls seem to be more conscious of the effects of CFC's as 14% of them seldom or never use aerosols as opposed to the 9% of the boys. In addition 14% of the girls stipulated that they used "ozone friendly"

forms as opposed to the 3% of the boys. With respect to the recycling items, the percentages in Item 17.3 indicate regular use of recycling bags where the boys reflect a low frequency.

A major difference between boys and girls lies in their willingness to raise funds. In five of the nine projects listed under Item 21, the girls were significantly more willing to raise funds (Table 9.2). The girls also expressed greater willingness in the other four items, but the differences were not statistically significant. The responses to Items 24 and 26 reflect a similar trend, however in both sexes the difference between behavioural intention and action is small. These findings concur with those of Stern and Dietz (1994) who suggest that girls are far more willing to sacrifice time to raise funds, than the boys. A similar conclusion can be made from the response to Item 23 where the girls were significantly more prepared to sacrifice time to establish an indigenous school garden ( $p < 0.01$ ). The two groups also differed significantly with what they would like to do on Conservation Day (Item 22). A significantly higher percentage of girls wanted to do a beach clean-up and a smaller percentage wanted to hack on the mountain ( $p < 0.01$ ). This indicates that girls are less prepared to carry out actions that are physically demanding than boys.

There were also some significant gender differences in the student responses to the items relating to their source of environmental knowledge:

- significantly more girls read environmental articles than do boys ( $p = 0.012$ .)
- 67% of the girls indicated that they learnt the most about the environment in Biology as opposed to 37% of the boys, while 46% of the boys indicated that they learnt the most about the environment in Geography as opposed to 37% of the girls ( $p < 0.01$ )
- 58.2% of the girls wanted more social issues to be dealt with in school as opposed to 41.8% of the boys ( $p = 0.025$ ).

In evaluating the role of gender as an independent variable in this survey, the following conclusions can be made:

- the majority of the issues covered showed no significant gender differences
- girls were significantly more sensitive to issues involving the killing of animals
- girls showed a greater concern for social issues and problems

- girls showed a significantly greater degree of commitment to environmental actions, particularly those which involved a sacrifice of time.

These findings confirm those of Kellert (1987) in respect to attitudes to animals and wildlife, and that of Szagun and Mesenholl (1993) with respect to the link between sympathy for animals and sympathy for other humans. It also concurs with Stern and Dietz's (1994) research with respect to the behavioural intentions of the girls and the link to altruistic values.

### 9.3 The student's standard as an independent variable

Most researchers have found a positive correlation between environmental concern and increasing educational experience (Opie 1990). Opie found that a high aesthetic response tended to be associated with those who had reached the tertiary level of education.

The section discussed in Chapter 5 indicated that, in general, the Std 9's showed more concern for environmental and social issues than the Std 8's. Before discussing the significantly differing responses between the two standards, it is necessary to look at the responses to Items 12, 13 and 14 which were tests of knowledge. In Item 12, the students were asked to give one cause and one effect of the following: *Destruction of the ozone layer, Greenhouse Effect, Acid Rain and Plastic Pollution*. There was no significant differences in the responses to the first item. However, when it came to the cause of the Greenhouse Effect, 53 students or 18.5% gave 'no' response at all, compared to a 7% 'no' response to the previous item. Of the 53 'no' responses, 52 were Std 8 students. If one considers the Std 8's and 9's who did respond, then there is no statistical significance between the two groups. However, if one includes those who did not respond as not knowing the cause, then the difference between the two groups is significant ( $p < 0.01$ ). There was an even higher 'no' response to the item asking for consequences of the *Greenhouse Effect*, but again this included only a single Std 9 student. When considering only those who responded then the Std 8's were significantly more aware of the effects than the Std 9's ( $p = 0.04$ ). If however, the 'no' responses were included, then there is no statistical difference between the responses of the two groups. The pattern of 'no' responses was repeated concerning the cause and effect of *acid rain*. Of those Std 8's who did respond, there was

significantly greater ignorance on both aspects of acid rain amongst the Std 8's compared to the Std 9's ( $p < 0.01$  for the cause and  $p < 0.05$  for the effect.). While there was a far smaller 'no' response from the Std 8's on the cause and effect of *plastic pollution*, the Std 9's were significantly more knowledgeable about the cause ( $p < 0.01$ ).

There were also significant differences between the two standards in response to Items 13 and 14. In Item 13, 49.6% of the Std 9's were aware of the fate of the black bags of rubbish collected from the Fish Hoek area as opposed to 7.2% of the Std 8's ( $p < 0.01$ ). Similarly with regard to Item 14, 45% of the Std 9's knew what happened to the local sewage compared to the 10.1% of the Std 8's ( $p < 0.01$ ). These differences were not surprising when one considers that in the previous year the Std 9's had done a cross-curriculum project on the various forms of waste disposal in the Fish Hoek valley. What is surprising is that one year later, less than half of the Std 9's were able to respond correctly to these items.

Likert-type items which elicited significantly different responses from the two standards are listed in Table 9.3 below. It is worth noting that there are no significant differences in the two group's attitude to *animal conservation*, and only two of the *local issues* produced markedly different responses. The discrepancy in Item 9.10 can be attributed to the difference in the neutral response. Exactly half of the Std 8's remained neutral compared to 33.8% of the Std 9's. The statement in Item 9.13 received the support of 75% of the Std 8's as opposed to 58% of the Std 9's. It would appear that lack of knowledge amongst the Std 8's is the chief reason for these differences about local issues.

		Std 8	Std 9	
<i>Local Issues</i>				
Item 9.10	Too many people would become unemployed if Serina (the kaolin mining company) had to stop mining in the valley	A = 35% D = 15%	A = 42% D = 24%	p < 0.05
Item 9.13	Rotting kelp should be regularly removed from Long Beach.	A = 75% D = 16%	A = 58% D = 19%	p < 0.01
<i>Pollution and Resource Conservation</i>				
Item 15.5	I get angry when I see graffiti on mountain rocks	A = 72% D = 10%	A = 82% D = 2%	p < 0.05
Item 15.10	There is conclusive evidence that the Greenhouse Effect is going to change our climate	A = 60% D = 7%	A = 74% D = 2%	p < 0.05
Item 15.12	Convenience foods with individual throw-away containers should be heavily taxed to pay the costs of eliminating their effects on the environment	A = 42% D = 27%	A = 58% D = 14%	p = 0.01
Item 15.13	I find the prospect of using purified sewage water unacceptable.	A = 45% D = 26%	A = 29% D = 43%	p < 0.01
<i>Nature vs people</i>				
*Item 18.13	Conservation should be for the benefit of people not animals	A = 21% D = 79%	A = 11% D = 89%	p < 0.05
Item 19.2	Aids will help to solve our environmental problems	A = 26% D = 54%	A = 41% D = 41%	p < 0.05
<i>General Issues</i>				
*Item 18.18	I would prefer planned open spaces geared to human recreation rather than to areas of natural vegetation	A = 30% D = 70%	A = 19% D = 81%	p < 0.05
Item 9.7	I am not really interested in environmental issues outside the Fish Hoek/Noordhoek valleys	A = 11% D = 61%	A = 3% D = 78%	p < 0.01
Item 19.6	I find environmental discussions depressing.	A = 45% D = 28%	A = 31% D = 41%	p < 0.05

\* = Items which did not offer a neutral response:      A = Agree:      D = Disagree

**Table 9.3** List of items to which the Std 8's and Std 9's gave significantly different responses

There were four items relating to *pollution and resource conservation* where significant differences were evident. Significantly more of the Std 8's did not support the statement in Item 15.5. The same could be applied to Item 15.10 where there was a much larger neutral response from the Std 8's which is predictable in the light of the poor knowledge of this concept as indicated above. The Std 9 students were more in agreement with the tax on packaging than were the Std 8's (Item 15.12). With respect to Item 15.13 there was a marked discrepancy with 45% of the Std 8's supporting the statement compared to the 29% of the Std 9's, while only 26% of them found it acceptable to drink

purified sewage water compared to the 43% of the Std 9's. It would appear that the Std 9's have a greater awareness of the water scarcity problems of the future.

In the section on *Nature vs. people*, both groups rejected the statement in Item 18.13, but the Std 9's showed significantly more opposition than the Std 8's. Significantly more of the Std 9's agreed with the statement in Item 19.2 while fewer rejected it in comparison to the Std 8's. A possible reason for this is that the Std 9's would have had more classroom exposure to the problems of increasing populations than the Std 8's.

The two standards differed on three of the *general environmental issues*. More of the Std 8's wanted open space to be used for recreation purposes (Item 18.18). Over a third of the Std 8's either supported or remained neutral on Item 9.7 compared to less than a quarter of the Std 9's. Finally, significantly more of the Std 8's (45.3%) found environmental discussions depressing as opposed to the 31.4% of the Std 9's.

With the exception of the item on AIDS, the Std 9's showed a more positive attitude to those environmental issues where significant differences existed. This applied particularly to those items on pollution. This may be due partly to a significantly greater level of ignorance amongst the Std 8's on some of these issues, but there does seem to be a degree of negativity towards the environment which is more evident amongst the Std 8's and is reflected in some of their responses, particularly to the general issues.

In the sections of the questionnaire dealt with in Chapters 4 and 5, the Std 9's were significantly more concerned about environmental issues than the Std 8's. Table 9.4 below lists the differences between the two standards with respect to their commitment to positive environmental actions.

<i>Litter</i>		<i>Std 8</i>	<i>Std 9</i>	
Item 15.2	I get angry when I see litter lying around the school	59.60%	72.90%	p < 0.05
Item 15.3	I ought to pick up litter dropped by other people	41%	57.70%	p < 0.05
Item 17.2	You voluntarily pick up other people's litter	31.80%	49.60%	p < 0.05
Item 17.3	You put waste paper into the recycling bags at school.	56.90%	76%	p < 0.01
<i>Energy Conservation</i>				
Item 17.1	You switch off lights when nobody needs them on	54.50%	63.60%	p < 0.05
<i>Recycling</i>				
Item 17.12	Recycling of bottles without a deposit.	44.10%	53.60%	p < 0.05

**Table 9.4 Significant differences between Std 8 and Std 9 students in items relating to student commitment to environmental actions**

In Items 15.2 and 15.3 the percentages indicate agreement with the statement. In Items 17.1 and 17.3 the percentages indicate those who regularly carry out the activity. In the other items the percentages indicate those who regularly or occasionally perform the activity. From Table 9.4 it can be seen that the Std 9's show greater commitment in all of the items listed. Apart from the three items relating to litter, there were only three other actions where the two standards differ. There are significantly fewer differences in behavioural intentions between the two standards than there are of attitudinal differences.

With respect to their sources of environmental information the following significant differences were recorded:

- Std 9 students read more environmental articles than Std 8 students (p < 0.01)
- the ratio of Std 9's who rated television as their main source of environmental information, to those who rated the school as a source of learning about the environment was 2 :1 whereas in the Std 8's it was 1:1 (p < 0.05)
- 21.1 % of the Std 8's felt that they hear too much about the environment at school compared with 8.8% of the Std 9's (p < 0.01)
- 21.7% of the Std 8's felt that there was not enough done on the environment at school compared to 40.8% of the Std 9's (p < 0.01).

The fact that over 20% of the Std 8's felt that there was too great an emphasis on the environment at school tends to confirm the existence of a sense of negativity towards the environment amongst the Std 8s.

The main conclusions that can be drawn from this section are:

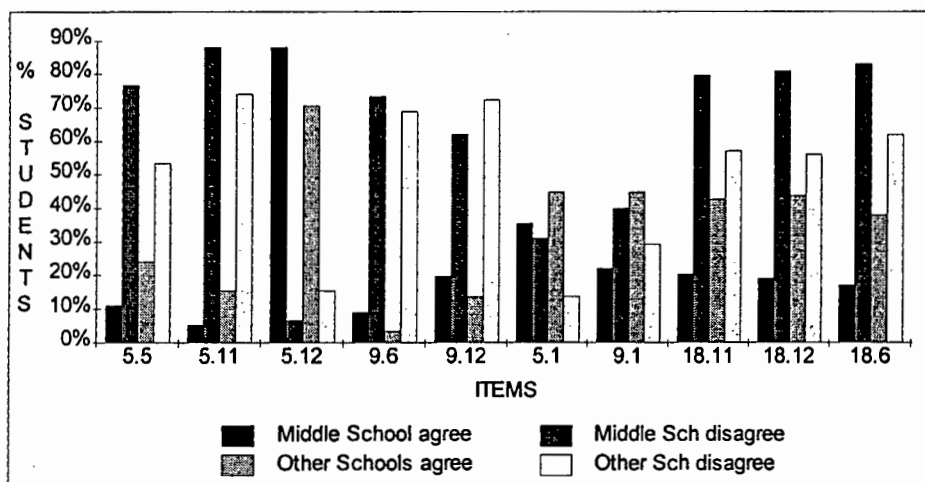
- that overall there are fewer differences between the standards than there are gender differences
- that where differences exist, the Std 9's in general show a more positive attitude towards the environment
- that many of the Std 8's are decidedly lacking in knowledge particularly with regard to those issues relating to pollution
- that there are a significant number of Std 8's who appear to have a negative attitude towards environmental issues in general.

The overall finding that Std 9's seem to have a more positive attitude to the environment than the Std 8's contradicts those of Opie (1979) and others whom he cites, notably Schock (1973) that attitudes tend to become more negative as students proceed through the secondary phase of education. This decline in positive attitudes has only been demonstrated in Science and Biology students (Opie 1979). More recent studies indicate that it applies to students in general (Opie 1989). Further research would need to be done to ascertain whether this tendency is unique to this study and is a consequence of the Senior High School Curriculum, the natural environment of Fish Hoek or the educational approach of the schools in the valley, or whether it would apply to other schools as well.

#### **9.4 The student's previous school as an independent variable**

Of the 285 students who completed the questionnaire, 228 or just under 80% had attended the Fish Hoek Middle School while the remaining 20% had come from other schools. There are two aspects to this variable. Firstly, it could be inferred that students who came from other schools could be regarded as comparative newcomers to the Fish Hoek valley. This inference is invalid as just over a quarter of the students in this group had come from Ocean View Secondary School which is also

situated in the valley. In addition there were also a few students who had not attended the Middle School, but had still lived in the valley. The second and more important aspect of this variable is whether the Middle School has been instrumental in developing environmental attitudes and a level of commitment which differed significantly from those students coming from other schools. Those items which showed significant differences in the responses of the two groups are listed in Figure 9.1 below.



#### KEY TO ITEMS

##### *Animal Conservation*

Item 5.5: Seal culling should be allowed as it provides much needed employment. ( $p < 0.01$ )

Item 5.11: There is no harm in feeding baboons as long as one is careful. ( $p < 0.01$ )

Item 5.12: Trade in ivory should be banned. ( $p < 0.01$ )

##### *Local Issues*

Item 9.6: Developing the Kommetjie/Noordhoek coastline for tourism is desirable even if it results in the destruction of rare plant communities. ( $p < 0.05$ )

Item 9.12: I feel that vehicles should be allowed on Noordhoek beach. ( $p < 0.01$ )

##### *Nature vs. people*

Item 5.10: Trek fishermen should be banned from Fish Hoek beach. ( $p < 0.05$ )

Item 9.1: In spite of the fact that Rooikrans is a threat to the local fynbos, it should not be eradicated, because, as firewood it should provide an important source of income for the unemployed in the valley. ( $p < 0.05$ )

Item 18.11: Money spent on wildlife conservation should be reallocated to provide housing for the homeless. ( $p < 0.01$ )

Item 18.12: Wilderness areas should be utilised to provide food and space for crowded hungry populations. ( $p < 0.01$ )

##### *Conservation vs. development*

Item 18.6: People have the right to decide how to modify the natural environment to suit their needs. ( $p < 0.01$ )

**Figure 9.1** Graphical representation of items to which responses of students from the Middle School differed significantly from students from other schools

There were only ten items which indicates that the attitudes of the two groups to most environmental issues were largely the same. It should be noted that in Figure 9.1 the percentage of neutral

responses is not indicated and that for Items 18.11, 18.12 and 18.6, there was no neutral option given. It is of interest that four of the ten items referred to local issues. Three of the items related to *Animal Conservation*. The responses to Items 5.5 and 5.12 reveal that students who did not go to the Middle School showed significantly less opposition to the killing of animals than their counterparts who went to the Middle School. The responses to Item 5.11 show a greater ignorance amongst students from other schools regarding the dangers of feeding baboons. The two items under *Local Issues* where the two groups differed significantly, concerned the Noordhoek beach area.

In the section, *Nature vs. People*, there was a striking contrast in responses to Items 5.10 and 9.1 which concerned local conflict issues. Students coming from other schools showed greater support for the banning of trek fishermen from Fish Hoek beach than did their Middle School counterparts. They also showed an 8% higher neutral response.

Middle School students were more in favour of eradicating alien vegetation than considering the benefit this plant provides as a livelihood for the unemployed. This trend is also reflected in the responses to Items 18.11 and 18.12 where non-Middle School students showed far more sympathy for disadvantaged communities than did those from the Middle School, although the majority still supported the interests of conservation. Similarly in the response to Item 18.6 a greater percentage of the non-Middle School students supported the human-centred viewpoint than was the case with Middle School students.

There was virtually no difference between the two groups with regard to their environmental knowledge. The only area where ex-Middle School students showed significantly greater awareness was in the disposal of local solid waste and sewage (Items 13 and 14).

There was not a single item where the two groups differed in the area of environmental commitment. It could be suggested that the level of environmental commitment shown by the students has not been influenced

by the school previously attended by the students. There were also no significant differences relating to the source of environmental information of the two groups.

The analysis of cognitive and affective responses discussed in Chapter 4 revealed that ex-Middle School students seemed to have a greater awareness and concern for the illustrated concepts than the students who came from other schools. However, when it came to the rating of the degree of concern shown for various environmental and social issues (discussed in Chapter 5), it was the students from other schools who seemed to show greater concern.

The major conclusion that one can draw regarding the influence of the previous school as an independent variable is that ex-Middle School students do seem to be more biocentric and oriented towards the natural environment whereas those who went to other schools, while still holding largely biocentric conceptions, do seem to show more affinity for the human-centred viewpoint.

## **9.5 Subject choice as an independent variable**

It seems logical to assume that students taking environmentally-oriented subjects would be more knowledgeable and show greater concern. However, Dispoto (1977) found that students taking non-Science subjects were as concerned about environmental issues as those taking science-oriented subjects (which included environmental components), but the latter group not only knew more, but were more likely to take action to demonstrate their concern. Hart and McClaren (1978) in their study of 12th grade students in Canada found that those taking science courses were more likely to show concern for the natural environment and to reject the notion that economic considerations should take priority over environmental quality. Kuitunen, *et al*, (1994) found that amongst Finnish students those doing Biology majors were most willing to make sacrifices to protect endangered species while students at commercial and technical schools were least willing. Research has also shown that the method used to teach a subject can also influence student attitudes. Opie (1979) indicated that a student-centred, group work-oriented approach to the teaching of ecology, an approach which

included field work, was more effective in developing environmental concerns than the traditional lecture/ demonstration method.

All students in state schools take "environmental " subjects such as Geography and Biology up to the end of Std 7 (Hurry,1982). From Std 8 onwards Biology and Geography are not compulsory subjects, therefore students coming into the Senior High School are able to choose one, both or neither of these two subjects.

Table 9.5 below indicates the subject choice of the student respondents with respect to Biology and Geography.

Subject Choice	Number of students
Includes Biology	151
Includes Geography	136
Includes both Biology and Geography	73
Includes neither Biology nor Geography	72

**Table 9.5 Student's subject choice in relation to Biology and Geography**

Table 9.5 shows that approximately 25% of the students take neither Biology nor Geography and the same percentage take both subjects. All of the students have had ample exposure to both Biology and Geography in the first nine years of their formal education. In addition, as indicated in Chapter 8, just under 80% of all the student respondents attributed most of the environmental knowledge gained at school to one or other of these two subjects. While the environmental attitudes and degree of commitment of the students may have been influenced by the knowledge gained in Biology and Geography, this is not the main purpose for investigating subject choice as an independent variable.

One might expect that students who choose either Biology or Geography as a subject would, by virtue of their choice, be more interested in or be more concerned about environmental issues than those students who choose neither subject. However, this is too simplistic as many students may show concern for the environment, but their chosen career or academic strengths preclude the taking of either Biology or Geography. Alternatively there are students who take Biology or Geography out

of necessity and not because they show any interest in either of these subjects or in the environment. The main emphasis here is to compare the responses of those students taking Biology and Geography with those who take neither subject.

There were sixteen items where students taking one or both Biology and Geography, gave significantly different responses to those students who take neither subject. These have been listed in the form of a table in Appendix H.

Of the sixteen items that showed significant differences between the two groups, all but one involved students taking Biology. This seems to indicate that students taking "non-environmental" subjects had viewpoints which were more divergent from those of Biology students than from those of Geography students. Seven of the sixteen items relate to *local issues*, and of these the Biology/Geography students are significantly more oriented towards protecting the natural environment than those taking "non-environmental subjects". The responses to the two other items are interesting. In Item 9.9 those taking "non-environmental" subjects appear to be significantly more concerned about the impact of the existing kaolin mine than those taking Geography. Student surveys of the inhabitants of the area in the vicinity of the mine revealed a divergence of opinion with the majority feeling that the mine's impact was negligible (pers. comm). The response to Item 9.10 was puzzling in that the Biology students were more concerned about a possible increase in unemployment if mining in the valley was stopped than their "non-environmental" counterparts. This response contrasts sharply with the one to Item 18.1 where the majority of the latter (52.2%) rated social problems above threatened habitats whereas over 70% of the Biology/Geography students felt that threatened habitats should receive precedence. A possible reason for the response to Item 9.10 could be that the Biology students did not see the item in the context of the natural environment, that is relate continued employment to the impact that further mining could have on the valley.

The three items on *Pollution and Resource Conservation* seem to indicate that the "non-environmental" group are less concerned about the effects of pollution than the Biology/Geography group. The latter group also seem to lean towards the protectionist viewpoint and the belief that

conservation and development are incompatible. The response to Item 18.19 coupled to that of Item 9.4 reveal that the Biology/Geography group show significantly more concern for future generations and their right to environmental quality.

In analysing the responses to the concepts illustrated in Chapter 4, it was apparent that students taking both Biology and Geography showed greater awareness and concern than did those taking neither subject. Students taking Biology showed very little difference in cognitive and affective responses compared to those taking Geography. As far as the degree of concern for environmental and social issues described in Chapter 5 is concerned, students taking Biology and Geography did tend to show greater concern than those taking neither subject, but these differences were only statistically significant in one of the global issues and two of the local issues. Students taking Biology recorded similar ratings to those taking Geography in all of the categories. Students taking Biology differed significantly from those taking Geography in just two items, namely Item 5.13 where the Biology students expressed greater opposition to the giraffe braai ( $p < 0.05$ ) and Item 9.5 where Biology students were more strongly opposed to housing on the sand dunes.

There was very little difference between the groups with regard to knowledge which was uniformly low. There were isolated cases where the subject content in Biology and Geography resulted in those students showing greater awareness, for example fynbos amongst Biology students and the ozone layer amongst Geography students, but overall the knowledge difference between the groups was minimal.

Subject choice was shown to have no influence on student commitment to environmental action, as not a single item relating to student commitment showed any significant differences between the subject groups.

It is suggested that subject choice at the Senior High School seems to have only limited influence as an independent variable and this seemed to be almost exclusively linked to the issue of conservation and development where those students taking "environmental" subjects, particularly Biology were

generally more opposed to any link between conservation and development, especially at local level than were those taking "non-environmental" subjects. The "non-environmental" group showed themselves to be just as biocentric as the "environmental" group in their responses to the *Animal Conservation* items. What differences that do exist between those taking "environmental" and those taking "non environmental" subjects apply mostly to those taking Biology only, with only one item applying to Geography.

It would thus appear that the majority of students who take Biology and/or Geography do not choose these subjects because they are "environmental" subjects, but rather for other reasons, more often than not related to limitations in the subject choice offered.

## **9.6 The influence of other independent variables on student responses**

### **9.6.1 Anonymity**

The influence of subjective pressure which includes peer pressure was covered in part by having an *anonymous* group and a *named* group. Throughout the questionnaire the responses of the two groups were similar thus confirming the findings of Corey (1937) that the effect of having to supply one's name on the way in which students respond to this type of questionnaire, is negligible.

### **9.6.2 Effect of geographical location**

The importance of place of residence as an independent variable is rather less than one would have anticipated, given the fact that a number of the issues cited have generated a great deal of heated debate amongst local communities (see Appendix D). In Chapter 5, where students were asked to express their degree of concern for local issues, there was only one instance where students from the affected area showed significantly greater concern than the student body as a whole. These students of Kommetjie and Noordhoek expressed greater concern over the possible development of the adjacent coastline. Similarly in those items relating to local issues in Chapter 6, there was again only one item namely, the fate of the squatter community in Noordhoek, where the local students demonstrated significantly more concern than the other students. For the rest, there were no significant

differences between local students and the student body as a whole. Three possible reasons for this are:

- students show greater concern for global or national environmental problems than local ones (See Chapter 6).
- the number of students living in any of the local communities outside of Fish Hoek and Sun Valley is very small (See Chapter 1)
- students are just not interested in local environmental issues, no matter how important they might be to other members of the community.

### 9.6.3 The role of the media as an independent variable

As was described in Chapter 8, the most important source of environmental information for the students is television. However only 21.7% of the student respondents indicated that they regularly watched environmental programmes on television and 38.1% claimed that they seldom or never watched environmental programmes. In addition, an analysis of the student responses found no statistical relationship between the nature of the responses and the frequency with which students watched environmental programmes. It would appear that television does not rate highly as a variable influencing student attitudes and actions towards the environment. However, at the same time, it must be acknowledged that television and /or other media must have some influence on student attitudes as can be seen by the high level of concern shown by the students for global issues such as deforestation, global warming etc. (see Chapters 4 and 5) which are not given much emphasis in the school curriculum. Television could also have played a role in the development of the biocentric viewpoint shown by the majority of the students. Irwin (1982) found that while a large proportion of the students in his study intimated that television had increased their awareness of conservation problems, their level of awareness did not differ significantly from those who did not have television.

Hausbeck, *et al* (1992) pointed out that students may become aware and show concern because of television programmes, but gain little substantive knowledge or understanding of environmental

issues. It would seem that in order to gauge the importance of television in determining environmental attitudes, there is a need to evaluate the nature and quality of programmes watched and to assess their impact, both short-term and long-term, on student attitudes and level of commitment.

The impact of printed media would be substantially less than that of television as a significantly lower proportion of students read environmental articles than watch environmental programmes on television ( $p = 0.014$ ). In addition only 6.2% of the students indicated that books were their main source of environmental information. As with television no relationship could be found between student responses to items and the frequency with which environmental articles were read. One would assume that those who regularly read environmental articles would already have an interest in and show concern for the environment.

## **9.7 Conclusion**

It seems apparent from the data that, individually, the independent variables considered had a limited influence on student responses, with gender having the most significant effect followed by educational level as indicated by standard. It is more probable that, collectively, one or more of the variables investigated in this study together with other variables such as academic achievement, peer pressure and socio-economic variables could have a significant influence on student attitudes and degree of commitment. This is what Opie (1990) concluded in his study on aesthetic responses. The degree of influence of each of these variables would vary from individual to individual.

## CHAPTER 10

### CONCLUSIONS AND RECOMMENDATIONS

#### 10.1 Introduction

This study arose as a result of a growing concern on the part of the researcher at an overall lack of interest in environmental activities organised by the school after school hours. There was in addition an apparent lack of commitment to environmentally-responsible actions such as recycling. The students did appear to be concerned about the natural environment and its associated problems, but this concern seemed to be restricted to the biophysical environment and a more holistic perspective appeared to be lacking.

In an attempt to address this concern on the part of the researcher, a survey was carried out in order to establish student awareness and attitudes towards the environment, along with their commitment to positive environmental actions. The survey had the following objectives:

- to compare student awareness and attitudes towards environmental issues
- to see how students viewed local environmental issues in comparison with global or national issues
- to clarify student responses to situations where there is a conflict between the interests of nature and human interests
- to establish the degree of personal commitment of the students towards the environment.

The survey took the form of a comprehensive questionnaire which was administered to Standard 8 and 9 students. A variety of formats was used in drawing up items for the questionnaire. These included Likert-type statements, items requiring open-ended responses based on illustrations of environmental concepts, multiple choice items, and questions aimed at testing student knowledge. In addition, students were asked to give ratings on a scale of ten for various global and local issues. The items covered topics including animal conservation, local issues, pollution and resource depletion, ecocentric versus anthropocentric conflict situations, and items relating to student perceptions of

environmental issues in the school curriculum. Other items explored the student's degree of personal commitment both by intention and deed. There was also a section on biographical data.

The analysis of the data was largely descriptive as this suited the purposes of this study. Statistical analysis was only used to compare the responses of the different student sub-groups and here the Pearson's chi-square test was used. Response patterns were presented as tables, histograms and pie charts, and where appropriate subjected to correspondence analysis and displayed as a 'perceptual map'. The responses of student sub-groups based on gender, standard, previous school, anonymity and subject choice were also analysed in order to assess the influence of independent variables on the student responses. An analysis of the student responses lead to the following conclusions.

## **10.2 Conclusions**

### **10.2.1 Knowledge of environmental concepts**

It was found that in general the knowledge base of the students in all of the sections covered was low. An overall ignorance was displayed in Question 1 where only four of the eleven concepts illustrated were recognised by more than 50% of the students. The student's overwhelming rejection of any form of animal utilisation such as hunting, trade in ivory and harvesting of seals as well as the perception that conservation and development are incompatible, imply that they are not familiar with the concepts of conservation, development or sustainability as defined in the World Conservation Strategy. Nor do the students show an awareness of the relationship between these concepts.

The lack of in-depth knowledge relating to ecosystem functioning was shown by the large-scale ignorance of the relationship between seals and seabirds. It was also reflected by the desire of 67% of the students to see more game in the Cape Point Nature Reserve. A similar percentage feel that the preservation of individual species should have preference over the preservation of habitats.

The paucity of knowledge in the area of pollution and resource conservation is reflected by the existence of misconceptions such as the confusion shown by many students between ozone destruction and the Greenhouse Effect. Lack of awareness of the state of water resources in the country was revealed by the fact that fewer than 25% of the students identified farmers as the main water consumers in the country and that only one third of students found the re-use of sewage water acceptable. More than three-quarters of the students did not know anything about garbage and sewage disposal in the Fish Hoek valley. This reflected particularly poorly on the Std 9's who had covered these aspects in a cross-curriculum project the previous year.

A feature of many of the items was the high number of neutral responses which was indicative of a lack of awareness of situations, issues and concepts. This trend was particularly evident in those items relating to local issues and to pollution and resource conservation. Despite this apparent lack of knowledge, the students in general showed a positive attitude towards the natural environment and expressed concern over environmental problems. The knowledge deficiencies described above seem to imply that there are shortcomings in the school curriculum which need to be addressed.

#### **10.2.2 Concern for global and local issues**

One of the major findings of this questionnaire was the greater concern shown by the students over general or global issues as opposed to local issues. On a scale of ten the concern expressed for the nineteen global issues listed, reflected a mean of 7.1, whereas the mean of the thirteen local issues listed was only 5.9 ( $p < 0.01$ ). The local issue which generated the most concern would have been ranked only eleventh under the global issues. A contributing factor to this finding was lack of awareness with respect to a number of local issues, as was indicated by the high number of 'no responses' to these issues coupled with the high number of neutral responses to many of the items in those Likert-type statements which related to local issues. This implies a lack of awareness of local issues despite the high profile that some of these issues have enjoyed.

### 10.2.3 Biocentric orientation

This biocentric orientation is evident throughout the questionnaire. Any of the Likert-type statements which involved the harming or killing of animals was rejected by a substantial majority of the students. This included sustainable utilisation activities such as hunting. Over 60% of the students felt that species preservation should have priority over habitat preservation. This biocentric trend is also reflected in the students' verbal commitment to fund-raising where raising funds to protect a single species such as the black rhino or Jackass penguin received more student support than fund-raising to protect a wetland or establish a nature reserve. Funding to eliminate an alien species (the Himalayan Thar) received the least support from the students.

### 10.2.4 Ecocentric orientation

There were a number of items where students were given a conflict situation where they had to choose between the interests of nature and human interest. In most of the items in this section, the majority of students chose the ecocentric option. This was most clearly indicated in Item 18.13 where 83% of the students rejected the statement that conservation should be for the benefit of people not animals, and in Item 18.8 where 69% of students agreed that the main purpose of conservation was to protect nature from people. There were however, some items which drew a strong anthropocentric response. The overall response to these items indicate that the majority of the students still perceive conservation in its protectionist context. The responses to the items in 6.4 also reflect a biocentric/ecocentric orientation with the general student feeling that conservation and development are incompatible. This ecocentric outlook has also been reflected in the responses to some of the local issues, notably those which involve proposed developments such as the Fish Hoek sand dunes and the Noordhoek coastline.

### **10.2.5 Student perception of environment**

Students defined the environment as natural and saw environmental issues as separate from social, economic or political issues. This perception is reflected throughout the questionnaire with few students showing support for any integration of the interests of nature and people, or of conservation and development. The response to Item 18.20 saw 66% of the students agree that environmental and political issues should not be linked. This is a clear demonstration that in the view of the majority of students, the human environment was quite distinct from the natural environment.

### **10.2.6 Social issues in the school curriculum**

Despite the ecocentric orientation described in 10.1.4 there were three items where the anthropocentric viewpoint received substantial support. These related to poverty in general, poverty of communities bordering on game reserves and forced removal of people. These responses together with the responses on the local squatter issue were indicative of a concern amongst many students about social justice. Social issues had been given high ratings as areas of concern, particularly amongst the girls. In response to the last item on the questionnaire, half of the students felt that the school curriculum should include social issues. These responses indicate that there is a need for social issues to be addressed at school and also for students to see such issues in their environmental context.

### **10.2.7 Commitment to environmental actions**

The study revealed that the correlation between student attitude, verbal commitment and actual commitment varied according to the nature of the commitment, but in general the level of actual commitment was low. This lack of commitment to action is most vividly illustrated in the responses to the three items on litter (7.2.4). 67% of the students expressed anger when they saw litter around the school; 48.4% felt that they ought to pick up other people's litter, yet only 5.3% did so on a regular basis. This lack of commitment is also shown by the apathy shown by most students to recycling both at home and at school where the students who run the recycling business soon tire of the monotony of

sorting and packing recycled materials. It would appear from the responses to these items, that most students are not prepared to become involved in environmental actions which would require them to sacrifice personal time.

#### **10.2.8 Student support for environmental activities**

Students have shown very little support for environmental activities offered by the school outside of school hours. A Conservation Society which was started and maintained by a few dedicated individuals, eventually disbanded due to lack of interest. A once-thriving hack group seems destined to suffer a similar fate. While 35% of the students approve of the idea of a school-organised hike in the holidays, such hikes have in practice been very poorly supported. The reason for this would appear to be that students value their personal time and are not prepared to sacrifice any of it for environmental activities.

#### **10.2.9 Egocentrism**

Students tended to be egocentric in their approach to environmental commitment, in that while a positive attitude may be shown towards the natural environment, it seems as if for many students, commitment to environmental action depends on the personal benefits or costs involved in such actions. This is linked to the previous conclusion in that the students appear reluctant to sacrifice personal time to support environmental activities. The question of self-interest is also reflected in student commitment to recycling of bottles. 61% of students regularly or occasionally return bottles which carry a deposit, whereas the figure drops to 48% for bottles with no deposit. The economic incentive makes it more worthwhile to 13% of the students to take the trouble to recycle bottles. For the 39% of students who do not recycle bottles with a deposit, the incentive is insufficient to offset the perceived personal cost of recycling.

#### **10.2.10 Independent variables**

It was found that the effect of independent variables on the environmental attitudes and commitment to positive actions of the students was largely insignificant. The most influential of these variables was gender where the girls differed significantly from the boys in their greater sensitivity to the killing or harming of animals; their greater concern for social issues and their greater commitment to environmental actions, particularly with respect to giving up personal time. In all other areas there were no significant gender differences. There were relatively few differences between the two standards. Where differences did occur the Std 9's showed a more positive attitude towards the environment, which could be linked to the fact that in a number of areas they also showed greater knowledge.

The influence of the other variables considered namely, previous school, subject choice, geographical location of residence and the media is limited, while that of anonymity is non-existent.

#### **10.2.11 Potential role of school**

The school has the potential to influence the environmental attitudes and commitment of its students. Only 25% of the students saw the school as their main source of environmental information as opposed to 34% who felt that television was more important in this regard. To this must be added another 16% who rated television and the school equally as sources of environmental awareness (Figure 8.1). However, as can be seen from Figure 8.2, only 22% of the students regularly watch environmental programmes on television. It would thus appear that if the school can provide an environmental education that is meaningful and of relevance to its students, who are in a sense a captive audience, the school could make a substantial contribution towards achieving the objectives set out in Table 2.3. This would apply particularly to the "environmental subjects", Biology and Geography, which together cater for 75% of the student population.

### 10.3 Discussion

A comparison of the outcome of the “ environmental education” experienced by the students of Fish Hoek Senior High School with the Tibilisi Principles or the principles listed in Chapter 2, reveal the following shortcomings amongst the students:

- the students do not have a holistic view of the environment
- the natural environment is seen in isolation from the human environment
- the students appear to be largely ignorant of the content of the *World Conservation Strategy* (1980) and its successor “ *Caring for the Earth*”(1991).
- students appear to have very little interest in local issues
- the majority of students are not motivated to commit themselves to any form of environmental action.

The literature cited in this survey seems to indicate that these shortcomings are not confined to Fish Hoek Senior High School but could be applicable to other educational institutions both locally and in other countries. Accordingly, the recommendations which follow, while specifically aimed at Fish Hoek Senior High School, could be of relevance to other schools.

### 10.4 Recommendations.

The following recommendations are aimed at addressing the shortcomings mentioned above and attempt to develop in students a set of ideas based on knowledge, attitudes and values and a commitment to environmentally-responsible actions (Ballantyne and Packer, 1996). Some of these recommendations are included in the source document of the Environmental Education Policy Initiative (EEPI 1995). As this survey was confined to Senior Secondary students these recommendations were drawn up with particular reference to this phase of education but can also be applied to earlier phases.

#### **10.4.1 Recommendations relating to Curriculum Development.**

- there should be substantial consultation across subjects so as to co-ordinate curricula in order to facilitate a holistic approach to environmental topics, and to break down subject barriers, so that students no longer perceive each subject in isolation from any other subject
- a core curriculum relating to education "for the environment" could be drawn up and the content of the various subject syllabi be chosen so as to meet the aims of that curriculum (Lucas, 1980)
- the syllabi of the "environmental subjects" namely Biology and Geography should be more socially oriented so as to sensitise students to the interrelatedness between human and natural environments
- curricula should be of such a nature so as to allow teachers the freedom to incorporate local issues and circumstances and feel free to use a range of teaching strategies
- any curricula that are drawn up should be done in full consultation with teachers at all levels of education.

#### **10.4.2 Teaching strategies**

- content material should be selected and presented in such a way as to be of relevance to the students
- students should also be exposed to issues from a number of viewpoints. For example, both Opie (1990) and Schreuder (1990) found that students from advantaged and disadvantaged communities had differing perceptions of the same concept e.g. deforestation. A student should be given all alternative viewpoints and be allowed to evaluate them according to his/ her own value system
- a variety of teaching strategies should be used in order to generate the desired goals. These would include

implement strategies aimed at achieving the objectives in Chapter 2. The time is ripe to enter a new era for environmental education, hopefully an era when no longer can it be said of environmental education that:

*“Conferences and working parties have successively produced definitions and lists of aims which are repetitions of earlier declarations. They have made little effort to bridge the gap between their philosophical utterances and the classroom practice required to achieve the declared goals.”*

*Morgan and Richmond (1977, pp61)*

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## **APPENDICES**

## APPENDIX A

### ENVIRONMENTAL QUESTIONNAIRE

These are questions to assess your thoughts and ideas about various issues. You are asked to give your honest reactions. There are no marks involved and most of the questions do not have right or wrong answers.

✓ 1. Look closely at each of the diagrams given and in each case answer the following questions.

A. What does the picture tell me?

B. How do I feel about the picture?

1.1 A .....

B .....

1.2 A .....

B .....

1.3 A .....

B .....

1.4 A .....

B .....

1.5 A .....

B .....

1.6 A .....

B .....

1.7 A .....

B .....

1.8 A .....

B .....

1.9 A .....

B .....

1.10 A .....

B .....

1.11 A .....

B .....

2. Listed below are a number of social and environmental issues. Using a scale of 0 to 10 rate the degree which you feel for each of these issues.

0 = of no concern

10 = of critical concern

	Rating	Don't Know
2.1 Increasing human population	[ ]	[ ]
2.2 Drug abuse	[ ]	[ ]
2.3 Destruction of the ozone layer.	[ ]	[ ]
2.4 Soil Erosion	[ ]	[ ]
2.5 Teenage pregnancy	[ ]	[ ]
2.6 Poverty	[ ]	[ ]
2.7 Loss of tropical rain forests	[ ]	[ ]
2.8 Child molestation	[ ]	[ ]
2.9 Future availability of water	[ ]	[ ]
2.10 AIDS	[ ]	[ ]
2.11 The Greenhouse Effect	[ ]	[ ]
2.12 Alcohol abuse	[ ]	[ ]
2.13 Water pollution	[ ]	[ ]
2.14 Air pollution	[ ]	[ ]
2.15 Solid waste pollution (garbage)	[ ]	[ ]
2.16 Rising cost of living	[ ]	[ ]
2.17 Road accidents	[ ]	[ ]
2.18 Vandalism	[ ]	[ ]
2.19 Noise	[ ]	[ ]



3. How do you feel about each of the local environmental problems/issues listed below? Rate your degree of concern on a scale of 0 to 10.

0 = of no concern

10 = of critical concern.

	Rating	Don't know
3.1 Kaolin mining	[ ]	[ ]
3.2 Squatters ✓	[ ]	[ ]
3.3 Pollution in False Bay	[ ]	[ ]
3.4 Invasive alien vegetation ✓	[ ]	[ ]
3.5 Dogs on beaches	[ ]	[ ]
3.6 Housing development on sand dunes ✓	[ ]	[ ]
3.7 Increase in traffic	[ ]	[ ]
3.8 Littering ✓	[ ]	[ ]
3.9 Overcrowding of beaches in summer.	[ ]	[ ]
3.10 State of the Silvermine River	[ ]	[ ]
3.11 Coastal development in the Kommetjie\Noordhoek area.	[ ]	[ ]
3.12 Proposed roads such as the Fish Hoek by-pass.	[ ]	[ ]
3.13 Over-fishing in False Bay. ✓	[ ]	[ ]

4. The whale species which visits Fish Hoek beach each spring is the ...

Sperm [ ]      Killer [ ]      Southern Right [ ]      Humpback [ ].

5. What is your reaction to each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5.1 I couldn't care less whether whales come into Fish Hoek Bay or not.	[ ]	[ ]	[ ]	[ ]	[ ]
5.2 I don't see any point in trying to save the Great White Shark <i>Hyphal</i>	[ ]	[ ]	[ ]	[ ]	[ ]
5.3 More game animals should be introduced into the Cape Point Nature Reserve.	[ ]	[ ]	[ ]	[ ]	[ ]
5.4 Seals are a threat to the fishing industry	[ ]	[ ]	[ ]	[ ]	[ ]
5.5 Seal culling should be allowed as it provides much-needed employment	[ ]	[ ]	[ ]	[ ]	[ ]
5.6 The increase in seal populations is threatening the survival of sea birds such as the Jackass penguin.	[ ]	[ ]	[ ]	[ ]	[ ]
5.7 I am opposed to seal culling	[ ]	[ ]	[ ]	[ ]	[ ]
5.8 Seals represent a resource and, as such should be harvested.	[ ]	[ ]	[ ]	[ ]	[ ]
5.9 Disease causing animals such as the malarial mosquito have a right to exist. ✓	[ ]	[ ]	[ ]	[ ]	[ ]
5.10 Trek fishermen should be banned from Fish Hoek beach.	[ ]	[ ]	[ ]	[ ]	[ ]
5.11 There is no harm in feeding wild baboons as long as one is careful. ✓	[ ]	[ ]	[ ]	[ ]	[ ]
5.12 Trade in ivory should be banned. ✓	[ ]	[ ]	[ ]	[ ]	[ ]
5.13 A "giraffe braai" was held recently. This should not be allowed. ✓	[ ]	[ ]	[ ]	[ ]	[ ]
5.14 Any dangerous puff adders found outside nature reserves should be killed.	[ ]	[ ]	[ ]	[ ]	[ ]

6. Baboon troops which come into conflict with local communities, such as happened at Kommetjie recently, should: ( place a tick in the block next to the statement with which you agree.)

- be left alone [ ]
- be moved to another area [ ]
- be killed [ ]

7. Which of the following plants are indigenous to the South Western Cape? (Indicate your choice by means of a tick)

Restios [ ]: Pines [ ]: Vygies [ ]: Kikuyu grass [ ]: Ericas [ ]: Hakea [ ]:  
 Yellowwoods [ ]: Buffalo grass [ ]: Proteas [ ]: Acacias [ ].

8. Which of the following are true of fire in fynbos areas?

- 8.1 The germination of seeds is stimulated [ ]
- 8.2 All plant life is usually destroyed. [ ]
- 8.3 If too frequent, fires cause soil erosion. [ ]
- 8.4 Fires should preferably occur in late summer/autumn. [ ]
- 8.5 Fires are effective in controlling invasive alien vegetation. [ ]

9. What is your reaction to each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
9.1 In spite of the fact that Rooikrans is a threat to the local fynbos, it should not be eradicated because, as firewood, it provides an important source of income for the unemployed in the valley.	[ ]	[ ]	[ ]	[ ]	[ ]
9.2 I feel that all invasive plants in the valley should be removed.	[ ]	[ ]	[ ]	[ ]	[ ]
9.3 I would not like to spend any of my free time chopping down alien vegetation.	[ ]	[ ]	[ ]	[ ]	[ ]
9.4 The dunes are a feature of the Fish Hoek Valley	[ ]	[ ]	[ ]	[ ]	[ ]
9.5 I support housing development on the sand dunes, as the rates that will be paid will provide more money for the Fish Hoek Town Council.	[ ]	[ ]	[ ]	[ ]	[ ]
9.6 Developing the Kommetjie/Noordhoek coastline for tourism is desirable, even if it results in the destruction of rare plant communities. //	[ ]	[ ]	[ ]	[ ]	[ ]
9.7 I am not really interested in environmental issues outside the Fish Hoek/Noordhoek valleys.	[ ]	[ ]	[ ]	[ ]	[ ]
9.8 The proposed kaolin mine in Noordhoek will destroy a large area of indigenous flora and fauna.	[ ]	[ ]	[ ]	[ ]	[ ]

- |  | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|----------------|-------|---------|----------|-------------------|
| 9.9 I feel that the existing kaolin mine has little impact on the environment.   | [ ]            | [ ]   | [ ]     | [ ]      | [ ]               |
| 9.10 Too many local people would become unemployed if Serina ( the kaolin mining company) had to stop mining in the valley.                | [ ]            | [ ]   | [ ]     | [ ]      | [ ]               |
| 9.11 It would be preferable for the proposed site at Noordhoek to remain covered with alien vegetation than for it to be mined for kaolin. | [ ]            | [ ]   | [ ]     | [ ]      | [ ]               |
| 9.12 I feel that vehicles should be allowed onto Noordhoek beach   | [ ]            | [ ]   | [ ]     | [ ]      | [ ]               |
| 9.13 Rotting kelp should be regularly removed from Long Beach.   | [ ]            | [ ]   | [ ]     | [ ]      | [ ]               |

**10 What do you think should be done with the land on either side of the Silvermine River between Clovelly and Fish Hoek .**

- |  |     |
|--|-----|
| left as it is  | [ ] |
| formed into a wetland                                | [ ] |
| reintroduce indigenous plants to form a nature area. | [ ] |
| developed as a picnic area with braai facilities     | [ ] |
| allocated to housing                                 | [ ] |
| it doesn't really matter to me.                      | [ ] |

**11. Practically all of the lead in the atmosphere comes from**

motor vehicles [ ]: industrial plants [ ]: burning rubbish [ ]: cigarettes [ ].

**12. Name ONE CAUSE and ONE EFFECT of each of the following.**

	CAUSE	EFFECT
12.1 Destruction of the ozone layer		
12.2 The Greenhouse Effect		
12.3 Acid Rain		
12.4 Plastic Pollution		

**13. What happens to the black bags of rubbish which are collected from the Fish Hoek area?**

---

14. Where does the bulk of the sewage from the Fish Hoek valley go to?

---

✓ 15. What is your reaction to each of the following statements?

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
✓ 15.1 I am bothered by people playing their radios at public recreation areas. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
✓ 15.2 I get angry when I see the litter lying around the school. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
✓ 15.3 I ought to pick up litter dropped by other people. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
15.4 People who worry about pollution have nothing else to worry about. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
✓ 15.5 I get angry when I see graffiti on mountain rocks [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
15.6 Oil tankers should not be allowed into False Bay. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
✓ 15.7 Smoking should be banned in public places. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
✓ 15.8 Reducing environmental damage is more important than increasing our living standards [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
✓ 15.9 It worries me that there is a nuclear power plant so close to Cape Town. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
15.10 There is conclusive evidence that the Greenhouse Effect is going to change our climate. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
15.11 The benefits of pesticides far exceed their threat to wildlife and health. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
15.12 Convenience foods with individual throw-away containers should be heavily taxed to pay the costs of eliminating their effects on the environment. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]
15.13 I find the prospect of using purified sewage water unacceptable. [ ]	[ ]	[ ]	[ ]	[ ]	[ ]

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
15.14	The price of electricity should be increased to cover the cost of pollution control.	[ ]	[ ]	[ ]	[ ]	[ ]
15.15	Deposits should be paid on all glass bottles	[ ]	[ ]	[ ]	[ ]	[ ]

16 The single greatest user of our country's water resources is:

farmers	[ ]	:	city residents	[ ]
industrial complexes	[ ]		mining activities	[ ]

17. Indicate in the appropriate column how often each of the following apply:

		Regularly	Occasionally	Seldom	Never
17.1	You switch off lights when nobody needs them on.	[ ]	[ ]	[ ]	[ ]
17.2	You voluntarily pick up other people's litter.	[ ]	[ ]	[ ]	[ ]
17.3	You put waste paper into the recycling bags at school.	[ ]	[ ]	[ ]	[ ]
17.4	At home, organic waste (vegetable peels etc.) are onto a compost heap	[ ]	[ ]	[ ]	[ ]
17.5	Waste liquids such as oil are thrown down the drain	[ ]	[ ]	[ ]	[ ]
17.6	You use aerosol products (e.g. deodorants)	[ ]	[ ]	[ ]	[ ]
17.7	You use insecticides in your house or garden	[ ]	[ ]	[ ]	[ ]
At home the following are recycled					
17.8	Paper	[ ]	[ ]	[ ]	[ ]
17.9	Plastic	[ ]	[ ]	[ ]	[ ]
17.10	Bottles (with a deposit)	[ ]	[ ]	[ ]	[ ]
17.11	Bottles (without a deposit)	[ ]	[ ]	[ ]	[ ]
17.12	Tins	[ ]	[ ]	[ ]	[ ]

18. What is your reaction to each of the following statements?

		Strongly Agree	Agree	Disagree	Strongly Disagree
18.1	It is far more important to attend to social problems such as poverty than to protect threatened habitats	[ ]	[ ]	[ ]	[ ]
18.2	The aim of conservation is to protect a natural area from any sort of development.	[ ]	[ ]	[ ]	[ ]
18.3	The preservation of habitats is more important than the preservation of endangered species.	[ ]	[ ]	[ ]	[ ]
18.4	It is wrong to remove people from an area in order to establish a nature reserve.	[ ]	[ ]	[ ]	[ ]
18.5	The managers of game reserves which are bordered by poverty stricken people cannot ignore the needs of these people.	[ ]	[ ]	[ ]	[ ]
18.6	People have the right to decide how to modify the natural environment to suit their needs	[ ]	[ ]	[ ]	[ ]

		Strongly Agree	Agree	Disagree	Strongly Disagree
18.7	Environmentalists needlessly interfere with development projects.	[ ]	[ ]	[ ]	[ ]
18.8	The purpose of conservation is to protect nature from people.	[ ]	[ ]	[ ]	[ ]
18.9	Development on a piece of land should not be stopped to protect an endangered species.	[ ]	[ ]	[ ]	[ ]
18.10	We owe it to future generations to prevent the extinction of animals such as the Black Rhino	[ ]	[ ]	[ ]	[ ]
18.11	Money spent on wildlife conservation should be reallocated to provide housing for the homeless.	[ ]	[ ]	[ ]	[ ]
18.12	Wilderness areas should be utilized to provide food and space for crowded hungry populations.	[ ]	[ ]	[ ]	[ ]
18.13	Conservation should be for the benefit of people not animals.	[ ]	[ ]	[ ]	[ ]
18.14	I feel that hunting for sport is morally wrong.	[ ]	[ ]	[ ]	[ ]
18.15	It is the government's responsibility to look after the environment, not mine.	[ ]	[ ]	[ ]	[ ]
18.16	Too much fuss is made about beautiful scenery	[ ]	[ ]	[ ]	[ ]
18.17	I am sick and tired of hearing about the problems of the environment.	[ ]	[ ]	[ ]	[ ]
18.18	I would prefer planned open spaces geared to human recreation rather than areas of natural vegetation.	[ ]	[ ]	[ ]	[ ]
18.19	I am not really concerned about the state of the world in a hundred year's time as I won't be there to see it.	[ ]	[ ]	[ ]	[ ]
18.20	Environmental issues should not be linked to political issues.	[ ]	[ ]	[ ]	[ ]

19. How would you react to each of the following statements

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
19.1	Human beings have evolved from animal ancestors	[ ]	[ ]	[ ]	[ ]	[ ]
19.2	AIDS will help to solve our environmental problems	[ ]	[ ]	[ ]	[ ]	[ ]

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
19.3 I would like to see more indigenous plants in our school grounds.	[ ]	[ ]	[ ]	[ ]	[ ]
19.4 I feel that there should be more emphasis on environmental issues in the classroom	[ ]	[ ]	[ ]	[ ]	[ ]
19.5 I would like to go on a school-organized hiking trail sometime during the holidays.	[ ]	[ ]	[ ]	[ ]	[ ]
19.6 I find environmental discussions depressing.	[ ]	[ ]	[ ]	[ ]	[ ]
19.7 I feel that there should be more field trips into nature areas.	[ ]	[ ]	[ ]	[ ]	[ ]

**20. Place a tick in the box next to the statement with which you agree.**

Squatters in the Fish Hoek Valley should...

- be allowed to remain where they are [ ]
- be provided with homes in the valley [ ]
- be allocated serviced sites to erect their shacks [ ]
- be sent back to where they originally came from. [ ]

**21. Would you be prepared to help raise funds for each of the following. Tick the appropriate block**

	YES	POSSIBLY	NO
21.1 To save or protect an endangered species such as the Black Rhino.	[ ]	[ ]	[ ]
21.2 To establish a nature reserve at Noordhoek.	[ ]	[ ]	[ ]
21.3 To save a threatened habitat such as a wetland.	[ ]	[ ]	[ ]
21.4 To improve the standard of living of the squatters	[ ]	[ ]	[ ]
21.5 To stop kaolin mining.	[ ]	[ ]	[ ]
21.6 To develop an environmental education centre and coastal trail at Kommetjie.	[ ]	[ ]	[ ]
21.7 To establish a recreation centre for the teenagers of Fish Hoek	[ ]	[ ]	[ ]
21.8 To erect a fence to protect the penguin colony at the Boulders.	[ ]	[ ]	[ ]
21.9 To eliminate the Himalayan Thar (an introduced mountain goat) which is destroying indigenous vegetation on Table Mountain.	[ ]	[ ]	[ ]

**22. How would you prefer the school to spend Conservation Day? (tick only ONE block)**

- hacking alien vegetation up the mountain [ ]
- clearing alien vegetation along the Silvermine River [ ]
- cleaning up one of the beaches [ ]
- having lectures, discussions, films etc. on conservation issues. [ ]
- as a normal school day [ ]

23. How many free afternoons (if any) would you be prepared to spend establishing an indigenous garden at the school ?

- one afternoon a week [ ]
- one afternoon a month [ ]
- one afternoon a term [ ]
- over a week-end once a term [ ]
- not at all [ ]

24. How many tickets did you sell in the Great White Shark campaign earlier this year? [ ]  
Not applicable [ ]

25. How many tickets did you buy in this campaign? [ ]

26. Would you be prepared to sell tickets if a similar campaign were to be held next year?  
Yes [ ] no [ ] not sure [ ]

#### BIOGRAPHICAL DATA

CLASS [ ] AGE [ ] GENDER, male [ ] female [ ]

FATHER'S OCCUPATION; [.....]

MOTHER'S OCCUPATION [.....]

PLACE OF RESIDENCE (tick the appropriate block)

- Fish Hoek (mountainside i.e. above Simonstown/Kommetjie Rd) [ ]
- Fish Hoek (valley) [ ]
- Silverglades [ ]
- Clovelly [ ]
- Sun Valley/Sunnydale [ ]
- Noordhoek [ ]
- Ocean View [ ]
- Kommetjie [ ]
- Glencairn/Da Gama Park [ ]
- Kalk Bay/St James [ ]
- Other (please specify) (.....) [ ]

HOW LONG HAVE YOU BEEN LIVING IN THIS AREA?

- Less than a year. [ ]
- Between 1 and 5 years [ ]
- Between 6 and 10 years [ ]
- More than 10 years. [ ]

WHICH YEAR DID YOU ENROL AT THIS SCHOOL?

1988 [ ] 1989 [ ] 1990 [ ] 1991 [ ]

WHICH SCHOOL DID YOU ATTEND BEFORE FISH HOEK SENIOR HIGH?

Fish Hoek Middle School [ ]  
 Other (please specify) [ .....

HOW MANY YEARS DID YOU SPEND AT THE SCHOOL NAMED ABOVE?

Less than a year [ ] 1 year [ ] 2 years [ ] 3 years [ ] More than 3 years [ ]

SUBJECTS TAKEN: (indicate by means of ticks in the appropriate blocks). Also indicate the symbol obtained in your last examination./

		GRADE	SYMBOL
English	[ ]	[ ]	[ ]
Afrikaans	[ ]	[ ]	[ ]
Mathematics	[ ]	[ ]	[ ]
Physical Science	[ ]	[ ]	[ ]
Biology	[ ]	[ ]	[ ]
History	[ ]	[ ]	[ ]
Geography	[ ]	[ ]	[ ]
Accounting	[ ]	[ ]	[ ]
Art	[ ]	[ H ]	[ ]
Technika	[ ]	[ ]	[ ]
Typing	[ ]	[ S ]	[ ]
Home Economics	[ ]	[ ]	[ ]
Business Economics	[ ]	[ ]	[ ]
French/Xhosa	[ ]	[ H ]	[ ]

GENERAL INFORMATION

27.1 Which sports do you play? .....

27.2 Hobbies or other interests. ....

27.3 Which occupation/career do you wish to follow when you leave school  
 .....

27.4 Do you have any pets? If so specify .....

28. Are you a scout or girl guide? Yes [ ] No [ ]

29. Do you belong to any conservation societies, such as the Wildlife Society No [ ] Yes [ ] ✓

Name of society .....

30 Do you read the "environmental articles" in newspapers and magazines? ✓

No [ ]: seldom [ ] occasionally [ ] regularly [ ]

31 How often do you watch environmental programmes such as 50\50 on television? ✓

never [ ] seldom [ ] occasionally [ ] regularly [ ]

32. From which source have you learnt the most about the environment? (TICK ONLY ONE BLOCK) ✓

- Your parents [ ]
- Brothers or sisters [ ]
- Friends [ ]
- People involved in conservation [ ]
- Environmental books\ magazines [ ]
- Television [ ]
- Radio [ ]
- School [ ]
- Other sources (specify) [ ] .....

33. Where do you learn the most about the environment at school? (TICK ONLY ONE BLOCK.)

- Geography [ ]
- Biology [ ]
- Life Skills [ ]
- Conservation Society [ ]
- Other (specify) [ ] .....

34. Place a tick in the block next to those statements with which you agree ✓

- 34.1 We hear too much about the environment at school [ ]
- 34.2 We do not do enough on the environment at school [ ]
- 34.3 I find studying the environment at school boring. [ ]
- 34.4 I found the cross-curriculum project done in Std 8 highly stimulating. [ ]
- 34.5 We need to learn more about social issues [ ]

THANK YOU.

## APPENDIX B

**Comparison of the mean values of student sub-group ratings of the level of concern felt for various environmental and social issues.**

	All	Boys	Girl	Std	Std	Middle	Other	Ano	Nam	Bio	Geo	Bio/	No Bio
	Students			8	9	Schoo	School					Geo	/Geo
Loss of tropical forest	8.5	8.6	8.4	8.2	8.8	8.5	8.5	8.5	8.5	8.8	8.7	9.3	8.3
Child molestation	8.3	7.6	9	8.2	8.5	8.2	8.6	8.5	8.2	8.6	8.1	8.3	8.2
Destruction of ozone layer	8.2	7.8	8.6	8	8.4	8.1	8.7	8.1	8.3	8.5	8.4	8.6	7.7
Increasing human population	8.1	7.9	8.3	7.9	8.5	8	8.7	8.3	8	8.5	8.3	8.5	7.5
Future availability of water	8.1	7.7	8.4	7.9	8.3	8.1	8.1	8.3	7.8	8.3	8	8.1	7.9
AIDS	8.1	7.6	8.5	7.8	8.4	8.1	7.4	8.2	7.9	8.2	7.9	7.9	7.9
Rising cost of living	8	7.8	8.2	8	8	7.9	6.7	8	8	8.1	8	8	7.8
Water pollution	7.9	7.6	8.1	7.6	8.2	7.8	8.6	8	7.8	8	7.9	8.2	7.7
Air pollution	7.8	7.6	8.1	7.5	8.2	7.7	8.2	7.9	7.7	8.1	8	8.3	7.5
Solid waste pollution	7.6	7.1	8	7.3	7.9	7.4	8.3	7.8	7.3	7.8	7.6	7.9	7.5
Greenhouse Effect	7.3	6.9	7.6	6.7	7.9	7.3	6.2	7.3	7.2	7.4	7.2	7.2	7
Poverty	7.2	6.8	7.7	7	7.5	7.2	7.2	7.5	7	7.3	7.1	7	7.2
Drug abuse	6.8	6.1	7.5	6.7	6.8	6.6	7.3	6.7	6.9	6.9	6.8	6.8	6.2
Teenage pregnancy	6.4	5.7	7.1	6.3	6.6	6.3	6.8	6.6	6.3	6.8	6.2	6.3	6.1
Road accidents	6.1	5.4	6.7	5.8	6.4	5.9	6.3	6.3	5.9	6.4	5.9	6.3	5.9
Soil Erosion	6	5.7	6.4	5.7	6.4	5.9	6.6	5.8	6.3	6.4	6.3	6.7	5.5
Alcohol abuse	5.8	4.9	6.6	5.4	6.2	5.6	8.3	5.9	5.6	6.1	5.7	5.7	5.2
Vandalism	5.2	4.5	5.7	5.1	5.2	4.9	5.6	5.2	5.1	5.6	5	5.5	4.9
Noise	4.2	3.8	4.5	4.6	3.7	3.9	5.3	4.2	4.2	4.5	4.6	4.9	3.4

**Table 1 : Comparison of mean values of student sub-group ratings of general environmental and social issues ( each rating was out of 10 according to the degree of concern felt about the issue)**

	All	Boys	Girl	Std	Std	Middle	Other	Ano	Nam	Bio	Geo	Bio/	No Bio
	Students			8	9	Schoo	School					Geo	/Geo
Pollution in False Bay	7.7	7.7	7.6	7.3	8.1	7.7	7.5	7.8	7.5	7.6	7.9	7.9	7.6
Squatters	7.2	6.8	7.5	6.9	7.5	7.3	6.7	7.2	7.2	7.1	7.3	7.2	7.2
Over-fishing in False Bay	7.2	7.3	7.1	7	7.4	7.2	7.5	7.3	7.1	7.3	7.5	7.8	7
Littering	7.1	6.4	7.7	7.1	7	6.9	7.6	7.1	7	7.3	7.2	7.5	6.7
State of the Silvermine River	6.6	6.1	7	6.3	6.9	6.4	7.3	6.5	6.5	6.9	6.7	7.2	6.3
Housing development on dunes	6.5	6.1	6.8	6.3	6.6	6.5	6.3	6.3	6.7	6.9	6.9	7.3	5.6
Coastal development	6.2	5.7	6.6	5.6	6.8	6.3	6.1	6.4	6	6.4	6.3	6.7	6.2
Invasive alien vegetation	6	5.7	6.1	5.8	6.2	5.9	6	6.1	5.8	6.5	6.1	6.8	5.6
Kaolin mining	5.8	5.4	6.1	5.5	6.1	5.9	5.6	5.8	5.8	5.9	5.9	6.2	5.8
Proposed roads	5.1	4.8	5.6	5	5.3	5.3	4.5	5.2	5	5.4	5.2	5.6	5
Increase in traffic	4.5	4.5	4.6	4.5	4.6	4.3	5.3	4.6	4.4	4.7	4.9	5.2	4.1
Overcrowding of beaches	4.3	4	4.6	4.3	4.2	4.1	4.8	4.7	3.9	4.5	4	4.5	4.6
Dogs on beaches	2.6	2.4	2.7	2.8	2.3	2.4	3.2	2.2	2.9	2.5	2.4	2.5	2.8

**Table 2: Comparison of mean values of student sub-group ratings on local environmental and social issues.**

## APPENDIX C

### ANALYSIS OF QUESTIONNAIRE ITEMS RELATING TO ANIMAL CONSERVATION

4. The whale species which visits Fish Hoek beach each spring is the Sperm [ ], Killer [ ], Southern Right [ ] Humpback.

*Sperm 11.8%    Killer 1.5%    Southern Right 73.9%    Humpback 10.7%*

This question was designed to test the knowledge of the student. All four species do occur in Cape waters, and each has been sighted on occasions in False Bay. It is however, the Southern Right whale which comes into the bay every spring to calve (Best, *et al*, 1989) over 70% of the students were aware of this but there were some discrepancies amongst the sub-groups. For example 84.8% of the Std 8's compared to 61.9% of the Std 9's correctly identified the Southern Right, while 80.3% of those who took Biology and Geography were correct compared to 64.3% of those who took neither subject.

- 5.1 I couldn't care less whether whales come into Fish Hoek Bay or not

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
3.5%	2.8%	14.3%	28%	51.4%

The purpose of this item was to assess the extent to which the students value the annual influx of whales. Not unexpectedly, there was large scale disagreement (79%) with the statement. There were no significant differences in the responses of the various sub-groups.

- 5.2 I don't see any point in trying to save the Great White Shark.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
3.8%	4.2%	14.3%	31.8%	43.7%

Traditionally human attitudes to sharks in general and the Great White Shark in particular has been one of dread and has been regarded by many as "murderous vermin to be exterminated" (Compagno, 1988). The above statement was put to the students in order to assess their attitude to the Great White Shark.

Earlier in the year, the school had been involved in a fund raising exercise for the White Shark Research Project of the South African Museum. The students had received input about the role of the

Great White as a predator at the top of the marine food chain and its endangered status, largely as a result of extensive hunting. The large scale disagreement with the statement does seem to indicate support for the conservation of this animal. However, this set of responses should be compared with the degree of student participation in the fund raising exercise.

As far as the student sub-groups were concerned, there were significant differences in the responses of students from the Middle School and those from other schools, in that 78% and 66% respectively disagreed with the statement ( $p < 0.01$ ); 83% of students taking Biology and Geography supported conserving the Great White as opposed to 65% of those taking neither subject ( $p < 0.05$ ).

### 5.3 More game animals should be introduced into the Cape Point Nature Reserve.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
31.9%	35.1%	23.9%	4.6	4.6

A frequent complaint heard from visitors to the Cape Point Nature Reserve is “where are all the animals”, and judging from the responses to the above statement, the majority of the students feel the same way. However, the reserve with its fynbos vegetation is unable to sustain a diversity of large mammal populations because of the lack of grazing and nutrient deficiencies in the soil (Rebelo, 1992). Previous attempts to maintain populations of wildebeest, springbok etc., involved frequent burning, provision of salt licks, cultivation of alien grasses etc., were incompatible with maintaining the integrity of the natural ecosystems (ibid.). Many of these mammals died and others had to be translocated to other areas. As a result the reserve management has had to restrict the presence of large mammals in the reserve to comparatively small populations of bontebok, eland and one or two other species.

The majority of the students seemed unaware of these problems, although just under a quarter of them did not feel qualified to express an opinion. There were no significant differences amongst the sub-groups.

### 5.4 Seals are a threat to the fishing industry.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
5.3%	11.6%	37.5%	28.8%	16.8%

This was the first of a number of statements relating to the topical and emotive issue of the culling of seals. While there is little doubt that seals do adversely affect the fishing industry by taking snoek off handlines, interfering with purse seine net operations, damaging nets and fish, disturbing rock lobster traps etc. (David, 1989). The estimated total cost to the fishing industry is estimated at less than 1%

of the total value of the fishing industry (Wickens, 1994). This can hardly be described as a threat to the fishing industry, although individual fishermen who carry out their operations close to large seal populations, can suffer far greater adverse effects.

The relative ignorance of the students on this topic was revealed by a neutral response of over a third. There were no significant differences amongst the sub-groups.

#### 5.5 Seal culling should be allowed as it provides much needed employment.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
6.0%	4.6%	13%	23.5%	53%

When the government suspended seal harvesting in 1990, it deprived a number of breadwinners of their only means of employment, thus creating hardship for them and their dependants, notably at Kleinsee on the west coast. This generated heated controversy amongst environmental groups (Koch, 1991). The statement also highlights the ethical conflict between those who are animal centred or biocentric (that is, they feel that the lives of wild animals cannot be compromised for the benefit of people) and those that are human centred or anthropocentric (conservation should be for the benefit of people).

The students overwhelmingly rejected the idea that jobs should be created at the expense of seals lives thereby associating themselves with the animal rights ethic. 85.4% of the girls disagreed compared to 66.1% of the boys ( $p < 0.01$ ). The difference was even greater between students coming from the Middle School with 76.8% disagreeing with the statement as opposed to 54% of those coming from other schools ( $p < 0.01$ )

#### 5.6 The increase in seal populations is threatening the survival of sea birds such as the Jackass penguin.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
4.3%	15.4%	56.8%	15%	8.6%

Research has shown (David, 1989) that where seals have recolonised islands from which they were previously exterminated, there have been significant decreases in the breeding numbers of Jackass penguins, cormorants and gannets on such islands, and in some cases for example, Mercury Island, whole populations have been displaced (ibid.). It would appear that as seal populations increase or when they colonise other islands, the pressure on sea birds is going to increase. This could have serious consequences for threatened species such as the Jackass penguin.

The majority of the students were uncertain about this relationship between seal and seabird populations and remained neutral. With regard to those who did commit themselves, to a decision 4% more disagreed with the statement. The responses amongst the sub-groups, all followed a similar pattern to the total student response.

### 5.7 I am opposed to seal culling.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
45%	21.6%	17.7%	7.8%	7.8%

The three previous items directly or indirectly implied that culling should take place. This statement is an emotive one rejecting the culling of seals for whatever reason. The main opposition to the culling of seals seems to be the method employed to kill the pups that is, clubbing., followed by the severing of arteries with a knife (David, 1989).

Two thirds of the students agreed with the statement confirming their animal centred ethic. The girls felt more strongly about this issue than the boys with 74% supporting the statement as opposed to 60.3% of the boys. ( $p < 0.05$ ).

### 5.8 Seals represent a resource and as such should be harvested.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
6.1%	10.4%	31.7%	24.5%	27.3%

Both the *World Conservation Strategy* (IUCN, 1980) and its successor *Caring for the Earth - A strategy for sustainable living* (IUCN, 1991) encourage the principle of sustainable utilisation of natural resources including wildlife. This view has been endorsed locally by the Council for the Environment (1989) and the South African Nature Foundation (Hanks, 1993). Since seal populations had been decimated by over-exploitation during the nineteenth century, harvesting became regulated in 1893 and operated under a controlled basis. As a result of intense public pressure harvesting was suspended in 1990 (Koch, 1991). Annual harvesting is still being carried out, in the midst of much controversy, off the Namibian coast. Harvesting can be distinguished from culling in that its purpose is to market the products from the seal whereas the latter concept relates to population control. The main seal products have been the skins of pups for which the market has collapsed, the genital organs of bulls and, to a lesser extent seal oil. It has hitherto not been profitable to market the carcasses and they have been dumped. This wastage has also been the source of criticism by conservationists of the harvesting system. While the seal population has reached levels at which it can be harvested sustainably (David, 1989), the standpoint of the biocentric lobby prevails.

Just over half of the students opposed harvesting, although there was a large group who remained neutral. There were no significant differences amongst the student sub-groups.

**5.9 Disease causing animals such as the malarial mosquito have a right to exist.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
10.3%	27%	30.1%	15.2%	17.4%

This statement expresses the biocentric viewpoint that every species has an inherent right to exist and that it is ethically wrong to hasten the extinction of any species ( Tyler Miller Jr, 1989). Others with an ecocentric viewpoint would also support this statement because the malarial mosquito is part of an ecosystem and its eradication could have far-reaching effects on the whole ecosystem (Preston, 1983). Those who disagree with the statement will have an anthropocentric ethic, believing that any organism which is harmful to humans should be exterminated.

The students were almost evenly divided over this issue with just over a third supporting the statement, just under a third opposing it and the rest remaining neutral. There was a surprising difference between the boys and girls where 44.4% of the boys supported the biocentric viewpoint compared to 31% of the girls ( $p < 0.05$ ).

**5.11 There is no harm in feeding baboons as long as one is careful.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
3.9%	3.5%	7.7%	30.9%	54%

The feeding of baboons and its consequences has become a major problem in the Cape of Good Hope Nature Reserve and other areas where troops of baboons roam near roads and picnic sites. Baboons come to associate humans with food and suspend their normal foraging and become more dependent on humans for their food supply (Petersen, 1993). This frequently leads to conflict between humans and baboons which can end tragically for the baboons.

The students seem to be aware of the problems associated with the feeding of baboons and have overwhelmingly rejected the statement. There was however, one difference between the sub-groups. A significantly higher percentage of those students who came from the Middle School disagreed with the statement when compared with those from other schools ( $p < 0.01$ ). This suggests that students coming from other areas, in common with many members of the general public have not been made aware of the baboon problem.

**5.12 Trade in ivory should be banned**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
77.9%	6.7%	7.4%	2.8%	5.3%

In order to protect the decimated elephant herds in East Africa, CITES (the Convention on International Trade in Endangered Flora and Fauna) placed a ban on the international trade in ivory. The aim was to close down the ivory markets and in so doing remove the incentive for poaching and end the slaughter of elephants (IUCN Bull., 1989). Southern African countries opposed this step as they had thriving elephant populations which had to be managed. Ivory and other elephant products were exported and the revenue gained, ploughed back into conservation. The elephants were being managed on a sustainable utilisation basis which upheld the principles of the *World Conservation Strategy* (1980)

The students showed overwhelming support for the ban. The argument for sustainable utilisation, if they were aware of it, was heeded by very few. There was a significant difference between students from the Middle School, 88.1% of whom agreed with the ban, and those from other schools where 69% supported the statement. ( $p < 0.01$ ).

**5.13 A “ giraffe braai” was held recently. This should not be allowed.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
53.5%	11.5%	17.1%	9.4%	8.4%

This statement refers to a much publicised giraffe braai held at Lichtenberg in the Western Transvaal in 1991 (Preston and Campbell, in press). In spite of the fact that the event caused an uproar in the media and enraged many people, to many it was basically a form of sustainable utilisation. It could be argued that there is very little ethical difference between braaing a giraffe and braaing an ox. However, many others would feel the same abhorrence at braaing a giraffe as braaing a dog or a cat.

Two thirds of the students supported the statement. There was however, substantially more support from the girls (72.7%) than from the boys (56%) ( $p < 0.01$ ). In addition significantly more Biology students (73.3%) agreed with the statement than Geography students (61.3%) ( $p < 0.05$ ).

**5.14 Any dangerous puff adders found outside nature reserves should be killed.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
6%	6.3%	17.5%	23.9%	46.3%

Many people have an innate fear of snakes, and their immediate reaction when coming across one in a garden is to kill it, particularly if it is thought to be poisonous. The aim of this item was to see whether the biocentrism of the students extended to snakes.

Over 70% of the students disagreed with the statement thereby demonstrating their antipathy to the senseless killing of animals, including puff adders. There were no significant differences amongst the sub-groups.

*The next three statements were positioned further on in the questionnaire in a section where no neutral option was given.*

**18.3 The preservation of habitats is more important than the preservation of endangered species.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
8%	27.3%	38.9%	24.7%

The public at large respond enthusiastically when called upon to support measures aimed at protecting endangered species, particularly the larger forms such as the panda, black rhino, Jackass penguin etc. Preserving species is important for ecological reasons in that they contribute to biotic diversity and form an integral part of ecosystems; for ethical reasons in that every species has a right to exist, and for economic reasons as a source of food, tourism etc. (Myers, 1991). However, the most important cause of species loss is habitat destruction (Myers, 1983). It therefore follows that in most cases, by preserving the habitat of an endangered species, that species is being protected.

Only a third of the students had the insight into the importance of habitats. The majority saw endangered species as the greater priority for preservation. There were no significant differences amongst the student sub-groups.

**18.10 We owe it to future generations to prevent the extinction of animals such as the Black Rhino.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
72.1%	13.9%	4.3%	9.3%

The purpose of this item was to give the students an easier choice. It is based on the concept that each generation should leave to future generations a world that is at least as diverse and productive as the one it inherited (IUCN, 1991).

It was anticipated that student support for this concept would be unanimous. However there was a minority of 13% who did disagree with the statement. It should also be pointed out that the concern of

the students may lie with the well-being of the species rather than for the benefit of future generations.

**18.14 I feel that hunting for sport is morally wrong.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
67.3%	15.3%	10%	7.5%

This statement represents the ethical standpoint of the biocentric who believes that to kill an animal for no other purpose than for enjoyment is unacceptable. The feeling amongst many conservationists is that, with the pressures facing conservation at the present time, there is no room to entertain such an argument. Hunting should be viewed as a form of sustainable utilisation and in many instances is of substantial benefit to conservation (Howard, 1994). Money raised from hunting licenses is used to help preserve the natural habitat thereby maintaining biological diversity (ibid.). Howard also point out that by preserving the habitat of animals of economic value that is, those that will attract hunters or tourists, the survival of less economically important species is ensured.

The massive support that the students have given this statement confirms their biocentric ethic. This applies especially to the girls, 93% of whom agreed with the statement compared to 72.6% of the boys. ( $p < 0.01$ ).

*The last item in this section was in a multiple choice format.*

**6. Baboon troops which come into conflict with local communities, such as happened at Kommetjie recently should:**

- be left alone (23.9%)*
- be moved to another area (74%0*
- be killed (1.8%)*

This item arose out of an incident which occurred a few weeks prior to the main pilot test. A troop of 18 baboons which, because of a recent fire, had been forced to forage for food in Kommetjie and Ocean View had come into conflict with some local residents and had subsequently been shot by Cape Nature Conservation officials. The incident was condemned by many of the local community and this item was aimed at testing the student reaction.

The students with a few exceptions unanimously rejected the killing option. Approximately a quarter of the students opted for leaving the baboons alone. The majority however, felt that to avoid further conflict the baboons should be relocated. All of the sub-groups showed similar responses. In

comparing the responses from the students from Kommetjie and Ocean View, it was found that with one exception the Ocean View students opted for the relocation option, whereas the Kommetjie students were almost evenly divided between relocation and no action.

## APPENDIX D

### ANALYSIS OF QUESTIONNAIRE ITEMS RELATING TO LOCAL ENVIRONMENTAL ISSUES

The first two parts of this section were aimed at testing the students' knowledge, firstly of the local fynbos vegetation and secondly on the effects of fire on the fynbos.

#### 7. Which of the following plants are indigenous to the South Western Cape?

The percentage indicating that a plant type was indigenous is given in brackets (\* = indigenous)

<i>*Restios</i> (38,7)	<i>Hakea</i> (18,2)
<i>Pines</i> (12,5)	<i>*Yellowwood</i> (27,9)
<i>*Vygies</i> (39,3)	<i>*Buffalo grass</i> (18,6)
<i>Kikuyu grass</i> (18,2)	<i>* Proteas</i> (70,7)
<i>*Ericas</i> (53,6)	<i>Acacias</i> (27,0)

The students were only asked to indicate the indigenous plants on the list.. It can be seen that all the plant types named were regarded by at least 12,5% of the students as being indigenous. With the exception of 71% of the students being able to identify *Proteas* and 54% *Ericas* as being indigenous, the students' knowledge of the local vegetation was decidedly lacking.

There were, overall, no significant differences between the various sub-groups. However when those who correctly identified the six indigenous plant types were considered it was found that 45,2% of the students taking Biology and Geography were successful compared to 37,9% of those taking neither subject ( $p = 0.024$ ). Those students taking Biology only also differed significantly from the latter group with 44,7% correct responses ( $p < 0.01$ )

#### 8. Which of the following are true of fires in Fynbos areas

The Fish Hoek valley and the surrounding mountains are subjected to periodic fires, and these questions were designed to assess the students familiarity with the ecological effects of fire. In addition Biology students do receive input on this topic during Std 8 and these questions can also be used to determine the effectiveness of this input.

*The germination of seeds is stimulated.*

This statement is true as many seeds of fynbos plants do germinate after a fire (Kruger and Bilgalke, 1984). The stimulus to germinate varies according to the plant species, some respond to the direct heating, and others to chemicals released by the smoke or charred wood (Le Maitre and Midgeley, 1992). A high percentage of the students (73.2%) responded correctly to this statement. Of the sub-

groups Biology students provided the highest percentage of correct responses (81.9%) and Std 9 students the lowest (66.6%).

*All plant life is usually destroyed.*

This statement is not true although the level of plant destruction would depend on the fire intensity (Kruger, 1977). Apart from seeds, corms and other storage organs of geophytes survive and many are stimulated to flower. In addition many plants are able to resprout after a fire either from woody rootstocks or fire resistant dormant buds (Fraser, 1988).

There was again a high percentage of correct responses (78.9%) from the students. The Biology students had the highest correct response percentage (86.6%) and the students doing neither Biology nor Geography, the lowest. (70.8%).

*If too frequent, fires cause soil erosion.*

An area burnt too often in relation to the natural fire regime results in reduced vegetation cover and hence less effective binding of soil (Deacon, 1992). The above statement is thus true. 58,5% of the students responded correctly which was surprisingly low. The highest percentage of correct responses, came from those students taking both Biology and Geography (65,3) and the lowest from those who take neither of these two subjects.

*Fires should preferably occur in the late summer\autumn.*

Owing to the climatic conditions of the Fynbos Biome, natural fires tend to occur most often in summer, although they can occur at any time of the year (Van Wilgen, *et al*, 1992). Research findings indicate that late summer-early autumn is the best time to burn as most species flower in late winter /spring . In addition the maximum seed germination rate occurs after fires in the late summer-autumn period (ibid.).

Only a third (34,2% of the students agreed with this statement. The majority could have been influenced by the size and at times devastating effects of fires which occur at this time of the year. The highest percentage of correct responses once again came from the sub-group of students taking both Biology and Geography (50 %) while the lowest again came from those students taking neither of these subjects. (16,7%)

*Fires are effective in controlling invasive alien vegetation*

This statement is not true as fires can trigger the release of large quantities of seed from serotinous cone bearing plants such as the *Hakea* species, or can stimulate the germination of masses of *Acacia* seeds in the soil (Richardson, *et al*, 1992). In addition once resprouters such as the Port Jackson (*Acacia saligna*) are established, they are able to regenerate fairly rapidly after fire by coppicing (ibid.). Only 41,5% of the students responded correctly to this statement.

*Likert -type statements*

**9.1 In spite of the fact that Rooikrans is a threat to the local fynbos, it should not be eradicated, because, as firewood it provides an important source of income for the unemployed.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
9.5%	17%	35.3%	23.7%	14.5%

*Acacia cyclops* or Rooikrans together with the Port Jackson (*Acacia saligna*) dominates large parts of the Fish Hoek valley and surrounding mountains. This includes the coastal sands around the vleis of the Noordhoek basin (Heineken, 1985), the woodlands and dune shrublands adjacent to the Silvermine River (Heineken, 1982) and the Elsies Peak area above Fish Hoek where dense infestations of Rooikrans occupy 65% of a 400ha area. (Keane, 1985). These invasives have transformed areas comprising many species into virtually single species thickets. Introduced to stabilise the sand dunes, they have established large seedbanks in the soil and have then by mass of numbers and higher growth rate and greatly reduced predation, outgrown and outcompeted the indigenous plants and drastically reduced the biotic diversity of the area ( Macdonald, *et al*, 1986), not only of the plants but also of the animals (Fraser, *et al*, 1988). Thus conservationists would like to see these invasive aliens eradicated and the natural biodiversity restored. However these *Acacias* are being cut down and sold as braaiwood as a source of income for many of the disadvantaged members of the valley community. They are also being used to produce charcoal and this has created employment for some of the jobless (Richardson, *et al*, 1992). The respondents were thus asked to choose between restoring the natural fynbos environment and possible sustainable use of an invasive alien as a means of generating income for the disadvantaged.

The students were divided over this issue, although there was a majority that favoured eradication. Just over a quarter agreed with the statement. There was however a large neutral response of just over a third. This could be due to the fact that these students did not want to commit themselves or that there could be a compromise could be reached between the two standpoints, i.e. that Rooikrans could be eradicated from certain areas and allow for sustainable use in other areas. It is interesting to note the significant difference in the response to this statement and the statement linking seal culling to employment ( $p < 0.01$ ).

This seems to confirm that students are more concerned about the preservation of animal species than of habitats. There was a significant difference between the girls and boys' responses ( $p < 0.04$ ) with 44.4% of the girls disagreeing with the statement as opposed to 32% of the boys. There was also a highly significant difference in the responses of students from other schools where more students (44.4%) agreed with the statement than disagreed as opposed to those from the Middle School where only 22% supported the statement ( $p < 0.01$ ).

**9.2 I feel that all invasive plants in the valley should be removed.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
12%	33.1%	37.7%	13%	4.2%

This statement was aimed at assessing the respondent's attitude towards invasive alien plants. There was again a large neutral response which seems to indicate that it did not matter to these students whether the invasives were removed or whether they were allowed to remain. There is a discrepancy in the student response to this statement compared to the previous one in that 12% more students supported the removal of aliens. One must thus assume that a number of students who indicated that Rooikrans should be kept, to be harvested for firewood, have now supported the cause for the removal of all aliens. There were no significant differences between the student sub-groups.

**9.4 The dunes are a feature of the Fish Hoek valley and I would like them to be there for my children to enjoy.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
48.1%	34.4%	15.4%	2.1%	0%

The sand dunes in question lie to the east of the Skilderskop ridge, a rocky outcrop containing the famous Peers Cave and lies between the residential area of Fish Hoek and the Silvermine River. (Heineken, 1982). These dunes fall largely within the Cape Peninsula Protected Natural Environment (Mitchell and Du Plessis, 1991). The sand dunes form an integral part of the aesthetic character of the area and form an important habitat for plants and animals (Heineken, 1982). Part of the area has become a contentious issue as the landowners are applying to have this section rezoned to allow for residential development and have encountered strong opposition from various organisations. This and the next statement examines the respondent's attitudes towards the proposed development.

Students overwhelmingly agreed with the statement and this indicates that there is concern about future generations. However the "halo effect" may have been a factor in the high agreement figure. There was however one significant difference amongst the student sub-groups in that 85% of the students taking Biology and Geography agreed with the statement as opposed to only 72.2% of those students who take neither subject ( $p < 0.05$ ).

**9.5 I support housing development on the sand dunes, as the rates that will be paid, will provide more money for the Fish Hoek Town Council to use for the benefit of the community.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1.4%	8.1%	21.6%	26.1%	42.8%

This was listed as one of the sociological benefits of housing development in the Environmental Impact Assessment Final Report (Mitchell and Du Plessis, 1991) on the proposed housing development on the dunes. The majority of the students disagreed with the statement. Not all of the students disagreed with the statement specifically because they were against the development however, as a few expressed doubt as to whether the increased revenue would be used to benefit the community. The general feeling does seem to be against housing development on the dunes. There were significant differences between the girls and boys, in that only 63.2% of the boys disagreed with the statement as opposed to 76% of the girls ( $p < 0.04$ ). The Biology students were also significantly more opposed to the statement than were their Geography counterparts ( $p = 0.011$ ). All of the students living in Clovelly which is just across the Silvermine River from the proposed development, disagreed with the statement.

**9.6 Developing the Kommetjie/Noordhoek coastline for tourism is desirable even if it results in the destruction of rare plant communities.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
5.3%	3.9%	18.4%	31.1%	41.3%

The undeveloped Noordhoek beach with its associated wetlands have high aesthetic and scenic value for local inhabitants and tourists alike (Heineken, 1985). A large portion of the wetland area of the Noordhoek basin forms part of the Cape Peninsula Protected Natural Environment and there are no plans to develop this area or the adjacent coastline with the exception of the northern end of the beach. (Noordhoek Structure Plan, 1985). Within this nature area is the last remnant of a plant community which was once widespread in the Cape Peninsula and Cape Flats and contains 19 species which are rare or threatened (Cowling, 1991). Concern has been expressed about the future of this nature area (ibid.) as much of it is privately owned, and with development taking place on its boundaries the pressure on it is going to increase and parts of it could be deproclaimed. Thus while the above statement represents a hypothetical situation, it is certainly one which could arise in the future.

Approximately three quarters of students disagree with the statement. One could argue that many of the respondents are simply opposed to the development of the coastline, irrespective of whether rare

plant communities were affected or not. A significantly higher percentage of students from the Middle School disagreed with the statement compared to those from other schools. ( $p < 0.05$ )

**9.8 The proposed kaolin mine in Noordhoek will destroy a large area of indigenous flora and fauna.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
31.3%	33.1%	24.9%	6.8%	3.9%

This, and the next three statements relate to the controversial plan to establish an open cast kaolin mine on the western slopes of the Noordhoek amphitheatre to the south east of Chapman's Peak and north of Chapman's Peak Drive. According to a report drawn up by Environmental and Geographical Science Masters students in 1988, most of the proposed mining site is covered by three alien *Acacia* species as well as a plantation of *Pinus radiata* and there is not much fynbos left. Virtually two thirds of the students agreed with the statement, while a further quarter remained neutral., demonstrating complete lack of knowledge concerning the nature of the site. There were no significant differences in the responses of the student sub-groups.

**9.9 I feel that the existing kaolin mine has little impact on the environment**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
6.4%	24.3%	33.6%	25%	10.7%

The existing kaolin mine is situated on the Brakkloof ridge above Sun Valley. This statement was designed to see if some of the negative impacts which concern critics of the proposed mine, such as noise, dust, increased traffic, are in fact applicable to the present mine. The student response is more or less evenly distributed between the three options. One can accept however that a neutral response indicates that the respondent is not aware of any impacts. The only significant difference between the student sub-groups involved those students taking Biology and Geography where more students agreed with the statement than disagreed, as opposed to those who take neither subject where the majority rejected the statement ( $p < 0.05$ ). Those students living in Sun Valley responded in much the same way as the overall student body, as did those students living in Noordhoek and Capri. Capri is a comparatively new development to the west of the existing kaolin mine.

**9.10 Too many local people would become unemployed if Serina (the kaolin mining company) had to stop mining in the valley.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
7.9%	30%	42.9%	13.2%	6.1%

The mining company Serina had indicated that as the Brakkloof site was nearing the end of its mining life and there were no other sustainable kaolin deposits available in the area if it was denied the right to mine it would have to relocate with the resultant loss of 140 jobs. Accordingly, in responding to the above statement, the students would have to weigh up the social costs of increased unemployment against the environmental cost of the mine.

A rather high percentage of the students were not prepared to commit themselves on this issue and remained neutral. Of those who did commit themselves, the majority, supported the statement, implying rather surprisingly that job retention was the more important issue. Exactly half of the Std 8's remained neutral on this issue while the Std 9's neutral response was significantly lower at 33.8% ( $p < 0.02$ ).

**9.11 It would be preferable for the proposed site at Noordhoek to remain covered with alien vegetation than for it to be mined for kaolin.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
18.8%	20.9%	34.4%	15.2%	10.6%

As stated earlier the proposed mining site is dominated floristically by invasive alien plants. The respondents thus had to choose between this option and the mine which once it had yielded its available kaolin would be rehabilitated into its natural fynbos state (Earthyear Ed 3, 1992).

Again there was a large neutral response from students which when taken with the response to the previous statement seems to indicate a surprisingly high measure of indifference to the whole kaolin issue. A small majority in both groups agreed with the statement, but in real terms only about 40% of students are opposed to the mine. This comes as a surprise when one takes into account the high profile anti mining campaign conducted by the Save Chapmans Peak Action Group. There were no significant differences in the responses of the student sub-groups.

**9.12 I feel that vehicles should be allowed onto Noordhoek beach.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
10.2%	8.4%	17.5%	33.7%	30.2%

Vehicles have been banned from Noordhoek beach because apart from the disturbance and at times hazards that they cause for other users of the beach, they often drive over and destroy the pioneer plants thereby limiting dune formation and stability. (Council for the Environment: 1991). They can also destroy the nests and young of birds such as the white fronted sand plover as well as plough shells and other intertidal organisms.

The majority of students disagree with the statement, although a third are either unaware of or indifferent to any impacts vehicles may have on the beach ecology. The girls feel more strongly about vehicles on the beach with 72% disagreeing with the statement as opposed to the 55% of the boys ( $p=0.011$ ). Students from other schools show significantly more opposition to the statement than students from the Middle School ( $p<0.01$ ). 71% of the students taking Biology and Geography disagreed compared to only 48.6% of those students taking neither subject ( $p<0.05$ )

### 9.13 Rotting kelp should be regularly removed from Long Beach

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
35.3%	31.8%	15.5%	12%	5.3%

Long Beach lies to the south west of Noordhoek Beach, being separated from it by the Klein Slangkop ridge. During winter storms large quantities of kelp gets washed up from the kelp beds offshore. This kelp then lies on the beach rotting which, to many people, is unsightly and there are also complaints about the smell given off by the decomposing kelp. This is the reason why kelp is cleared from other beaches in the Peninsula such as Muizenberg. The kelp however, when washed up onto the beach serves as a food source for animals such as the sand hopper (*Talorchestia capensis*) which congregate in huge numbers under the kelp, as well as isopods and kelp fly larvae (*Fucellia capensis*). These animals help to recycle the kelp and return it to the sea in the form of faeces where they are eaten by filter feeders (Branch, 1981). In addition these animals serve as food for shore birds such as the white fronted sand plover. Thus the rotting kelp as an integral part of the sandy beach ecology and their removal disrupts the natural food webs and nutrient recycling processes.

The majority of the students agree with the statement and appear to be unaware of the ecological importance of the kelp. The girls seemed to be more concerned about the aesthetic quality of the beach, and 74.6% of them supported the statement compared to 59.5% of the boys ( $p=0.016$ ). There was a similar discrepancy between the Std 8's where 75% supported the statement and the Std 9's where the support was only 58% ( $p<0.01$ ).

### 5.10 Trek fishermen should be banned from Fish Hoek beach.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
23%	14.5%	34.8%	17.4%	10.3%

Trek fishermen have been operating on False Bay beaches for more than a century (Yeld and Gubb, 1992). However with the decline in fish numbers and species in False Bay, and the perceived wastage in the trek fishermen's method of fishing such as the deaths of invertebrates, fish too small to use, and

non marketable species, the trek fishermen have been accused of over exploitation by anglers and some conservationists (ibid.). Calls have been made for this type of fishing to be banned or severely curtailed. (ibid.). However research carried out by the Marine Research Institute of the University of Cape Town indicates that trek fishermen have not made a significant impact on the fish resources of the bay (ibid.). These trek fishermen operate on a subsistence basis and they appear to be exploiting the fish resource in a sustainable manner. The respondents were thus asked to select between the perceived over-exploitation of fish and the livelihood of the fishermen.

Students were divided on this contentious issue, and there was a high neutral response. Among the student sub-groups those students from other schools showed very little opposition to the statement with only 13.8% disagreeing with it compared to the 31% of the students from the Middle School ( $p < 0.05$ ).

*In Item 10, the students were asked to choose one of a number of possible development options for the lower Silvermine River.*

**What do you think should be done with the land on either side of the Silvermine River between Clovelly and Fish Hoek?**

<i>Left as it is .....</i>	<i>21,8%</i>
<i>Formed into a wetland.....</i>	<i>8,9%</i>
<i>Reintroduce indigenous plants to form a nature area....</i>	<i>41,4%</i>
<i>Developed as a picnic area with braai facilities .....</i>	<i>10,4%</i>
<i>Allocated to housing.....</i>	<i>1,1%</i>
<i>It doesn't really matter to me.....</i>	<i>9,6%</i>

The area concerned is zoned as public open space with the Cape Town City Council controlling the northern side and the Fish Hoek Town Council the southern side. Both sides are undeveloped with the exception of a roadside rockery on the Fish Hoek side. The first 100 metres or so consist of grass which then gives way to riverside woodland which is dominated by the Port Jackson (*Acacia saligna*). (Heineken, 1985)

Students were asked to select one alternative but a number (6.2%) gave more than one and these were not considered in the analysis. The *nature area* option got the most support followed by *leave as it is*. The students living in Clovelly all supported one or other of these two options. The *picnic area* and *wetland options* did get a little support but *housing* virtually none. The majority of the students were thus against any major changes to the area.

## APPENDIX E

### ANALYSIS OF QUESTIONNAIRE ITEMS RELATING TO POLLUTION AND RESOURCE CONSERVATION.

This section dealt with various aspects of pollution as well as proposing trade-offs to reduce pollution. The students were first tested on their knowledge on pollution. There then follows a series of Likert-type questions testing student attitudes.

#### 11. Practically all of the lead of the atmosphere comes from:

*Motor vehicles (56,2%) Industrial Plants(23,6%) Burning rubbish (3,2%) Cigarettes (1,6%)*

The figures in brackets indicate the percentage of students who selected the item.

The major constituent of atmospheric lead is derived from petrol and is released into the atmosphere by means of car exhaust fumes (Von Schirnding, 1989). Research has shown that there is a strong correlation between lead petrol sales in areas of high traffic density and blood lead levels in children (Myers, 1985). Von Schirnding has noted that there is increasing evidence linking lead in blood to impaired nervous system development in children (Von Schirnding, 1991).

While over half of the students gave the correct response, there were a number (15.5%) who indicated more than one of the options given and 10% who did not respond to the question at all. There were no significant differences between the various sub-groups.

#### 1.2 Name ONE CAUSE and ONE EFFECT of each of the following.

##### 12.1 Destruction of the OZONE layer.

###### *Cause*

Most of the atmospheric ozone exists in the stratosphere where it plays a critical role in the absorption of the ultraviolet radiation from the sun. (Clarke, 1991). In recent years researchers in the Antarctic have discovered that each spring the levels of stratospheric ozone in this region have decreased by more than 50% giving rise to the so called "hole" in the ozone layer. (Levine, 1992). The main agents in this destruction of the ozone layer have been identified as the chlorofluorocarbons (CFCs) which are used as refrigerants and as propellants for aerosol cans (ibid.). The chlorine atoms released from the CFCs chemically destroy the ozone.

Half of the students correctly identified the CFCs as the main causative agent of ozone destruction while a further 23.9% mentioned aerosol cans and/or refrigerants without naming CFCs. However 25.8% did not know the cause and gave answers such as air pollution, car fumes, and Greenhouse

Effect.. 7.7% of the students gave no response to this question. As far as the sub-groups are concerned the boys were significantly more aware of the cause than were the girls(  $p < 0.05$ ). Significantly more Geography students identified CFCs than did Biology students ( $p < 0.05$ ). Far more of the latter group named aerosol sprays etc.

### *Effects*

Calculations indicate that for every one percent decrease in stratospheric ozone there will be a two percent increase in ultraviolet solar radiation reaching the earth's surface. (Levine, 1992) The effect of this could be an increase in the various types of skin cancer as well as possible damage to the immune system. In addition the increased radiation could adversely affect the marine plankton and cause extensive crop damage (ibid.).

The students were found to be substantially less aware of the effects of ozone depletion than of the causes. While 44% of the students identified skin cancer etc as a consequence of ozone depletion and a further 11.2% mentioned increased radiation, 44.8% gave incorrect responses. A total of 10% of the students did not respond at all. Of the incorrect responses, there were many who gave global warming as an answer, indicating confusion between ozone depletion and the Greenhouse Effect. This confusion was even more evident in the response to the next question. There were no significant differences between the various sub-groups.

## **12.2 Greenhouse Effect.**

### *Cause*

The so called greenhouse gases namely water vapour, carbon dioxide, and small amounts of methane, ozone, nitrous oxides and CFCs have the ability to absorb upward-moving infrared radiation emitted from the earth's surface and reradiate it back towards the earth, thereby warming the earth's surface. This represents the Greenhouse Effect and is responsible for global temperatures that are viable for life. (Tyler Miller, 1989). Human activities notably the burning of fossil fuels and deforestation have resulted in a steady increase in the level of carbon dioxide and other greenhouse gases. For example measurements show that atmospheric carbon dioxide is increasing by about 0,5% per year (Levine, 1992). This increase is giving rise to what is referred to as an enhanced Greenhouse Effect resulting in global warming.

A feature of the student response to this question was the number of students who gave no response at all. This amounted to 53 students or 18.5%, 52 of whom were Std 8 students. Of those who did respond, the majority (56.2%) did not know what causes the Greenhouse Effect. Many opted for the hole in the ozone layer, others merely said air pollution and still others cited global warming. A few did mention CFCs which do absorb some infra red radiation but has a very narrow absorption

spectrum compared to carbon dioxide (Fuggle pers comm). These students then went on to describe the ozone hole or skin cancer as a consequence of the Greenhouse effect thereby clearly demonstrating their confusion. 30% of the students knew that carbon dioxide or methane was involved, but only 13.7% actually identified fossil fuel combustion or deforestation as a direct cause. If one considers the Std 8's and 9's who did respond then there is no statistical significance between the two groups. However if one includes those who did not respond as not knowing the cause, then there is a significant difference ( $p < 0.01$ ). There were no differences between the other sub-groups.

### *Effect*

The predicted result of the enhanced Greenhouse Effect is global warming and secondary impacts associated with this could include rising sea levels due to the melting of the polar ice caps, climatic changes, spread of pests and diseases, loss of species and desertification (Huntley, *et al*, 1989).

There was an even higher no response, here of just under 20% of whom again only one student was in Std 9. Of those that did respond 54% identified global warming or one of its secondary impacts, a further 9% spoke of changes in weather or temperature and 36,7% gave incorrect responses. Many of these were associated with the effects of ozone depletion.

There were a couple of surprises in the sub-groups. If one considered only those Std 8's and 9's who responded then the Std 8's were significantly more aware of the effects than the Std 9's ( $p < 0.04$ ). If however, the no responses are included, then there is no statistical difference between the responses of the two groups. Secondly the students with named responses were significantly more aware than those who were anonymous ( $P < 0.04$ ). There does not seem to be any reason for this discrepancy.

## **12.3 Acid Rain**

### *Cause*

There are two main sources of acid rain. Firstly from the release of sulphur dioxide during the burning of coal and other fossil fuels in power stations and smelters which oxidises to form sulphuric acid in rain. Secondly nitrogen oxides derived from the exhaust of internal combustion engines forms dilute nitric acid in the rain (Openshaw, 1987). There can also be dry deposition of these acids or acid forming compounds onto the earth's surface in the form of gases, fog, dew or solid particles. (Tyler Miller, 1989).

Only 12.6% of the students who responded correctly linked acid rain to the burning of fossil fuels or to motor vehicle exhaust fumes. The majority (51%) either mentioned sulphur dioxide or simply factories or industrial plants. There were 36.4% who gave completely incorrect responses. This again illustrated the fairly large scale of ignorance amongst the students regarding the precise nature of acid rain. There

was a nil response from 13.6% of the students, all save one being Std 8's. Of those who did respond there was significantly greater ignorance amongst the Std 8's compared to the Std 9's ( $p < 0.01$ ).

### *Effects*

The severity of the impact of acid rain will depend on how low the pH is. Some of the harmful effects of acid rain include damage to statues, buildings etc, death of fish and other aquatic life in ponds and streams, weakening or killing trees such as conifers, stunting crop growth, and causing or aggravating diseases of the human respiratory system (Tyler Miller 1989).

There was a nil response from 16.1% of the students all bar one being Std 8's. Half (50.4%) of those who responded correctly identified one of the effects listed above while a further 14.6% gave rather vague responses such as "destruction of plant life" or "destruction of nature". The remaining 35% gave incorrect responses such as "pollute the water" The boys were significantly more aware of the effects of acid rain than the girls ( $p < 0.05$ ). If one includes the large number of nil responses from the Std 8's then the Std 9's are significantly more knowledgeable on this topic than the Std 8's ( $p < 0.05$ ).

## **12.4 Plastic Pollution**

### *Cause*

The most commonly encountered form of plastic pollution on beaches and elsewhere is disposable packaging (Ryan, 1988) which originates from thoughtless and accidental littering on land and sea. This coupled with the durability of most plastic products results in their accumulation on beaches, in the sea and in many urban and rural open spaces.

The nil response to this item was 12.2%. Of those who responded 13.9% named packaging as the cause whereas 33.1% gave littering as their answer. For the remaining 53% many responded with "plastic" which was regarded as too simplistic an answer while others gave "man or people" which was rejected for the same reason. Of the sub-groups the Std 9's gave a significantly better response than the Std 8's ( $p < 0.01$ ). There was also a significant difference between those students who were named and those who were anonymous with the former group giving the better response ( $p < 0.01$ ).

### *Effect*

Apart from negative aesthetic impact of littering, plastic can also impact on marine animals in two ways. (Ryan, 1988). Firstly by being ingested it can cause blockages of the alimentary canal. Plastic items have been found ingested by marine mammals, seabirds and turtles (ibid.). This has also been a problem with terrestrial animals such as cattle (Clarke, 1991) Secondly animals can become entangled in plastic debris notably abandoned fishing gear which can wound or disable an animal to such an extent that it dies (Ryan, 1988).

Most of the students who responded (62% ) linked plastic to the death of animals although 37% responded incorrectly and 14% of the students did not respond. Students who did not attend the Middle School showed a significant lack of awareness on this issue when compared to their counterparts who attended the Middle School ( $p < 0.01$ ) as did the anonymous students when compared to their named counterparts ( $p < 0.05$ ).

### **13 What happens to the black bags of rubbish which are collected from the Fish Hoek area?**

This and the next question were designed to test for the degree of awareness amongst the students of the methods of waste disposal used locally. In the case of solid waste, the garbage bags are collected by a private firm and transported to a landfill site at Strandfontein on the False Bay coast.

Only 27.6% of the students knew what happened to the black bags. The remaining 72.4% either did not respond or gave an incorrect answer. What was of interest was the comparison between the Std 9 and Std 8 responses. There was a highly significant difference here with 49.6% of the Std 9's being correct as opposed to the 7.2% correct responses for the Std 8's ( $p < 0.01$ ). This difference was not surprising as the Std 9's had in their Std 8 year done a cross-curriculum project on the various forms of waste disposal in the Fish Hoek valley. What was surprising was that one year later only half of the standard could still recall the correct answer. Not unexpectedly significantly more of Middle School students gave correct responses than did those from other schools ( $p < 0.05$ ).

### **14. Where does the bulk of the sewage from the Fish Hoek valley go to?**

The answer is that the sewage is piped to the Wildevoelplei sewage purification works in the Noordhoek/Kommetjie basin and the effluent is released into Wildevoelplei after treatment (Heineken, 1985). The reason why the question stipulated the bulk and not all of the sewage is that most of the properties in the Noordhoek and Kommetjie areas have septic tanks to dispose of their sewage.

The student response to this question was very similar to the previous one in that 26.9% answered correctly and 73.1% gave incorrect or no responses. Again as in the previous question there was a highly significant difference between the Std 8's and Std 9's with 10.1% of the former and 45 % of the latter being correct ( $p < 0.01$ ). The Std 9 level of correct responses was again low considering the exposure they had had to the topic. 34.6% of the named students gave the correct answer and this differed significantly from the 19.6% of the anonymous students ( $p < 0.01$ )

## *LIKERT STATEMENTS*

### **15.1 I am bothered by people playing their radios at public recreation areas.**

Many people are accustomed to taking portable radios with them to the beach or picnic areas including those in nature reserves and then have them operating with the volume turned up for the duration of their visit. This is regarded by many others as noise pollution and a disturbance to the tranquillity of the area particularly if it is a nature area. This statement was thus aimed at assessing student attitudes towards this fetish of radios in public places.

The majority of students seem to feel that it is quite justified to play radios at public places, and do not regard loud music as noise pollution. There was however a large neutral group, but only a small minority supported the statement. Amongst the student sub-groups it was noted that those students doing Biology as well as those doing Geography were significantly more bothered about radios in public than those students doing neither subject ( $p < 0.01$  in both cases).

### 15.2 I get angry when I see litter lying around the school

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
18.5%	47.2%	27.6%	4.2%	2.4%

One might anticipate a "halo effect" in response to this statement as students might feel that they ought to feel angry at the sight of litter. This might have been the motivation behind the response of some of the majority who supported the statement. However a third of the students did not support the statement, although the majority of these felt neutral on the issue. The Std 9 group showed significantly more support for the statement than the Std 8's ( $p < 0.02$ ).

### 15.3 I ought to pick up litter dropped by other people.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
9.4%	39.5%	23.8%	17.1%	10.1%

This statement is a follow up to the previous one. Would those respondents who are angered by the sight of litter feel any obligation to do anything about it? Experience has shown that most students resent having to pick up litter which has been dropped by others.

In looking at the student responses one finds that 16.8% fewer students supported this statement compared to the previous item while 20.6% more students rejected it. For those students that agreed with the previous statement but disagreed with this one, it can be assumed that although angered by litter they do not feel obliged to clean it up themselves. It must be noted however, that virtually half of the student respondents did express an obligation to pick up litter. As far as the student sub-groups are

concerned, significantly more girls supported the statement than boys ( $p < 0.05$ ) and a significantly higher percentage of Std 9's agreed with the statement than Std 8's. ( $p < 0.02$ ).

**15.4 People who worry about pollution have nothing else to worry about.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
1.8%	6.7%	16.8%	41.4%	33.3%

This item was included in order to see whether there was any support for the view that the extent and long term effects of pollution are exaggerated and represent the viewpoints of "gloom and doom pessimists" (Tyler Miller, 1989).

It is encouraging to note that three quarters of the students rejected the statement and less than 10% supported it. In spite of the fact that the majority of the boys also disagreed with the statement, there was significantly more support for it from them than from the girls ( $p < 0.01$ ).

**15.5 I get angry when I see graffiti on mountain rocks**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
39.9%	36%	17.8%	3.8%	2.4%

Many rockfaces in the mountains around Fish Hoek, particularly in the vicinity of caves have been decorated with various forms of graffiti. The painting of initials etc on the rocks detracts from their aesthetic value and to many is regarded as visual pollution. This item set out to examine the respondent's attitude towards this graffiti.

76.6% of the students agreed with the statement and it was only a small minority of students who rejected it. The Std 8's showed significantly less support for the statement than did the Std 9's ( $p < 0.05$ ).

**15.6 Oil tankers should not be allowed into False Bay.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
46.9%	23.1%	24.1%	4.2%	1.7%

Oil tankers are occasionally, under exceptional circumstances, allowed into False Bay to effect minor repairs, or if extensively damaged to transfer their cargo of oil to another tanker.(Moldan 1991). There is strong opposition to this practice especially from conservationists fearful of the ecological consequences of an oil spillage in the bay.

Most of the students agreed with the statement although there was a fairly substantial neutral stance. Amongst the student sub-groups the girls did show significantly greater support (78%) for the statement than the boys (61%) ( $p < 0.01$ ).

**15.7 Smoking should be banned in public places.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
31.9%	18.2%	22.5%	14%	13.3%

With the greater publicity being given to the health risks of tobacco both to the active and passive smoker, coupled with the fact that many non smokers are objecting to being subjected to cigarette smoke in public areas, there has been a trend to ban smoking in public areas such as cinemas, public buildings, restaurants etc. This has caused resentment amongst smokers who feel that they should have the right to smoke when and where they wish to. As there are a minority of smokers amongst students, this statement was aimed at testing the views of the respondents on this issue.

Half of the students agreed with the statement and just over a quarter opposed it with the balance remaining neutral. This would seem to indicate that at least half of the students are opposed to smoking either because they dislike the habit or because they are aware of the health hazard. There were no significant differences between the sub-groups.

**15.8 Reducing environmental damage is more important than increasing our living standards.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
26.8%	24.6%	33.9%	9.3%	5.4%

The more affluent the lifestyle of a person the more energy, water, food and other resources that person consumes (IUCN 1991), and the more pollution they cause, particularly those with a throwaway mentality. Environmental damage can be linked to increased living standards and this provided the motivation for the statement.

The majority of the students supported the statement although a third of them did not commit themselves. There were no differences between the various sub-groups. While this is a very encouraging response it must be borne out that students are not making any personal commitment in supporting this statement. As is pointed out in the publication *Caring for the Earth - A Strategy for Sustainable Living (IUCN, 1991)*, that many people while concerned about environmental degradation and the need to modify their lifestyle do not have the necessary commitment to do so.

**15.9 It worries me that there is a nuclear plant so close to Cape Town.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
17.3%	20.1%	41.7%	14.8%	6%

Koeberg, South Africa's only nuclear power station is situated some 30 km north of Cape Town on the West Coast. Nuclear power was originally hailed as a clean safe and cheap source of energy (Tyler Miller, 1989) and the logical replacement for heavily polluting coal fired power stations. However, escalating costs and the problem of nuclear waste disposal have been two factors which have retarded the growth of nuclear power. Another, if not the major factor has been extensive public concern over the safety and reliability of nuclear power stations (Gibbons *et al* 1989). This concern which originally stems from devastation caused by the atomic bombs and the subsequent effects of radioactive fall-out, was further fuelled by the accidents at Three Mile Island and at Chernobyl. Locally, organisations such as Koeberg Alert have continually warned of the high environmental risks of nuclear power and the possible effects which a nuclear accident could have on Cape Town and its environs.

There was a diverse reaction to the statement from the students with the largest percentage remaining neutral indicating that they did not have the knowledge to venture an opinion. For the rest the majority expressed concern about the nuclear power station but a fairly substantive minority rejected the statement. Amongst the sub-groups the girls showed significantly more concern than the boys on this issue ( $p < 0.01$ ). Similarly those students taking Biology and Geography as well as those taking Biology only, showed more concern than did those who took neither of these subjects ( $p < 0.01$  in both cases). However there was no difference in the degree of concern shown by those students taking Geography only and those taking neither Biology nor Geography.

**15.10 There is conclusive evidence that the Greenhouse Effect is going to change our climate.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
27.3%	39%	29.4%	2.8%	1.4%

The purpose of this item was to see whether the respondents unreservedly accepted the concept of global warming or whether some would challenge it. Alternatively, there might be those who are aware that global warming as a result of the Greenhouse Effect has not been proved beyond doubt. The average global temperature has risen by one degree over the last century, an increase which is paralleled by an increase in atmospheric carbon dioxide levels. However this increase in temperature is well within the normal natural variations in global temperatures (Kemp, 1991). This together with the fact that there was no global temperature increase between 1940 and 1975 does seem to cast doubt on the assumption that the recent warmer years can be solely attributed to the greenhouse gases. (Broeker, 1992).

In analysing the response to this statement one must also bear in mind the large percentage of students who showed little or no knowledge of the Greenhouse Effect as was shown at the start of this section. Two thirds of the students agreed with the statement while very few opposed it. There was again a large group who remained neutral on this item. Significantly more Std 8 students showed scepticism than Std 9's ( $p < 0.05$ ).

**15.11 The benefits of pesticides far exceed their threat to wildlife and health.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
9.4%	15.5%	32.9%	24.2%	18.1%

Pesticides are beneficial in that they save lives by destroying disease carrying insects such as the *Anopheles* mosquito, increase crop yields thereby lowering food costs and work more quickly and efficiently than other alternatives (Tyler Miller, 1989). However, there are social and environmental costs (that is, costs that society and the environment absorb as the result of actions of an individual or group) linked to pesticide use, the most serious of which is human poisonings (Pimental, 1991) Environmental effects include the destruction of natural predators, reduced crop yields through destruction of pollinators, poisoning of fish and wildlife particularly those near or at the tops of food chains. While most people acknowledge that pesticides are essential to control pests, many conservationists feel that by integrating their use with other methods of pest control, the environmental and social costs can be substantially reduced.(ibid).

While most of the students rejected the statement, virtually a third remained neutral and a quarter supported it. All of the student sub-groups responded in a similar way.

**15.12 Convenience foods with individual throw-away containers should be heavily taxed to pay the costs of eliminating their effects on the environment.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
18.9%	30%	30%	13.6%	7.5%

Until recently, many of the containers used as packaging in the "fast food" industry, were made of materials containing chlorofluorocarbons (CFCs), a greenhouse gas that has been implicated in ozone depletion in the upper atmosphere (Clarke, 1991). This represents a significant social cost. A number of the materials used for such packaging cannot be recycled (Ryan, 1988). The littering that inevitably occurs from this packaging is a further social cost. One could also argue that the opportunity costs of the resources used to make the packaging is a further social cost, particularly as water, electricity and other resources used in making the products themselves are not priced appropriately. From a resource economic standpoint, then, it would make sense to place a surcharge or deposit on such packaging, to

ensure that the social costs are absorbed as private costs by the manufacturers and consumers of the packaging.

Almost half of the students were in agreement that there should be a "tax" on the packaging., while 21% disagreed and there was a strong *neutral* response of 30%. Among the students subgroups, the Std 9 students were more in agreement with the packaging tax than the Std 8's ( $p= 0.1$ ). There were no significant differences between the other sub-groups.

**15.13 I find the prospect of using purified sewage water unacceptable.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
18.1%	19.5%	28.7%	25.9%	7.8%

South Africa is basically an arid country with a rainfall that is well below the world average and very erratic. (Davies and Day, 1986). With very few rivers left to dam or divert and the ever increasing population, the conventional water resources of this country are in the not too distant future going to be insufficient to meet the needs of agriculture, industry and the desired lifestyles of people (ibid.). The Western Cape region has not escaped this trend and it is estimated that present and potential water sources will only be enough to meet the region's water demands until the year 2007. Thereafter it will become necessary to use reclaimed effluent and desalinated sea water. (Dept of Water Affairs, 1986). The latter option will be far more expensive (ibid.) and it seems then that Capetonians will have to become accustomed to using what is effectively recycled water. Windhoek have already set an example in this connection in that they have been subsisting on recycled water since 1969. (Davies and Day, 1986), with no ill effects. In a country where the water resources are limited it makes sense to use purified sewage water if its quality meets the standards of drinking water..

The students were divided in their reaction to drinking sewage water with marginally higher percentage finding it unacceptable. There was again a high *neutral* response of almost a third. Amongst the student sub-groups the only significant difference occurred between the Std 8's and Std 9's. 45% of the Std 8's found the drinking of purified sewage unacceptable compared to 29% of the Std 9's while only 26% found it acceptable compared to the 43% of the Std 9's ( $p<0.01$ ). It would appear that the Std 9's have a greater awareness of the water scarcity problems of the future. There were no significant differences between the responses of the other sub-groups. The majority of the students do not seem to appreciate the fact that water is a limited resource in this country.

**15.14 The price of electricity should be increased to cover the cost of pollution control.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
2.1%	5.3%	28.6%	36.7%	27.2%

The social costs associated with the generation of electricity are substantial for example, the pollution from coal-fired power stations; the risk associated with nuclear (fission) power stations; the opportunity costs of the resources used in the generation of power. Such social costs should always be weighed up against the social benefits from the provision of electricity, of course, (e.g., improving quality of life indices such as health, education, status of women, infant mortality, population control and so on). However, a very important consideration when weighing up social costs and social benefits is the equity involved - who enjoys the benefits and who bears the costs. There can be very little doubt that, from a perspective of sustainable lifestyles, there has to be an increase in the price of electricity, at least for those who are decadent in their use of this resource ( Yeld, 1993).

Only 7% of the students agreed with the statement and fully 64% disagreed with the statement. A possible reason for this response from students could be the concern reflected earlier in the questionnaire with the rising cost of living. Increased electricity tariffs would in all likelihood exacerbate the situation and could involve some sort of personal cost to the student in the form of an adjusted lifestyle. Such a motivation however would contradict their support for the idea that reducing environmental damage is more important than increasing living standards. Amongst the student sub-groups those students not taking Biology or Geography showed significantly more opposition to the statement than did those students taking either or both of these subjects ( $p < 0.01$ ).

**15.15 Deposits should be paid on all glass bottles.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Neutral</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
39.6%	36.8%	12.3%	9.5%	1.8%

Reuse involves the collection, washing and refilling of glass bottles as opposed to recycling which involves the crushing and remelting the glass to form a new bottle from the old one. Reuse is preferable to recycling in that it extends the supply of the resource, is more energy efficient. It takes three times more energy to recycle a bottle than to reuse it (Tyler Miller, 1989). Most glass soft drink, beer, wine and spirit bottles are accepted for refilling and in many cases a deposit is payable when buying these beverages. Charging a deposit is an effective method of ensuring that they are returned for reuse (Clarke, 1991). Disadvantaged people can often be seen salvaging returnable bottles from bottle banks in order to recover the deposits. If deposits were charged on all glass bottles then more would be returned and reused thereby saving energy and reducing waste. However the packaging industry has largely resisted such a move for the obvious reason that the more bottles that are thrown away, the more bottles that can be sold (ibid.).

Over three quarters of the students agreed with the statement which indicates that they support the principle of recycling glass bottles. Amongst the sub-groups the boys were significantly more in

favour of deposits on bottles than the girls ( $p < 0.05$ ). There were no differences between the responses of the other sub-groups.

*The next question on the use of water as a resource was aimed at testing student knowledge.*

**The single greatest user of our country's water resources are**

*farmers [ ]                      city residents [ ]*  
*industrial complexes [ ]      mining activities [ ]*

It was estimated in 1983 that 73% of the total amount of water used in the country was for irrigation and stock watering making farmers by far the main consumers of water in South Africa (Davies and Day, 1986). The second largest consumer is industry with 11% of the total followed by domestic users (8%) and mining (1%). Figures of the Department of Water Affairs (1986) indicate irrigation as the largest water consumer (52,2%) followed by municipal and domestic users (9,3%), industry (6,3%) and mining (2,9%). Despite the discrepancies between the figures there is no doubt that most of the water resources are used for irrigation.

It was clear from the range of responses that the majority of the students are unaware of the water consumption patterns in South Africa. The highest percentage (33,6%) went for *city residents*, while less than a quarter (24%) correctly answered *farmers*. 19,9% of the students suggested that *industrial complexes* were the main consumers while 15,5% opted for *mining activities*. 7% gave more than one option and a further 5% did not respond to the question at all. Similar responses were obtained from all of the student sub-groups.

**STUDENT ACTIONS**

This subsection sets out to assess whether the students or their families take any active steps to conserve resources or to reduce pollution in their everyday activities.

**17.1 You switch off lights when nobody needs them on.**

<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>
59,2%	28,5%	10,9%	1,4%

Eighty five percent of the electricity generated in South Africa is derived from the combustion of coal (Clarke,1991). The generation of electricity by coal fired power stations is not more than 35% efficient (ibid.) with the loss of significant amounts of heat. The main drawback of coal fired power stations are the pollutants produced. The burning of coal produces 60% more carbon dioxide per unit of energy

produced than any other fossil fuel (Tyler Miller, 1989), thus contributing to the enhanced Greenhouse Effect. Studies carried out in the Eastern Transvaal Highveld where the bulk of the coal fired power stations are located indicate that these power stations are responsible for 84% of the total particulate (ash etc) pollution as well as 95% of the carbon dioxide, 90% of the sulphur dioxides and 91% of the nitrogen oxides in the surrounding atmosphere (Tyson, *et al*, 1988). The last two gases are responsible for the phenomenon of acid rain with its adverse impacts on health and the environment. One of the strategies to save energy and reduce pollution is to use the energy generated by electricity efficiently and to cut down on wastage. One of the ways to save on electricity consumption is to switch off lights and electrical appliances when not in use.

The majority of the students indicated that they acted responsibly in this regard with just under 60% switching off lights regularly and a further 29% occasionally. This is an encouraging response although it must be borne in mind that the motivation to regularly switch off lights may be economic rather than environmental and more as a result of parental pressure than intrinsic motivation. 54.5% of the Std 8's switched off their lights regularly and 18% seldom or never did so. This differed significantly from the Std 9's where 64% regularly switched off lights and only 7% fell into the *seldom* category and there were none in the *never* category ( $p=0.027$ )

**17.2 You voluntarily pick up other peoples' litter.**

<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>
4,9%	34,9%	43,3%	16,9%

The response to this statement clearly illustrates the resistance amongst the students to picking up litter which is not theirs. This is in spite of the fact that 66% of them are angered by the litter lying around the school and 49% feel they ought to pick up litter. Only 5% make a habit of picking up litter and fully 70% clearly avoid doing it

Amongst the student sub-groups there is significantly greater resistance to picking up litter shown by the boys than by the girls ( $p < 0.01$ ) and also from the Std 8's compared to the Std 9's. ( $p = 0.022$ ). Thus it appears that the students are prepared to bear the social cost in terms of negative visual impact rather than pick up the litter for which they feel they are not responsible.

**17.3 You put waste paper into the recycling bags at school.**

<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>
65,0%	21,9%	6,7%	6,4%

Large bags are placed in all of the classrooms to collect all waste paper from teachers and students. When full the bags are stored and periodically collected for recycling. The greater majority of the

students do use these bags thereby reducing but not eliminating the litter problem within the classroom. . 73% of the girls used the bags regularly which is significantly more than the 56% of the boys ( $p= 0.027$ ). The Std 9's also made significantly more use of the bags than the Std 8's ( $p= 0.016$ ).

#### 17.4 At home, organic waste (vegetable peels etc) are put onto a compost heap

<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>
26,8%	9,3%	11,8%	52,1%

Compostibles are defined as all substances which are biodegradable and not recyclable and include food and garden waste (Connett, 1991). By placing organic wastes onto a compost heap one is reducing the amount of refuse which needs to be disposed and ultimately reducing the cost of that disposal. (Lord, 1993). The compost formed can ultimately be added to the garden to enrich the soil by recycling the organic waste. This is done on a larger scale at compost plants on the landfill sites of the Cape Town municipality and the compost formed sold to the public.

Only 27% of the students do make regular use of a compost heap while almost two thirds (64%) hardly ever dispose of their organic waste in this manner. Some of these may not have the space in which to make a compost heap but as the majority of the students live in houses with gardens, these would be in the minority. The responses of the various student sub-groups were all similar to that of the student body as a whole.

#### 17.5 Waste liquids such as oils are thrown down the drain.

<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>
23,1%	26,3%	22,8%	27,8%

Motor oils together with household cleaners, pesticides, brake fluid, old medicines or any other materials which could adversely affect health or the environment is classified as hazardous household waste. (Earthyear, 1993). It is common practice for these chemicals to be disposed of by pouring them down the sink or drain relying on dilution and dispersion to render them harmless (ibid.). These wastes enter the sewage system which are often not designed to treat many of the chemicals involved. The chemicals could then form part of the treated effluent and contaminate rivers, the soil, ground water or the sea with harmful effects on the biota of these areas. Some chemicals can still have toxic effects at very high dilutions. Alternatively the micro-organisms responsible for the sewage treatment process might be destroyed. Thus disposing of hazardous household waste by pouring them down drains can have far reaching ecological effects.

The students were virtually evenly split on this issue with 49% pouring liquids down the drain regularly or occasionally and 51% doing it either not at all or seldom. However the fact that half of the

students or their families do carry out this practice is a cause for concern. There were no variations amongst the student sub-groups.

#### 17.6 You use aerosol products e.g. deodorants

<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>	<i>Not Ozone Friendly</i>
9,2%	62,3%	16,5%	6,7%	5,3%

Aerosol cans are used for a wide variety of purpose e.g. spray painting, insecticides, deodorants etc. Until recently these aerosols relied exclusively on Chlorofluorocarbons (CFCs) as a propellant and accounted for almost 50% of the CFCs used in South Africa (Clarke, 1991). Since the implication of CFCs in the depletion of the ozone layer, they have gradually been replaced by substitutes and such aerosols were labelled as "ozone friendly". At the time of the administering of the questionnaire, "ozone friendly" deodorants were in the minority and were more expensive than the conventional CFC driven aerosols. The reason why deodorants was given as an example is the majority of students use deodorants and apart from the "ozone friendly" aerosol forms there are also the "roll on" alternatives.

The bulk of the students (88%) do use aerosol sprays and of those only 9% stipulated that they specifically used the "ozone friendly" forms. One must therefore assume therefore that although some of the other 79% may use "ozone friendly" sprays none of them were environmentally conscious enough to emphasise the fact. From this one must conclude that although the students may be concerned about the depletion of the ozone layer, the majority are not sufficiently concerned to actively seek out "ozone friendly" forms or to persuade their parents to buy them even if they have to pay that little bit extra.. Amongst the student sub-groups the girls seem to be more conscious of the effect of the CFCs as 14% of them seldom or never used aerosol as opposed to the 9% of the boys and 14% of them stipulated that they used "ozone friendly" sprays as opposed to the 3% of the boys ( $p = 0.01$ ). The responses of the other sub-groups showed no significant differences.

#### 17.7 You use insecticides in your house or garden

<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>
13,2%	26,8%	34,6%	25,4%

Insecticides are used in the house to control insects such as ants, cockroaches, flies and mosquitoes. Outdoors they may be used to control garden pests or to protect wood against insect attack. The main danger of the use of insecticides in the house is that of poisoning resulting from the unsafe use and storage of insecticides. Young children are particularly vulnerable to this form of poisoning (Tyler Miller, 1989). There is also the danger of poisoning pets. In the garden there are the environmental risks to useful insects, birds and the disruption of the natural ecological balances. it would thus be

preferable to use environmentally friendly methods such as biological control, cleanliness inside the house, or target specific substances to control insect pests and keep the use of insecticides down to a minimum.

It was encouraging to note that the majority (60%) of the students seldom or never use insecticides and that only 13% used them on a regular basis. It could well be that many of those who do not use insecticides do not have problems with insect pests inside the house and do not have a garden to speak of, or the family has no keen gardeners. Nevertheless the fewer the people that use insecticides, the less potential there is for damage to the environment.. There were no significant differences amongst the various student sub-groups.

At home the following are recycled :

	<i>Regularly</i>	<i>Occasionally</i>	<i>Seldom</i>	<i>Never</i>
17.8 Paper	26,0%	13,4%	14,9%	45,7%
17.9 Plastic	13,4%	10,3%	19,2%	57,1%
17.10 Bottles	44,5%	16,2%	11,4%	27,9%
<i>(with deposit)</i>				
17.11 Bottles	31,6%	16,7%	13,8%	37,9%
<i>(without deposit)</i>				
17.12 Tins	9,1%	7,5%	15,5%	67,5%

The advantages of recycling include a reduction in pollution, saves costs on waste disposal, reduces the volume of solid waste and thus prolongs the life of landfill sites and saves energy. (Tyler Miller, 1989), conserves resources, reduces the need to import and has the social benefits by creating labour intensive operations and raises funds for charities and other organisations such as schools which can act as receiving depots (Clarke, 1991).

#### *Paper*

By far the highest percentage of waste comes from paper and cardboard products. South Africa recycles one third of its annual production of paper ( Clarke, 1991) which not only saves the raw material resource that is, trees but also the land which would have to be covered by pine forests in order to supply this resource. (ibid.). There is ample scope for an increase in paper recycling as it has been estimated that by recycling half of the world's paper consumption, almost 75% of the world's demand would be met. (Myers, 1985).

Unfortunately the level of paper recycling amongst the students is not particularly high with only 39% seeming to make any attempt to do so, and 46% responding in the *Never* column. this is most

disappointing since recycling is encouraged in the school environment and 65% indicated that they used the recycling bags. It would thus appear as if the students are either unaware of the benefits of recycling or even if they are aware of them are not prepared to make the necessary effort to recycle. This could be that they do not see any direct benefit to themselves in recycling.

#### *Plastics*

Plastics tend to be the most dominant visible component at landfill dumps and littered area. This is because they are mostly either non degradable or degrade very slowly. (Tyler Miller, 1989) There do appear to be problems with the logistics of plastic recycling. This could be due to the large diversity in forms and chemical composition of plastics, many of which are not suitable for recycling. It has been suggested that all plastic beverage containers be replaced with returnable glass ones (Tyler Miller, 1989). This does have disadvantages as glass is breakable and severe injuries can be sustained from being cut by glass. Plastic is also lighter than glass and consumes less energy in its manufacture. (Frosch, *et al*, 1989). Plastics can and are being recycled however, They can be converted into a synthetic wood which can be used for benches etc (Clarke, 1991). Plastic shopping bags could be reused or returned to collection points which have been set up by a certain supermarket chain.

Possibly because of the logistic difficulties mentioned above, the students have shown even less inclination to recycle plastic than paper with 76% of them seldom or never recycling and only 13% doing so on a regular basis. The girls are significantly more positive about recycling plastic than the boys with 19% of them doing it on a regular basis as opposed to 7% of the boys ( $p= 0.33$ ).

#### *Bottles with a deposit*

The most efficient method of saving a resource is reuse and this is the benefit of returnable bottles. By paying a deposit on the bottle on purchase, an incentive is provided to return the bottle.

The student response to this item was once again disappointing, especially when 76% of them supported the concept of paying deposits on bottles. In spite of the incentive only 61% return such bottles regularly or occasionally and over a quarter (28%) not at all. It is evident that for this latter group of students forfeiting the deposit is preferable to taking the trouble to return the bottle. There were no significant differences amongst the student sub-groups.

#### *Bottles without a deposit*

Bottle banks in the form of igloos occur in most areas and these serve as collection points for all bottles and broken glass. This glass is recycled as opposed to reused in that it is melted down and used to make new glass. The estimates of energy saving in recycling glass vary from 8% (Myers, 1985) to 25% (Clarke, 1991). In South Africa glass makers estimate that two thirds of the bottles made are recycled (Clarke, 1991)

As is to be expected the degree of recycling of non returnable bottles amongst the students is substantially less than that of returnable bottles with 48% doing so regularly or occasionally and 38% not at all. This attitude to the recycling of bottles was illustrated by the rather indifferent support given to a bottle recycling drive conducted at the school in 1992. Similar responses were obtained from, all of the student sub-groups.

### *Tins*

This refers to the tin cans in which foods and beverages are packaged. The type which the students mostly make use of, are the aluminium beverage cans.. Recycling one of these containers requires only 5% of the energy of that used to manufacture a new can from the raw material.(Myers, 1985) and causes 95% less air pollution and 95% less water pollution. (Tyler Miller, 1989). There are tin can collecting points for recycling although they are probably more scattered than the glass igloos.

Despite the potentially large savings in energy and pollution the recycling of tin cans has very little student support with 83% of the student body never or seldom doing so, and only 9% doing so on a regular basis. It is clear that if this level of support applies to the public at large than a great deal more needs to be done to promote the recycling of this commodity.

## APPENDIX F

### ANALYSIS OF QUESTIONNAIRE ITEMS RELATING TO CONFLICTS BETWEEN THE INTERESTS OF NATURE AND THOSE OF PEOPLE

18.1 It is far more important to attend to social problems such as poverty than to protect threatened habitats.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
9.2%	34.4%	35.1%	20.6%

For the respondents this statement involved deciding whether the social or the environmental issue should receive the greater priority and selecting the appropriate option according to their viewpoint. Many, including conservationists, would say that conservation is doomed unless the social problem of poverty is addressed, and that poverty together with population growth represent the greatest threat to natural habitats (Hanks, 1993). Others argue that the loss of biodiversity resulting from habitat destruction will exacerbate the social problem of rural poverty. Many impoverished rural communities rely on the local flora and fauna as sources of food, fuel, medicines, building and craftwork material etc (Cunningham 1989). The disappearance of these resources would increase the hardship of these communities and make their lives more precarious not only because women would have to travel further to find resources but also because of adverse ecological effects such as soil erosion, desertification etc. Apart from its ecological, and ethical value (from a first world perspective) these natural resources do have economic value (Myers 1991). Plant products such as medicines can be marketed to meet urban demands and local communities could also benefit from tourism and the sustainable harvesting of wildlife e.g. by hunting. Thus there is merit in both the conflicting viewpoints on this issue and in reality the two issues should be integrated as if managed correctly the conservation of habitats for the benefit of local communities can alleviate their poverty which in turn reduces the pressure on the habitat.

The majority of the students (56%) took the ecocentric viewpoint placing the threats to habitats above the welfare of human beings which hitherto has been the "perceived conservationist viewpoint" (Khan, 1990). However a significant minority (44%) did agree with the statement indicating that they supported the concept of "people first." It is possible that some of the students were influenced by the word "far" had it been left out they might have supported the statement. Only a small percentage strongly supported or rejected the statement. Students taking Biology and Geography showed significantly more support for the environmental issue compared to those not taking either subject the majority of whom supported the statement ( $p < 0.01$ ). This difference was more highly significant amongst students taking Biology only ( $p < 0.01$ ) than those taking Geography only ( $p < 0.05$ ).

**18.4 It is wrong to remove people from an area in order to establish a nature reserve.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
18.3%	34.8%	28.3%	18.3%

There are many cases of where the creation of game or nature reserves has involved the removal of local communities from the area in order to protect the fauna and flora within that reserve from any form of exploitation. Examples include the establishment of the Ndumu Game Reserve in 1924 (Khan, 1990). Tembe Elephant Park where the people were moved to a site where there was no water supply (Afra, 1990), and Kosi Bay Nature Reserve in 1988 (Khan, 1990). In all of these removals there were claims of inadequate consultation, compensation and, in many cases the sites to which they were moved were inferior in terms of resources, to the original. The result of these forced removals, social dislocation and changed lifestyles has been strong resentment against nature conservation in general and the newly proclaimed reserves in particular. (Khan, 1990). A similar attempt to keep people and their stock out of the proposed Richtersveld National Park was defeated by a court order and the National Parks Board had to negotiate a settlement with the local communities (ibid). The Wildlife Society which has come under fire for supporting the removal of squatters from the Dukuduku Forest Reserve, feel that their stance is justified as apart from the conservation value of the forest, most of the squatters have come from other areas and that there are alternative sites in the area which offer better living conditions. It would therefore benefit both people and forest if the squatters were moved. (Cooper, 1990). Again the students were fairly evenly split on his issue, with a small majority (53%) supporting the statement and 47% opposing it. There were no significant differences amongst the student sub-groups.

**18.5 The managers of game reserves which are bordered by poverty stricken people cannot ignore the needs of these people**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
24.1%	41.6%	22.3%	11.3%

Until comparatively recently, the policy of conservation authorities has been to fence off and protect nature reserves and deny neighbouring communities access and use. (Hanks 1993). These reserves had prior to their proclamation provided the local people with basic resources of food, fuel, shelter and medicine. These resources are no longer available to these people in their degraded environments outside the reserves and being denied access to the reserves has engendered deep resentment amongst these people. It has become increasingly evident that a game reserve or national park cannot be managed effectively or protected in the long term without the acceptance and approval of the neighbouring communities (Lucas, 1988). In order to gain support for a conserved area there needs to be concrete social and economic benefits for the surrounding impoverished communities. This could take the form of *inter alia* promoting reserve -related employment, sustainable use of the reserves 's

resources, a share in the profits derived from tourism etc. Two thirds of the students have accepted the principle that the needs of neighbouring communities need to be addressed by game managers while the remaining third disagree. The girls showed significantly more support for the statement than the boys ( $p < 0.05$ ). There were no other significant differences amongst the sub-groups.

**18.8 The purpose of conservation is to protect nature from people**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
36.8%	32.5%	18.9%	11.4%

A substantial majority of the students (69%) endorsed the statement confirming their adherence to the "protectionist" perception of nature conservation. Those students taking Biology showed significantly more support (73%) than did those taking neither Biology nor Geography (58%) ( $p < 0.05$ ). All of the other sub-groups showed similar responses to the statement.

**18.11 Money spent on wildlife conservation should be reallocated to provide housing for the homeless**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
5%	19.8%	33.8%	40.6%

The mushrooming of informal settlements in and around the major cities of South Africa as millions of people migrate to the cities to from the impoverished rural areas, provide ample evidence of the acute housing shortage which in 1988 was estimated at between 1.1 and 1.8 million units (Institute of Race Relations 1989). One should accept that one of the main priorities of this country must be to address this housing shortage but that to do so would require vast sums of money. The respondents were asked whether some of this money should not come from money which hitherto had been spent on wildlife conservation. Those who are anthropocentric and put people first will support the statement while those who place the interests of animals above those of people will reject the statement.

The students showed themselves to be largely bio or ecocentric with three students rejecting the statement for every one that supported it. 40% of the students strongly disagreed with the idea. An interesting response came from those students who did not come from the Middle School who showed significantly more support for the reallocation of funds than did those from the Middle School with 43% agreeing with the statement ( $p < 0.01$ ).

**18.12 Wilderness areas should be utilised to provide food and space for crowded hungry populations**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
7.9%	16.2%	29.5%	45.7%

Wilderness areas are defined as those areas where the impact of man is minimal and the area is as far as possible in its wild pristine state. (Tyler Miller,1989). Access to such areas is strictly controlled and is usually only allowed to hikers. Wilderness is of great ecological value due to their undisturbed habitats and biodiversity. It is also of great aesthetic value because of its natural beauty, sense of tranquillity, and enables one to "contemplate our origins and spiritual values while freed of daily stresses" (Siegfried 1987) Most of our national parks and many nature reserves consist partly or entirely of wilderness. Rural impoverished communities outside national parks and reserves practise subsistence agriculture and due to poor farming methods resulting in overgrazing and soil erosion together with ever increasing populations there is an increasing demand for land. the neighbouring wilderness area or reserve, to them seems unproductive and of no benefit to them. There is thus a strong feeling that they should have access to the land for grazing and cultivation. However much of the land in these reserves is not suited to agriculture or cattle. Allowing such land to be used for farming could very rapidly lead to environmental degradation and loss of biodiversity.

The student response to this statement was virtually identical to the previous one with 75% rejecting it. The only difference was that a higher percentage (46%) felt strongly opposed to the statement Paradoxically there was also an increase in those who strongly supported the statement (8%). Thus for the greater majority of the students the idea of sacrificing wilderness areas to provide more food for starving people is unacceptable. However as in the previous item there was the anomaly where those students who were not at the Middle School showed significantly more support for the statement than those who had been to the Middle School ( $p < 0.01$ ).

**18.13 Conservation should be for the benefit of people not animals**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
5.7%	10.7%	34.3%	48.6%

The perception of conservation which has held sway until comparatively recently and is now being increasingly rejected by many conservationists, is perhaps best encapsulated in this extract from the National Parks Act of 1926.

*" The object of the constitution of a park is the establishment, preservation therein of wild animals, marine and plant life and objects of geological, archaeological, historical and ethnological, oceanographic, educational and other scientific interest . . . in such a manner that the area . . . as far as may be and for the benefit and enjoyment of visitors , be retained in its natural state."*

*Source: Bannister and Gordon 1987 pp 24*

Here the emphasis is solely on the protection of nature and is symbolised by the separation of people and wildlife by the erection of fences. which is in many case justified in terms of maintaining biodiversity, particularly if one considers the overexploitation of resources outside reserves.. However this policy of complete protection and incompatibility of man and nature is not going to benefit conservation in the long term as it has failed in the rest of Africa due to the complete exclusion of people (Hanks pers comm). However in spite of this there are many, particularly those with a biocentric or ecocentric viewpoint who still perceive conservation as the protection of nature from the exploitation of people.

In its *World Conservation Strategy* of 1980 , the IUCN defined conservation as

*The management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to the needs and aspirations of future generations.*

This definition lays emphasis on the concept that conservation is for the benefit of people and encourages the use of resources as long as such utilisation is sustainable. Such a definition might be regarded as too utilitarian for those with a bio or ecocentric world view. In its follow-up to the *World Conservation Strategy* entitled *Caring for the Earth* published in 1991 the three organisations modified their definition of conservation to read.

*The management of human use of ORGANISMS or ECOSYSTEMS to ensure that such use is sustainable. Besides SUSTAINABLE USE, conservation includes PROTECTION, MAINTENANCE, REHABILITATION, RESTORATION, and ENHANCEMENT of populations and ecosystems.*

Thus the main thrust of conservation has moved from protecting nature from people to protecting nature for people (Giliomee 1991), in the short term by allowing neighbouring communities access to resources on a sustainable basis, generating employment and allowing the communities to share in the profits generated by the conservation area, and in the long term by maintaining the biodiversity and ecological life support systems of the area.

The students still view the main purpose of conservation as the protection of wildlife from the activities of people and this is confirmed by their response to the statement which was opposed by 83% of the student body with 49% expressing strong opposition. Of the 16% who supported the statement only 6% showed strong support.. The Std 9 group showed significantly more opposition to the statement with 89% of the group compared to the 79% opposition from the Std 8's ( $p < 0.05$ ).

## APPENDIX G

### ANALYSIS OF QUESTIONNAIRE ITEMS RELATING TO CONSERVATION AND DEVELOPMENT

#### 18.2 The aim of conservation is to protect a natural area from any sort of development.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
40.3%	30.9%	21.2%	6.5%

This statement represents the viewpoint of those conservationists who have resisted all forms of development, as being incompatible with the aims of conservation, that is, that of complete protection (*World Conservation Strategy 1980*). The lack of consultation between conservationists and developers has led to numerous developments going ahead causing damage to the natural environment which could have been prevented had consultation taken place.(*ibid.*). The IUCN/UNEP/WWF have defined development as " increasing the capacity to meet human needs and improve the quality of life" (*Caring for the Earth; 1991*). Development is sustainable when it is carried out within the carrying capacity of supporting ecosystems (*ibid.*) Both the *World Conservation Strategy* and *Caring for the Earth* represent strategies based on the complete integration of conservation and development. Development is essential to improve the quality of life of those trapped in rural poverty. For the development to succeed it must be sustainable, and to be sustainable it must be based on conservation principles. Similarly conservation of areas surrounded by increasing numbers of impoverished people will not succeed unless it is linked to development which benefits those people. Thus conservation and development are mutually dependent.

Over 70% of the students felt that conservation was incompatible with any form of development with 40% feeling strongly over the issue. Those students taking Biology showed significantly more support for the statement than did those taking neither Biology nor Geography( $p < 0.05$ ).

#### 18.6 People have the right to decide how to modify the natural environment to suit their needs.

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
8.6%	12.9%	35.6%	42.1%

This statement represents the extreme utilitarian viewpoint that *Homo sapiens* is the most important species on earth and as such as the right to use the world natural resources in any way which will promote the interests of human beings. (Tyler Miller, 1989). This anthropocentric stance is characteristic of societies where economic values prevail and religious or intrinsic considerations are

ignored (Fuggle 1983). Such a viewpoint has merit as long as an altered environment does not become degraded, is managed according to conservation principles, and resource utilisation is on a sustained basis. There are those who believe that many environmental problems are exaggerated and can be overcome by economic growth and technological innovations (Tyler Miller, 1989). In those impoverished communities where people struggle to satisfy basic needs such as food, shelter and security, the demand is for immediate benefits and intense exploitation of living resources. Here, understandably, there can be no consideration of aesthetic values, ecological consequences or future needs. (Fuggle, 1988), as such people have no choice but to modify and degrade their environment.

This viewpoint is rejected by the 78% of the students, over half of whom feel strongly on the issue. One concludes that they feel that the intrinsic values of the environment must be taken into account before modification. 39 % of students from other schools agreed with the statement compared to only 17% of those from the Middle School ( $P < 0.01$ ). It would seem that those who supported the statement saw social upliftment as the main priority in selecting their option.

#### **18.7 Environmentalists needlessly interfere with development projects.**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
9.2%	22.3%	34.4%	33.7%

In the past much development has taken place without due consideration of environmental implications. For example, the South African coastline is being developed rapidly particularly for residential and recreational facilities with little consideration of the impacts of this development on the natural coastal systems such as dunes and estuaries and on wildlife. (Council for the Environment, 1991)). Public concern for the environmental effects of development mushroomed in the late 1960s and resulted in the establishment of the Environmental Impact procedure in the U.S.A in 1970. (Fuggle, 1988). This EIA procedure was viewed as anti-development as it focused on negative aspects of a development and caused delays and great expense to developers. However it did force developers to identify and find ways to mitigate environmental impacts, as has occurred in the proposed kaolin mining at Noordhoek. This EIA process has since been broadened into what is termed integrated environmental management (IEM) the aim of which is to ensure that environmental implications are considered at all stages of the development process (Council for the Environment: 1989). Thus environmentalists will and should oppose developments which are not sustainable and have significant negative impacts on the environment. This opposition should not be geared to stop the development but try to solve the environmental problems or find alternative proposals (Fuggle, 1988).

68% of the students felt that interference in development project was justified while 32% agreed with the statement. There were no marked differences between the responses of the various student sub-groups.

**18.9 Development on a piece of land should not be stopped to protect an endangered species**

<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>
7.2%	10.5%	29.6%	52%

The response to this item was in line with the biocentric trend which has characterised the student responses. The girls in particular expressed strong opposition with 91% rejecting the statement as compared with 74% of the boys ( $p < 0.01$ )

## **APPENDIX H**

**LIST OF QUESTIONNAIRE ITEMS TO WHICH STUDENTS TAKING BIOLOGY AND/OR GEOGRAPHY GAVE SIGNIFICANTLY DIFFERENT RESPONSES TO THOSE GIVEN BY STUDENTS TAKING NEITHER SUBJECT.**

		Bio/Geo	No Bio/Geo	
<i>Animal Conservation</i>				
Item 5.2	I don't see any point in trying to save the Great White Shark	Bio: 78.5% disagree	65.2% disagree	p < 0.01
		Bio+Geo: 83.5% disagree		p < 0.05
<i>Local Issues</i>				
Item 9.1	In spite of the fact that Rooikrans is a threat to the local fynbos, it should not be eradicated because as firewood it provides an important source of income for the unemployed in the valley.	Bio: 20.3% agree 45.2% disagree	35.2% agree 26.7% disagree	p < 0.05
Item 9.4	The dunes are a feature of the Fish Hoek valley and I would like them to be there for my children to enjoy.	Bio: 87.3% agree Bio/Geo: 89% agree	72.2% agree	p < 0.01 p < 0.05
Item 9.5	I support housing development on the sand dunes, as the rates that will be paid will provide more money for the Fish Hoek Town Council to use for the benefit of the community.	Bio: 2.7% agree 74.3% disagree	15.3% agree 63.8% disagree	p < 0.01
Item 9.6	Developing the Kommetjie/Noordhoek coastline for tourism is desirable, even if it results in the destruction of rare plant communities	Bio: 4.7% agree 74.3% disagree	15.3% agree 69.4% disagree	p < 0.05
Item 9.9	I feel that the existing kaolin mine has little impact on the environment	Geo: 36.8% agree 32.3% disagree	26.7% agree 42.2% disagree	p < 0.05
Item 9.10	Too many local people would become unemployed if Serina (the kaolin mining company) had to stop mining in the valley	Bio: 39.1% agree 13.5% disagree	36.6% agree 26.2% disagree	p < 0.05
Item 9.12	I feel that vehicles should be allowed onto Noordhoek Beach	Bio: 14% agree 70% disagree Geo: 17.6% agree 68.3% disagree	27.7% agree 48.6% disagree	p < 0.01 p < 0.05
<i>Pollution and Resource Conservation</i>				
Item 15.1	I am bothered by people playing their radios at public recreation areas	Bio: 12.6% agree 49% disagree Geo: 15.5% agree 54.8% disagree	10% agree 56.9% disagree	p < 0.01 p < 0.01
Item 15.9	It worries me that there is a nuclear power plant so close to Cape Town	Bio+Geo: 44.3% agree 10% disagree Bio: 39.8% agree 13.5% disagree	33.3% agree 30.5% disagree	p < 0.01 p < 0.01
Item 15.1	The price of electricity should be increased to cover the cost of pollution control	Bio/Geo: 7.04% agree 50.7% disagree	5.5% agree 79.1% disagree	p < 0.01
<i>Nature vs people</i>				
Item 18.1	It is far more important to attend to social problems such as poverty than to protect threatened habitats	Bio/Geo: 28.2% agree 71.8% disagree	52.2% agree 47.8% disagree	p < 0.01
<i>Conservation vs development</i>				
Item 18.2	The aim of conservation is to protect a natural area from any sort of development.	Bio: 76.4% agree 23.6% disagree	62.3% agree 37.7% disagree	p < 0.05
Item 18.8	The purpose of conservation is to protect nature from people	Bio: 73.1% agree 26.9% disagree	58.3% agree 41.7% disagree	p < 0.05
Item 18.9	Development on a piece of land should not be stopped to protect an endangered species	Bio: 11.8% agree 85.8% disagree	25.4% agree 74.6% disagree	p < 0.05
<i>General Issues</i>				
Item 18.1	I am not really concerned about the state of the world in a hundred year's time as I won't be there to see it.	Bio/Geo: 6.9% agree 93.1% disagree	23.9% agree 76.1% disagree	p < 0.01