

ANALYSIS

Communicating the value of fynbos: results of a survey of stakeholders

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Abstract

The objective of this study was to determine what value was placed on the endemic fynbos vegetation by students from a range of socio-economic backgrounds. Students at four schools were given: (a) a questionnaire to assess their existing knowledge of fynbos; (b) a slide show; and (c) a second questionnaire to determine how effectively this information changed their perceptions and understanding of fynbos' benefits and values. Prior to the presentation, few students had any knowledge of the consumptive-use benefits of fynbos. Those from privileged backgrounds knew more about the non-consumptive use benefits of fynbos than the less privileged. Most students initially attached little value to fynbos, but the information in the presentation markedly increased their appreciation of fynbos and demonstrates the positive impact of enhanced understanding. Students from privileged backgrounds continued to rank non-consumptive benefits (aesthetic and bequest values) most important. The less advantaged students felt that consumptive benefits (remunerative and subsistence) were most important. Nevertheless, even students from disadvantaged backgrounds considered the non-consumptive benefits of fynbos to be important. This is crucial because support for the conservation of natural resources in South Africa will depend largely on the extent to which stakeholders understand and appreciate the benefits they receive. © 1997 Elsevier Science B.V.

Keywords: Fynbos; Students; Education; Socio-economic factors; Consumptive benefits; Non-consumptive benefits; Apartheid

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1. Introduction

1.1. Background

This paper reports on the results of a survey of schoolchildren from a range of socio-economic backgrounds to determine what value they placed on fynbos and the basis for that valuation. The survey formed part of a 2-week workshop on ecological economics held at the Institute for Plant Conservation, University

We had to complete the survey within a week so we were limited to a rapid pilot study of a sample of the citizens of the Cape Metropolitan Area (CMA). To standardise and simplify the survey we opted to sample students from standard 8 (10th school year) classes at schools representing a cross-section of socio-economic backgrounds. The broad aims of the survey were:

(a) To determine how much a cross section of the stakeholders in the CMA knew of fynbos, its value to them and the threats to it.

(b) To determine their degree of interest in fynbos and related issues.

(c) To determine whether the information we presented was meaningful, appropriate and sufficient to reach a broad sector of the public, so that it can be modified before being released on a wider scale.

(d) To demonstrate that it is possible and relatively easy to establish public outreach and that people are concerned and prepared to commit themselves to finding and participating in solutions.

In this paper we have used the racial groupings 'white', 'coloured' and 'black' purely because of their strong socio-economic associations which are a legacy of the fragmentation of South African society by apartheid. The term 'coloured' is used to describe a loose cultural grouping of peoples of Khoi-San, Malaysian, Indian, African and European origin which was given legal status under apartheid legislation and is still in general use.

1.2. Fynbos

Fynbos is an exceptionally species-rich vegetation type which is restricted to the southern-most tip of Africa (Cowling and Holmes, 1992). This unique and fragile, shrub-dominated vegetation is threatened by expansion of agriculture, urbanisation, uncontrolled fires and by invasive exotic plant species (Rebello, 1992; Richardson et al., 1992; 1996; Van Wilgen et al., 1992). Yet fynbos provides a number of important benefits (Anon, 1995; Van Wilgen et al., 1995):

(a) Fynbos is harvested for cut flowers, dried flowers and thatching grass. The combined value of these enterprises, much of which was made up of export earnings, was R65–70 million in 1993, providing a livelihood for 20 000–30 000 people. Some fynbos plants have been developed as food and drug products. The best known is rooibos tea which generated foreign exchange of R7.5 million in 1993.

(b) Fynbos is the natural cover in the mountain areas that supply the Western Cape Province with over 3000 million m³ of water annually, about 2/3 of the surface water resources of the Province. This water supports the regional economy which generated a gross domestic product of R55 billion in 1992. The CMA faces water shortages in the near future because of rapid population growth (Quick, 1995). Regional water supplies also could be reduced by 30% or more if the catchment areas are invaded by exotic shrub and tree species which use more water than fynbos (Le Maitre et al., 1996). Decision makers have recognised the significance of the potential losses and initiated alien plant clearing programmes because this is more cost-effective than building dams.

(c) There is increasing recognition of the international significance of fynbos as an ecotourism resource. Tourism represents a major growth industry in the Western Cape (Bridgman et al., 1992) with approximately 400 000 tourists visiting the Cape of Good Hope Nature Reserve alone. Ecotourism can provide employment and fuel economic growth in an economically and ecologically sustainable way.

The problem is that these benefits are poorly understood by the people who will be most af-

fectured by their loss. Their poor understanding is partly a product of the lack of suitable material on fynbos for the general public (Van Rensburg, 1987). Socio-economic factors and apartheid have also contributed (McDonald, 1994), as has the tendency to exclude the public from participation in environmental planning (Jackelman and Britton, 1995).

1.3. Reconstruction and development programme

A fundamental principle of the reconstruction and development programme (RDP), the government's core plan to rebuild South Africa, is people-centred and sustainable development (RDP, 1994). The primary aim of the RDP is to enhance the quality of life of everyone by developing and empowering people through their participation in the reconstruction of South Africa. A key thrust will be to provide students with appropriate education and training for them to participate fully in community life (RDP, 1994). Therefore the education departments are committed to school curricula which reflect local priorities and interests (DEA, 1994; Education, 1995) and include information on ecosystems (e.g. fynbos). At present, the value of fynbos remains unexplored in most schools despite its potential educational, aesthetic and economic value to the region.

1.4. Stakeholders

Stakeholders of the fynbos range from international to local communities, and across socio-demographic and age groups. Schoolchildren are particularly important as they are the decision makers of the future.

The population of the CMA was 2.2 million in 1994 and is projected to treble by 2020 (Quick, 1995; Van Wilgen et al., 1995). Demand for water will follow these trends, outstripping supply within the next 10 years (Quick, 1995). The expanding population will create strong demand for the development of the remaining open areas within the CMA, including nature reserves. These remnants will ultimately disappear unless the people in the local communities

understand the potential benefits (Britton and Jackelman, 1995; Jackelman and Britton, 1995). People-centred development must involve all the stakeholders, locally, regionally and nationally, in fynbos conservation. Therefore it is crucial that the stakeholders understand the value of fynbos, or else they simply will not care enough to conserve it (Swan, 1993; Britton and Jackelman, 1995).

1.5. Ecological economics perspective

Key elements that distinguish ecological economics are the integration of economics and ecology as the basis for sustainability, the emphasis on including non-market values and the importance of the equitable allocation of resources (Folke et al., 1994). Fynbos clearly has a significant direct and indirect value even in classical economic and market terms. It also has considerable biological and aesthetic value. The catchment areas in the Western Cape form the core of the Cape flora, one of the six floral kingdoms of the world (Bond and Goldblatt, 1984; Cowling et al., 1992). The Cape flora has 8574 plant species of which 5847 (68.2%) are endemic. It has been recognized as the world's 'hottest' hot-spot and is clearly both a national and international asset (Myers, 1990). The ecotourism value *sensu stricto* is also largely vested in this same diversity and in the landscapes that form fynbos catchment areas.

Non-consumptive non-use benefits are a significant component of the value of fynbos to stakeholders. Many of these benefits, such as bequest value and existence value, depend directly on the level of knowledge of stakeholders (Jackelman and Britton, 1995). Historical inequities in access to information about fynbos and to its services and benefits has strongly influenced perceptions of fynbos. Even access to water, the most widely available service, has not been equitably distributed. All these factors have combined to produce a situation where the broad public is largely oblivious to any or all of the remunerative and subsistence benefits of natural environments, including fynbos (Britton, 1995).

2. Methods

The approach we used was aimed at assessing whether perceptions and understanding of the value and benefits of fynbos depended on the amount of information available to the respondents. In this sense it is analogous to contingent valuation (Portney, 1994) which measures how values are contingent on other factors. The approach differed from a standard contingent valuation because we did not attempt to elicit or derive financial values but simply assessed the importance of the various benefits. Two questionnaires were used: one answered before and one answered after the presentation (see Appendix A for the questionnaires). The first questionnaire tested prior knowledge and values, and the second measured the change in values placed on fynbos following presentation of a scenario which dealt with the uniqueness of fynbos, its benefits and the threats to its continued existence.

2.1. The presentation

The presentation consisted of a slide show and simultaneous lecture on fynbos. The aims of the slide show were to:

- give students a brief introduction to what fynbos is and where it occurs;
- show why it is special (e.g. the high biodiversity, the high proportion of endemic species);
- show what the products and economic benefits of fynbos are (e.g. wildflowers, water); and
- to identify the major threats to fynbos (e.g. alien weed species, agriculture, urbanisation).

2.2. Sample selection

The survey was designed to reach a cross-section of the stakeholders in the CMA. It was not possible to obtain a representative cross-section of both racial and socio-economic groupings of the stakeholders. Historical inequalities under apartheid have resulted in the majority of the white stakeholders being affluent while the majority of coloureds and blacks are less affluent and have been deliberately disadvan-

taged. Thus our sample, of necessity, combines socio-economic and racial groupings.

The next requirement was to standardise these groups according to age and experience. The options of surveying adults, university students and schoolchildren were considered. As another group at the workshop was already going to do a similar survey of university students, the only practical option was to choose a representative sub-set of school students. Standard 8, the 10th school year, was chosen as it is the last year in which students get formal instruction in ecology. This is also an age at which many children leave school to begin their working lives. Co-educational schools were chosen to ensure that both sexes were represented in the sample.

The following schools were visited:

(a) Kh, a black school in the relatively new township of Khayelitsha where we addressed two Standard 8 classes. Two groups were addressed: the English group who were given the presentation in English and explanations of the questionnaires in Xhosa; and the Xhosa group who were given the presentation in Xhosa and had the questionnaires translated verbally into Xhosa. There were 58 pupils in each group. Attendance was voluntary and involved staying after normal school hours.

(b) MP, a coloured school in a poor area of Mitchells Plain, a coloured township built in the 1970's to house people evicted from other areas. The presentation was given in Afrikaans and was attended by volunteers from the entire Standard 8 class of about 300 students; 157 answered the questionnaire.

(c) At, a coloured school in Athlone, a well-established urban area built in the 1950's and 1960's to house people evicted from areas closer to Cape Town. The presentation was given to 32 students from the academic stream of the Standard 8 class. Attendance was optional.

(d) Ro, a white school in a long established and wealthy suburb of Cape Town. The Standard 8 class was not available with less than a weeks notice so a Standard 7 class (32 students) was chosen instead.

2.3. The questionnaire

Designing the questionnaire was a significant problem as we had little experience of this kind of survey. The first draft of the questionnaire was modified so that some of the questions were identical to those asked in a concurrent survey of university students. Copies of the questionnaires are included in Appendix A. In addition to questions about fynbos per se, the students were asked to specify their gender and the occupations of their parents. This enabled us to assess whether we had a balanced gender representation and had covered the socio-economic spectrum without asking sensitive questions.

Where multiple choice questions were used (e.g. Questionnaire 1, question 4, Appendix A) the responses were summarised as the percentage of responses rather than the percentage of students (respondents). The answers to open-ended questions were categorised to simplify their presentation.

3. Results

3.1. Prior knowledge of fynbos (questionnaire 1)

Most of the students indicated that they walk in natural areas. The highest percentage of 'yes' answers was at Ro while only 50% of students at MP answered 'yes'. Language was a factor at Kh where about 74% of the English group answered 'yes' compared with 59% of the Xhosa group. The high percentages were particularly surprising at MP and Kh as there are few open areas nearby, and those we saw were little more than neglected, weed invaded areas. No remnants of the original fynbos were seen in the vicinity of any of the schools.

Most students at Kh indicated they knew nothing at all about fynbos compared with less than half at MP (Fig. 1). Half the students at At and almost all the students at Ro indicated that they knew a lot. The few at Kh who indicated they knew a lot were entirely from the English group. Most students at Kh and MP were unable to answer the question about whether fynbos was

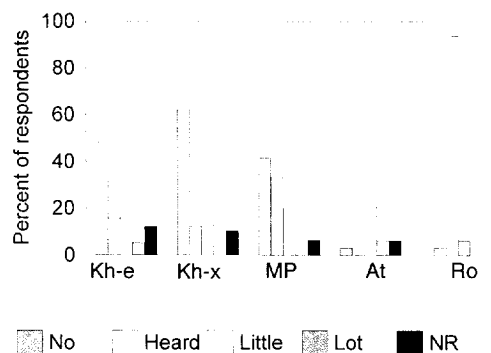


Fig. 1. Prior knowledge of what makes fynbos special among students at different schools visited during the survey. For an explanation of the categories see text. Kh-e = Kh English presentation (Section 3) Kh-x = Xhosa presentation; NR = no response.

typified by trees, shrubs, or grasses correctly (Fig. 2). This is in marked contrast to the high percentage of correct answers at At and Ro. At Kh the majority of students incorrectly believed that fynbos occurs in all of South Africa. Most students at MP, At and Ro more correctly identified it as occurring in the south-western Cape. More students in the Xhosa group at Kh answered correctly than in the English group.

The majority of students at all the schools identified natural objects (e.g. birds, insects, flowers) as the things that make fynbos special (Fig. 3). At At and Ro the next most important category was recreation and tourism, but at MP and Kh economic benefits and products were more

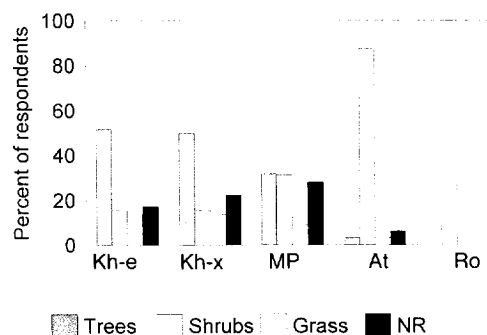


Fig. 2. Prior knowledge of what vegetation type (plant form) is characteristic of fynbos. For an explanation of the mnemonics see Fig. 1. NR = no response.

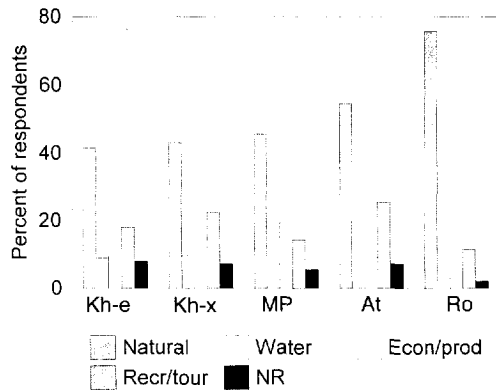


Fig. 3. Prior knowledge of what makes fynbos special among students at different schools. For an explanation of the categories see the text.

important. Few students identified water as special for fynbos and the majority of these were at Kh and MP. Within the 'natural' category there was also a strong link between the perceived importance of benefits and socio-economic status (Table 1). A surprisingly high percentage (17–34%) considered educational aspects to be important.

There was a wide range of responses to the question about where Cape Town's drinking water comes from. At MP 25% of the responses correctly identified dams, compared with about 60% at At and Ro. At Kh 47% of the responses identified sources other than dams compared with 12–15% at the other schools. Much of this was due to a language problem because 33% of the students in the Xhosa group answered 'dam' compared with 11% of the English group. Nearly 60% of the students at MP did not answer this question compared with 16–20% at the other schools.

Most students (60–78%) could not identify anything they used in their houses as coming from fynbos (Fig. 4). Together with the 5–20% who answered 'nothing' this indicates profound ignorance of the direct consumptive benefits of fynbos. Only 6–18% answered that items such as flowers, herbs or garden plants came from fynbos. At Kh, 10% identified other products that were used compared with 4% at MP and none at Ro or At.

The majority (65–88%) of the students did not know anyone with a job in fynbos (question 8). The language problem at Kh was evident again with 24% of the English group and 9% of the Xhosa group answering yes. Many of those at Kh who answered 'yes' specified unlikely jobs such as 'gardener'. While it is possible that they knew someone who was employed in the indigenous flower garden at Kirstenbosch, it is more likely that they worked in municipal parks or for garden maintenance companies and thus not in fynbos per se. Students at At and Ro knew people who were conservators and therefore were more likely to work in fynbos. At Kh and MP 36–39% of the students answered that fynbos is threatened compared with 75–81% of students at At and Ro. Most students at At and Ro identified urbanisation as a threat compared with 6–7% at Kh and MP. At At, 50% thought that fires were a threat compared with 28% at Ro, 19% at MP and 7% at Kh. Seventy-two percent of students at Ro identified alien plants as a threat compared with 44, 8 and 23% at At, MP and Kh respectively. The corresponding percentages for agriculture were 34, 25, 13 and 33%. Many students at Kh and MP (22 and 31% respectively) did not answer this question.

The students found it difficult to identify what would be lost if fynbos disappeared. More than half the students at Kh and MP did not respond (Fig. 5). Most of those who responded gave answers that related to natural things such as birds,

Table 1

The relative importance of natural products and features of fynbos and the associated benefits (such as employment) to students at the different schools

Item	Kh	MP	At	Ro
Flowers	50	32	34	81
Herbs	12	29	19	22
Firewood	16	17	0	6
Biodiversity	2	10	13	34
Rarity and endemism	0	1	38	53
Employment (jobs)	12	6	3	0
Education	17	17	34	13

Importance is calculated as the percentage of responses in which included the item

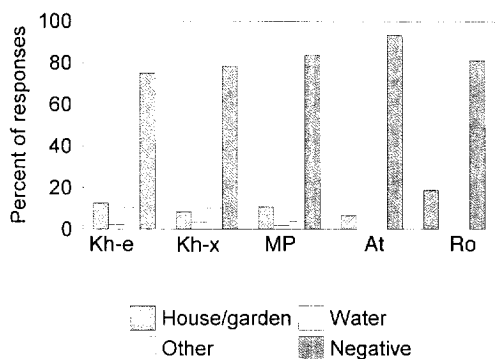


Fig. 4. Prior knowledge of which items used by the students family were derived from the fynbos. For an explanation of the categories see the text.

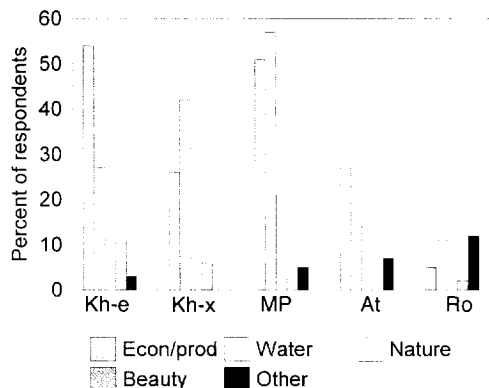


Fig. 6. Aspects of fynbos indicated as important by students at different schools after a presentation on fynbos. For an explanation of the categories see the text.

plants, animals and nature. The percentage of answers categorised as ‘nature’ ranged from 22% at Kh to 75% at Ro. Answers relating to beauty (e.g. aesthetic benefits) ranged from 1% at Kh to 5–6% at MP and At and 28% at Ro. Few identified remunerative benefits, such as flower harvesting, with the corresponding values being 7, 1, 0 and 6%. Nevertheless, their answers often included poignant concerns and significant insights into what they believed would be lost if fynbos were to disappear (Box 1 see Appendix A).

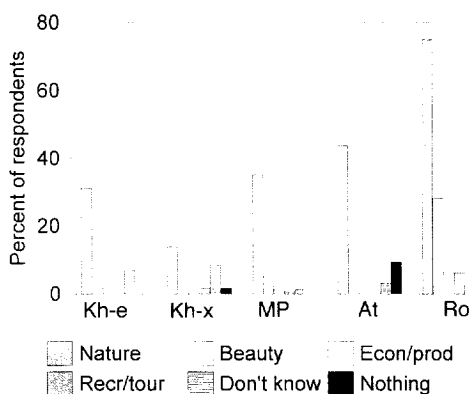


Fig. 5. Prior knowledge among students at different schools of what would be lost if fynbos were to disappear. For an explanation of the categories see the text.

3.2. Post-presentation knowledge and responses (questionnaire 2)

More than 80% of the students indicated that they had learnt something new from the slide show (Box 2; see Appendix A). The poorest response was at MP school (84%) where the large number of students may have made the presentation less effective. Some students at MP said that they had difficulty understanding the lecture because it was given in Afrikaans.

The message that fynbos was important for the production of water reached many students (Box 2, Appendix A). More than 40% of the Xhosa group at Kh identified water compared with 27% of the English group (Fig. 6). There was a distinct trend in the awareness of the economic role of fynbos, with the lowest response of < 40% from students at Ro. Students from Ro (6%) and at Kh (15%) were the only ones who highlighted aesthetic values.

More than 40% of the responses at all schools, except MP, included the removal of aliens as being important for the preservation of fynbos. Conservation was also emphasised at all schools but the level of support for educational outreach was very low. Despite this response, the overwhelming majority of students (70–80% or more) said that they would like to learn more about fynbos. Between 60 and 100% of the students

would like to help conserve the fynbos. When asked why they wanted to help (question 4), students from Ro and At identified its uniqueness and natural benefits such as the provision of animal habitat (Box 2, Appendix A). Conservation got the highest score at Ro (44%), followed by At (38%) compared with MP (20%) and Kh (11%, Fig. 7). There was a similar trend in the importance of beauty and the value of fynbos for future generations (Box 2, Appendix A). The opposite trend was evident in terms of remunerative benefits, e.g. products and jobs. At Kh more than 15% of the respondents mentioned these benefits in contrast to less than 3% of the students at At. When asked how they would help, students at the two wealthier schools highlighted involvement in education and research (Fig. 8, Box 2, Appendix A). Students from more disadvantaged communities showed more interest in conservation-orientated activities.

4. Discussion

Overall, the results of the survey were much better than initially expected. The level of interest, knowledge and motivation across such a broad cross section of the students and teachers was surprising and gratifying (see comments in Boxes 1 and 2, Appendix A).

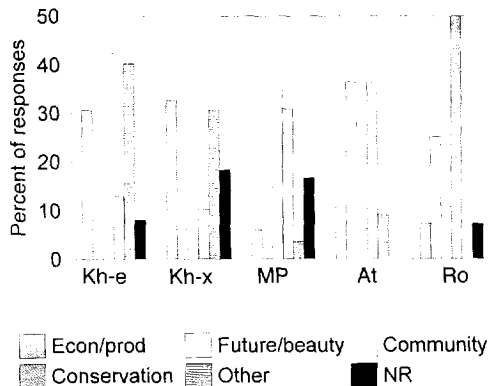


Fig. 7. Important reasons why fynbos should be conserved as indicated by students at different schools after a presentation on fynbos. For an explanation of the categories see the text. NR = no response.

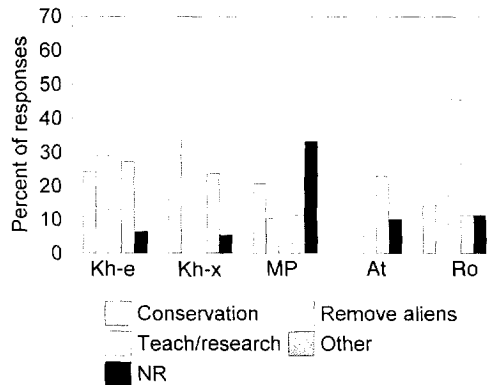


Fig. 8. How students at different schools believed they could help to conserve fynbos after a presentation on fynbos. For an explanation of the categories see the text. NR = no response.

There are some important points to consider in interpreting the results of this survey. It was very difficult to get the students to understand that this was not a test and that we simply wanted to know what they knew, if anything. There was collusion between the students in their attempts to answer the questions, some of which was due to difficulties in interpreting the questions and understanding the terminology that was used. The collusion resulted in distinct groupings of answers to questions. We have not attempted to control for that because the impact on the dominant trends was small. There were also marked differences in home backgrounds, educational strategies and school facilities which have influenced the results of the surveys. We believe there is strong justification for conserving fynbos. Our enthusiasm was conveyed in our presentation and would have influenced responses (Swallow and Woudleyalew, 1994). Thus we cannot claim to be neutral observers or interpreters (O'Hara, 1996) but we do not believe this had a significant influence on the results.

4.1. Background of the student

There were several indications that the students from Kh and MP had less general knowledge of fynbos than those at At and Ro. Factors that contribute to this include parental background (as reflected in their occupation and training), culture and maturity and experience.

4.1.1. Parental occupation

At Kh 10 and 17% of the fathers and mothers, respectively, were unskilled labourers, compared with 5 and 3%, respectively, at MP and none at the other schools. At Ro almost all parents were in occupations requiring training: the majority of the fathers were in managerial (28%) or professional (44%) occupations; the corresponding figures for mothers were 6 and 9%. Parental occupations at At fell between these extremes. Language problems were also a significant factor in the responses to this question. For example, at Kh 18% gave the place or suburb where their parents worked and not their occupation. The differences in parental occupation have influenced the responses, but the trends are probably typical of similar socio-economic groupings elsewhere in the world. For example, interest in and exposure to natural environments and conservation is generally greater in well-educated middle and upper class families than among working class families.

4.1.2. Culture

Differences in cultural background are evident in the responses to certain questions. For example, students at Kh strongly identified trees as being characteristic of fynbos. This is not surprising for several reasons. Firstly, the Xhosa language lacks the word 'shrub' and the nearest equivalent is 'small tree'. Secondly, their parents would have been familiar with grasslands and savannas and much of the traditional knowledge of natural vegetation and herbal medicines would therefore not relate to the fynbos. Thirdly, most of the remaining natural areas close to Khayelitsha and accessible to them are heavily invaded by alien trees.

4.1.3. Maturity and experience

Age is a reasonable index of student maturity and their outlook on and experience of life. At At and Ro the age distribution was typical for their standard, shifted by about a year at MP, and dominated by older students at Kh (Table 2). The wide age distribution at Kh is partially due to the school unrest involving both students and teachers during the last 20 years. Many students left school in protest against the inequitable education

system under the apartheid system, often becoming political activists and only returning to school after gaps of several years. These differences also influenced responses, for example the importance of education and jobs to those who left school and have returned to try to improve their education. The differences probably are typical of many schools and must be considered in planning environmental education materials for schools.

4.2. School facilities and settings

The facilities at the schools varied markedly, primarily because of the inequitable funding of schools during the apartheid era (Armstrong, 1995). The classrooms at MP were in poor condition with many broken window panes and no blinds or curtains, a legacy of the school unrest which has erupted periodically since 1976. At Kh the school building was modern but the furnishings were in poor condition. The classroom could also not be darkened and had no working wall plugs. At had a modern language laboratory, sponsored by an international company, which was equipped with facilities for slide shows. At Ro we used a well-furnished classroom which had blinds so that it could be darkened. Outdoor facilities such as sports equipment were non-existent or in poor condition at Kh and MP compared with the other two schools. These factors are important because they highlight the disparities in the kinds of materials that are available, the opportunities for making learning interesting and rewarding, and for outdoor activities.

Despite extensive urbanisation around all four schools, there are still some remnants of natural fynbos such as Kirstenbosch and Rondebosch

Table 2
The percentage of students in different age groups at the different schools

Age group	Kh	MP	At	Ro
14	0	1	0	66
15	7	27	87	34
16–18	46	71	13	0
19–21	41	1	0	0
>21	6	0	0	0

Common within about 10 km of Ro and At. Wolfgat Nature Reserve is situated a similar distance from MP and Kh schools. Opportunities to visit these areas would have been limited by factors like: (a) finance for transport; (b) the current lack of knowledge of the teachers about fynbos and these facilities; (c) the limited exposure of teachers to fieldwork during their training (Wagiet, 1991); and (d) the limited capacity of parents and social organisations (e.g. clubs) to organise and finance visits by students to these areas. This would clearly have had a much greater impact on the students from MP and Kh than those from the other two schools.

4.3. Educational strategy

In South Africa the typical socio-economic contrasts have been exacerbated by an education strategy and syllabus that deliberately downgraded science and environmental education and experiences for coloured and even more so for black students (Armstrong, 1995). The curricula for students at Ro and At (academic stream) put more emphasis on insight, understanding and relevance to life while those at MP and Kh were more knowledge or fact-oriented. Education in the latter two schools still reflects a system which discouraged engagement in local issues-based studies, an approach called 'pedagogy of the oppressed' by Freire (1972). Clearly, local environmental issues must be part of school curricula to enable the students to influence their parents and peers now, and to make better informed decisions when they become the decision makers of tomorrow (Knamiller, 1983).

Student performance also reflects teacher knowledge. Manuel (1995) found that knowledge of fynbos among teachers is poor. Curriculum materials, especially on interpreting and understanding fynbos ecology are inadequate or lacking. The current textbooks emphasise grassland, savannah and semi-arid vegetation types as they are the major vegetation types in South Africa. Some initiatives are being taken to redress the paucity of material on the fynbos available to teachers, but most are specific to particular reserves. There is a national initiative to make

environmental education part of the formal syllabus which includes guidelines on implementation and approaches (Nel, 1995).

4.4. Relevance of fynbos to students before exposure to information

Many black students apparently walk in natural vegetation for recreation and in wealthy white and coloured communities this activity is very widespread. The very low level of recreation in natural environments in MP is not simply due to the alienation of the urban poor from natural environments. The open areas are frequently overgrown by trees and shrubs and a hideout for criminals. Coloured children of this community have been specifically banned from open areas for the last five years because of the activities of a paedophilic serial murderer (Swartz, 1994). Nevertheless, the implication of the widespread recreational use of natural areas is that the amenity value of the fynbos is high and potentially relevant to a wide range of society.

4.4.1. Non-consumptive use benefits

The response of the students to what they thought would be lost if fynbos disappeared is obviously closely related to their level of knowledge and, accordingly, how they value fynbos (Box 1, Appendix A). Many of those who knew little about the fynbos didn't answer this question and apparently do not attach much value to fynbos. Those who knew most indicated that natural characteristics and aesthetic benefits would be lost, especially animal habitat and flowers.

Maslow's hierarchy of needs (Maslow, 1954) proposes that the poorer socio-economic groups will be most concerned with basic needs. The results of this survey support this but indicate that despite their relative poverty, black and coloured school children are concerned about aesthetics, bequest values and conservation (Box 2, Appendix A).

4.4.2. Consumptive use benefits

As expected, remunerative and subsistence benefits decreased in importance as affluence increased. The strong interest in direct benefits such

as firewood and jobs among the poorer students undoubtedly reflects socio-economic realities. Knowledge of the employment and products, including water, that fynbos provides was uniformly low. Most students were also unable to relate items used in their homes to fynbos. This ignorance must be tackled first if we wish to increase awareness of the importance of fynbos to the stakeholders. Information on the diverse benefits must become part of formal school curricula if environmental conservation is to get its rightful place in the reconstruction of South Africa.

4.5. *Current level of knowledge*

The level of knowledge of fynbos indicated by students was consistent with their responses to later questions. Those indicating some knowledge also knew what vegetation type fynbos is and where it occurs. Those with very low levels of knowledge, typically from Kh and MP, gave inaccurate answers to other questions even when they indicated some knowledge. Their responses highlight the desperate need for improved environmental education at historically black and coloured schools. It would be very interesting to determine what the current primary sources of knowledge and values are and this should be added to any future questionnaires.

The level of knowledge of fynbos probably reflects the amount of time spent in fynbos. Although many of the students at Kh apparently spent time in natural vegetation, much of the vegetation surrounding Khayelitsha is open wasteland or alien tree-invaded bush. Students at MP were more or less evenly divided between shrubs, trees and grass, the dominant cover in most parks and open areas they would have seen in their neighbourhood.

Most students knew that fynbos was important in terms of its natural characteristics and many identified flowers as important components of fynbos. More students at Ro and At knew the words biodiversity and endemism and also highlighted rarity. This clearly separated them from those whose prior knowledge was poor and is perhaps a good way of testing general levels of environmental knowledge.

Some answers were definitely biased by the structure of the questionnaire; an example is that the question on whether fynbos is threatened is followed immediately by a question on what is threatening fynbos. This would have encouraged the students to answered 'yes'. Thus the responses to what threatens fynbos are more revealing. For example, the threats alien plants pose to fynbos were not identified by most students except at Ro.

4.6. *Response to the presentation*

The slide show generated an overwhelmingly positive response and undoubtedly succeeded in increasing awareness that fynbos is unique to South Africa and that its benefits are relevant to the students (Box 2, Appendix A). They now appreciated the value of water from fynbos catchments and thus the need to remove alien plants. This suggests that it was relevant and accessible to a very wide audience and that all schools could benefit from improved environmental education. The students are also very enthusiastic about learning more—demonstrating strong support from the most important constituency for environmental education. This was also shown by the participation in this programme by students who could have been having free time and in the enthusiastic response that our team received at all schools.

Moreover, the majority of the students also indicated a desire to participate in conservation of the fynbos although there would undoubtedly be fewer who would actually become involved. This is very encouraging and indicates that there is a large untapped resource that could be incorporated in conservation programmes. In many cases the educational value of participation could exceed that of the activity itself. Many of the students at At indicated that they would like to help in education and research, particularly by becoming more informed and passing this information on to the wider community. The role of children and students in environmental education of the wider community has already been demonstrated locally (Britton and Jackelman, 1995; Manuel, 1995) and in Europe (Uzzel, 1994) and their power to influence affairs should not be underestimated.

4.6.1. *Non-consumptive use benefits*

There was still a definite trend for the interest in conservation, beauty and preservation for future generations to be lower in more disadvantaged communities, but it remained important. A surprising proportion of the students at Kh stated that the most important thing they had learnt was that fynbos is beautiful. Similarly, students at MP expressed a strong interest in preserving fynbos for the benefit of the community as a whole. Students at At were well aware of the remunerative benefits of fynbos and yet rated conservation, aesthetics and preservation of fynbos for future generations more highly when asked why fynbos should be conserved. These findings support those from a similar study of Tanzanian high school students where 37% of students gave priority to National Parks for their aesthetic and bequest values (Pennington, 1983; Harcourt et al., 1986).

4.6.2. *Consumptive use benefits*

Fynbos was highly valued by the poorer students for the resources it could provide, but the remunerative and subsistence benefits of fynbos were less important to the wealthier students. For example, the link between alien clearing and job creation and firewood production was more strongly emphasised by students at Kh than at the other schools. The importance of fynbos for the production of water was a very useful tool for bringing the relevance of fynbos home to students from all walks of life. This was also the first time that many students realised that products such as rooibos tea came from fynbos.

5. Conclusions

This study found a strong relationship between knowledge and appreciation of the benefits of fynbos and socio-economic status. Overall, the level of understanding ranged from none to limited, with few being aware of the substantial remunerative and subsistence benefits. Most of the students also were not well informed about the factors threatening fynbos,

particularly invasive alien plants. Nevertheless, there was a surprising degree of interest in fynbos and its benefits among all the students, with even the poorest students indicating that non-consumptive benefits were important to them. The results substantiate the argument that there is a strong relationship between knowledge and stewardship, and that non-consumptive non-use benefits are important even to the poor. They also support the argument that, in many situations, consistent values based on firm ethics may provide a more reliable basis for decisions in multi-stakeholder societies than 'soft' facts (O'Hara, 1996).

The information in the slide show appeared to be meaningful and sufficient and clearly increased the student's appreciation of fynbos, especially the consumptive benefits. The level of interest and enthusiasm was immensely satisfying. It was obvious also that both students and teachers at the schools deeply appreciated the fact that we cared enough to come and talk to them. The presentation will need adaptation to make it more appropriate and the technical terms such as 'biodiversity' must be better explained. One of the key areas will be language. Students from Kh should have sufficient grasp of English to understand the presentation, but there is much to gain through using the Xhosa language and idiom (Buckle, 1995). Thus we believe that it is essential that environmental educational material should be produced and presented and in the student's home language. There must also be substantial investment in further training of teachers, particularly through workshops (Ham and Sewing, 1988), to equip them to present these materials in the classroom and in field studies.

Conservation of the fynbos can play a vital role in the reconstruction and development of South Africa, but due to a lack of public knowledge it is in danger of being neglected in favour of other pressing issues. The RDP emphasises participation and that people have strong emotional and spiritual needs to be involved and to have identity, security, respect and recognition (Kraybill, 1995). Our survey shows that the in-

terest and enthusiasm is there among the stakeholders, but a substantial investment in environmental education will be required to tap that enthusiasm.

'It is the task of our democratic society to rebuild and green the impoverished areas. The masses—yes, all of us—need greenery; places where the human spirit can be free. The poor especially should not be deprived of the appreciation of beauty.' (Kader Asmal, Minister of Water Affairs and Forestry).

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Appendix A

Appendix 1: Questionnaires

QUESTIONNAIRE 1

School: _____

Age: _____ years Male _____ Female _____

Father's occupation: _____

Mother's occupation: _____

1. *Do you ever spend time in, or walk through, natural vegetation for your own pleasure?*
YES _____ NO _____
2. *Do you know what fynbos is? Tick the preferred answer:*
Don't know at all _____ Heard the name _____
Know a little bit _____ Know a lot _____
3. *What vegetation type best describes fynbos?*
Trees _____ Shrubs _____ Grasses _____
4. *What makes fynbos special? Tick the important ones (you can tick more than one):*
Birds _____ Tourism _____ Mammals _____ Rarity / Endemism _____
Insects _____ Motorcross _____ Plants _____ Big game viewing _____
Flowers _____ Education _____ Food _____ Water _____
Herbs _____ Firewood _____ Biodiversity _____ Jobs _____
Shopping _____ Gambling _____ Mountainbiking _____
5. *Where does fynbos occur?*
South-western Cape _____ All of South Africa _____ All of Africa _____
6. *Where does Cape Town's drinking water come from?*
7. *What, if anything, do you or your family use that comes from fynbos?*
8. *Do you know anyone who has a job related to the fynbos?* YES _____ NO _____
If YES, what is their job? _____
9. *Do you think that fynbos is threatened?* YES _____ NO _____
If YES, what are the main threats? (You can tick more than one)
Alien trees _____ Agriculture _____ Urbanisation _____ Fires _____
10. *What do you think will be lost if fynbos disappears?*

QUESTIONNAIRE 2

1. *Did you learn something new from the slide-show?*
YES _____ NO _____

If YES, what do you think is most important in relation to the fynbos?

2. *What do you think should be done to preserve or exploit the fynbos ?*

3. *Are you interested in learning more about fynbos?*
YES _____ NO _____

4. *Would you like to help with conservation of fynbos?*

YES _____ NO _____

If YES, why would you like to help? _____

5. *How do you think you can help?* _____

THANK YOU VERY MUCH FOR YOUR HELP

BOX 1: ANSWERS TO QUESTIONNAIRE 1**What do you think will be lost if fynbos disappears?**

- A very specialized and beautiful environment (Ro)
- A particularly unique environment found in only one part of the world (Ro)
- Tourism to SA (Ro)
- The beautiful sightseeing and getting back to nature (Ro)
- A diverse natural ecosystem which depends on fynbos. A natural heritage and a vast botanical phenomenon will be lost as well (At)
- Something no other land has and might never have a chance to see or appreciate (At)
- Natural vegetation and animals which live on it (MP)
- The tea (MP)
- The greenness and the beauty of nature (MP)
- The work is gone (Kh)
- Nothing because I don't know fynbos (Kh)
- Fruits, flowers, medicines, firewood, tourism, environment (Kh)
- We be lost many things such as trees and beautiful country (Kh)

BOX 2: ANSWERS TO QUESTIONNAIRE 2**What do you think is most important in relation to fynbos?**

- We get tea; stored water we get lovely flowers make the tourists more interested to the environment (Kh)
- It has been taken for granted (MP)
- Alien trees are taking over and using more water (Ro)
- We must conserve its beauty (Ro)

What do you think should be done to preserve or exploit fynbos?

- I think it should be under big protection and the trees that take a lot of water should be cutted and the fynbos should be planted in the places of those trees (Kh)
- To cut down the trees and this work is to create jobs in people (Kh)
- More people should be taught about fynbos, so they would be able to preserve it (At)
- By getting more people involved so that the future ahead could be a pleasant one for the children of South-Africa (MP)

Why would you like to help?

- Because I learnt a lot (Kh)
- So that I can show fynbos to my children one day (At)
- Because I finally realize its importance (At)
- Because our land is beautiful and up to us to preserve (At)
- So that our children will be able to see fynbos and have water to drink (Ro)

How do you think you can help?

- To clean the flowers because they are so beautiful (Kh)
- Telling other people about fynbos so that they can be alert of what is in their country (Kh)
- Start a group at school (At)
- By getting more people aware about it to make sure they realise how useful it is (Ro)

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