HUMAN IMPACT ON THE

CAPE OF GOOD HOPE NATURE RESERVE

by

Howard Benkenstein

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PREFACE

The research work described in this thesis was carried out under the auspices of the School of Environmental studies, University of Cape Town from November 1979 to January 1980 under the joint supervision of Professors R.F. Fuggle and J.R. Grindley.

These studies represent original work by the author and have not been submitted in any form to another University. Where technical assistance was given by others it has been duly acknowledged in the text.

ACKNOWLEDGEMENTS

Thanks are due to my joint supervisors Professors R.F. Fuggle and J.R. Grindley of the School of environmental Studies for arranging financial assistance and giving advice that proved to be invaluable in guiding the thesis to its final conclusion.

A special vote of thanks is due to the Environmental Studies technician, Mr. A. Flepp for designing and building traffic-counters used in the research. Without these it would have been impossible to obtain firm quantitative estimates of the distribution of people in the reserve. I would also like to thank Mr. G. Russel, a former University colleague, for his assistance in writing the computer program for processing visitor survey questionnaire data.

I am indebted to the Harry Crossley Bursary fund, the Wild Life Society of South Africa, and the Department of Nature and Environmental Conservation, Cape Provincial Administration for financial assistance rendered during the course of my studies.

ABSTRACT

The problem investigated in this study is the environmental effect of outdoor recreation on a valuable conservation area, the Cape of Good Hope nature reserve.

The approach adopted views the reserve as a business concern that produces service commodities from the resources of the natural environment. Supply of these commodities was estimated from a visitor activity profile obtained by combining traffic count data with timed observations on visitor behaviour. Demand was assessed from the results of a visitor survey and from information obtained from a literature review. The results of these investigations provided a data base for formulating a business management policy for the reserve.

The findings of the study were that the shortage of open space in Cape Town and the Western Cape is a human ecological problem and that a business management policy which reinforces human behavioural links with the environment would be both an economic solution and an ecological solution to the current controversy surrounding matters related to conservation in the Cape of Good Hope nature reserve.

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CHAPTER 1

INTRODUCTION

1.1 HISTORICAL PERSPECTIVE

The Cape of Good Hope nature reserve must be seen in historical perspective as an open space whose value has increased as neighbouring metropolitan areas (see Fig 1.1) have grown. The growth of the number of visitors to the Cape of Good Hope nature reserve is shown in Fig 1.2 (after Millar [1970] and updated from Divisional Council of the Cape records to 1980). This shows how public use of the reserve has increased since its inception in 1938. It shows a marked increase in visitors in the post-war period (World War 11) followed by a relatively stable period until the mid nineteen-fifties when a strong upward surge began. In 1967 there was a slight drop, a complete reversal of the trend, followed by a boom. Between 1967 and 1970 the number of visitors to the reserve more than doubled. In 1967 some 200 000 visitors were recorded, but in 1970 this total was almost half a million. Then came a slump and by 1973 numbers had dropped to 300 000. After this the annual totals of visitors oscillated between 300 000 and 400 000, and this represents the present condition.

Rural environments near towns are affected most by the urban expression of a desire to be in the country. This takes the form of day-tripping activities, a common phenomenon in the modern industrial west. It is these mass excursions from the built environment that characteristically give rise to human impact problems such as the one being studied here. The problem is not confined to a consideration only of nature conservation in a nature reserve, but relates in a wider sense to the growing necessity for man to maintain and reinforce his behavioural links with the environment in the face of increasing urbanisation.

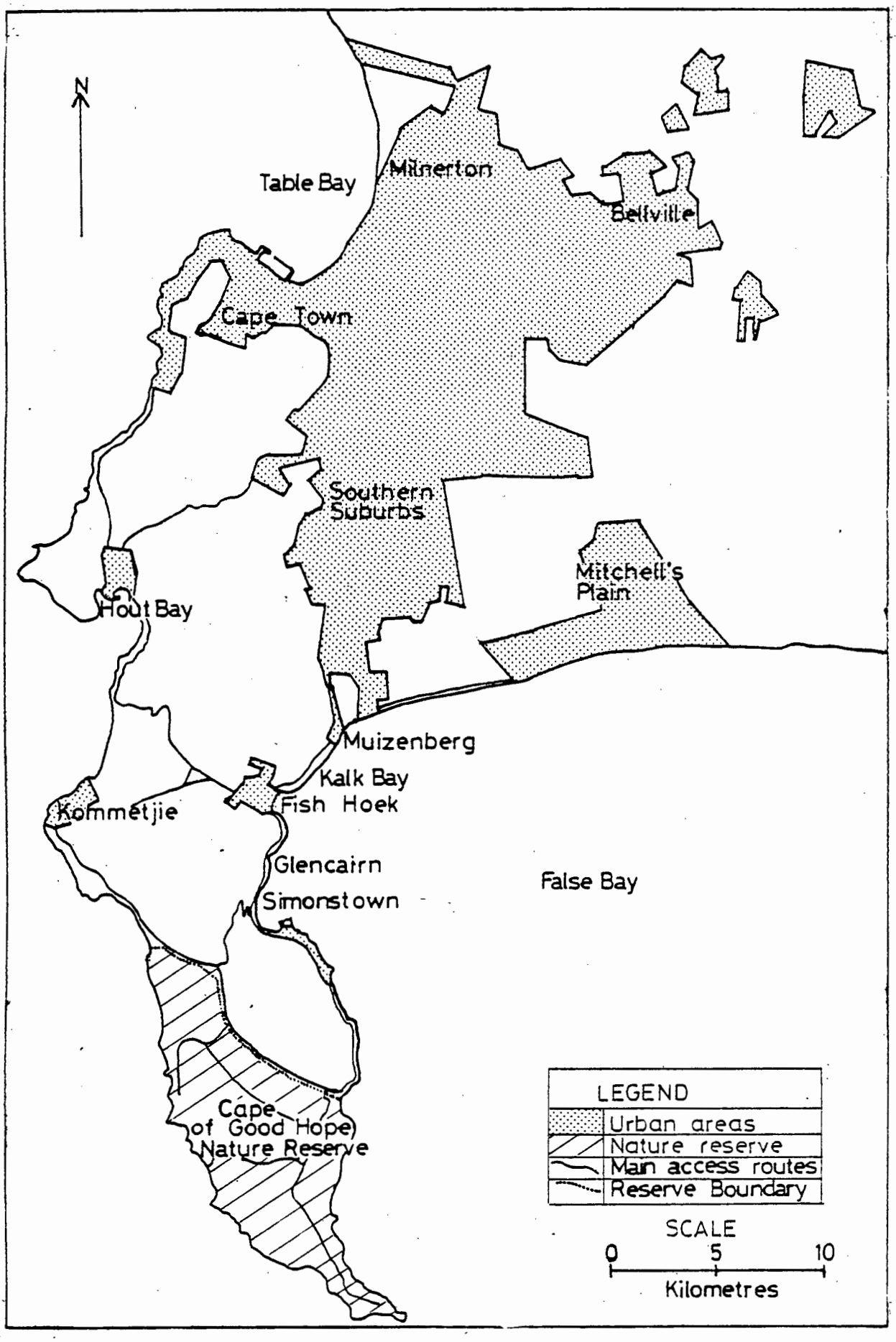


FIGURE 1.1 Locality plan showing the Cape of Good Hope nature reserve in relation to neighbouring urban areas

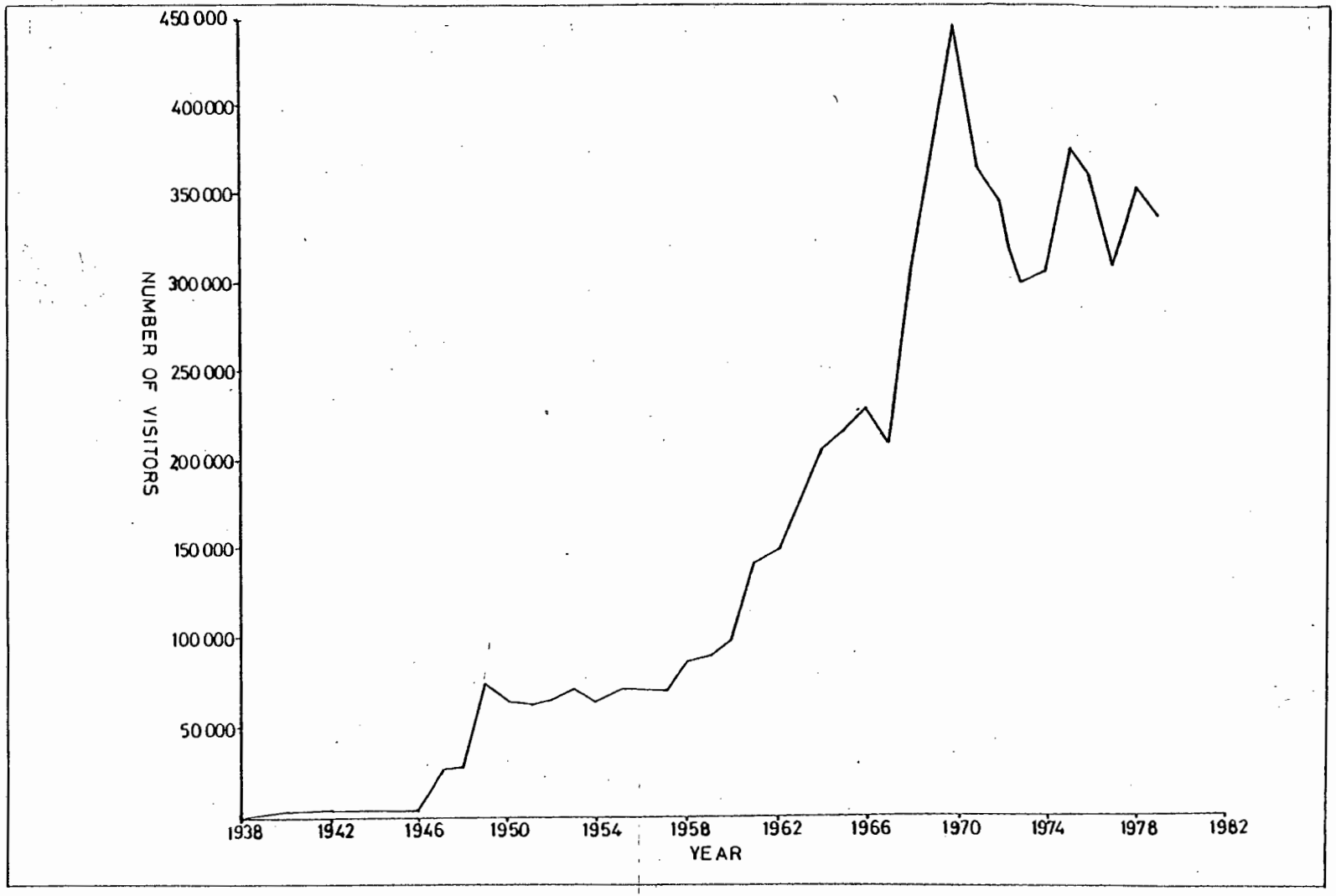


FIGURE 1.2 Graph of annual totals of visitors to the Cape of Good Hope nature reserve 1938 to 1980.

1.2 THE TOPIC

The Cape of Good Hope nature reserve is a parcel of land 7 750 ha in extent (Cottrel 1978) occupying the southern tip of the Cape Peninsula only 40 km from the approximately one-million inhabitants of Greater Cape Town (South African association of Municipal Employees 1979). The location of the reserve in relation to neighbouring urban areas is shown in Fig 1.1. The reserve, as a result of its proximity to urban environments, is visited by large numbers of people in search of the open space of a natural environment. More than a quarter of a million people visit the reserve annually (Fig 1.2) which equates to the number visiting South Africa's Kruger National Park (Cottrel 1978). There is a sharp increase in the number of visitors to the reserve in the summer holiday season, the peak months being December and January (Fig 1.3).

The provision of public amenities and the use of the reserve for outdoor recreation has aroused protests from conservation authorities and public alike. The reserve has an international tourist attraction within its borders (the unique landmark of Cape Point). It also has world-wide significance as a fynbos conservation area, since the threatened fynbos biome, which represents one of the six floral kingdoms of the world, now remains intact only in a few areas, the reserve being one of these (Taylor 1969). This whole situation has provoked controversy about human impact on the environment. It presents a dilemma for the Divisional Council of the Cape, the public authority managing the reserve. The Council is torn between providing amenities for its rate-payers and ministering to the needs of nature conservation. It is assisted financially by the Department of Nature and Environmental Conservation, Cape Provincial Administration which grants a 50% annual subsidy towards the cost of nature conservation undertaken in the reserve.

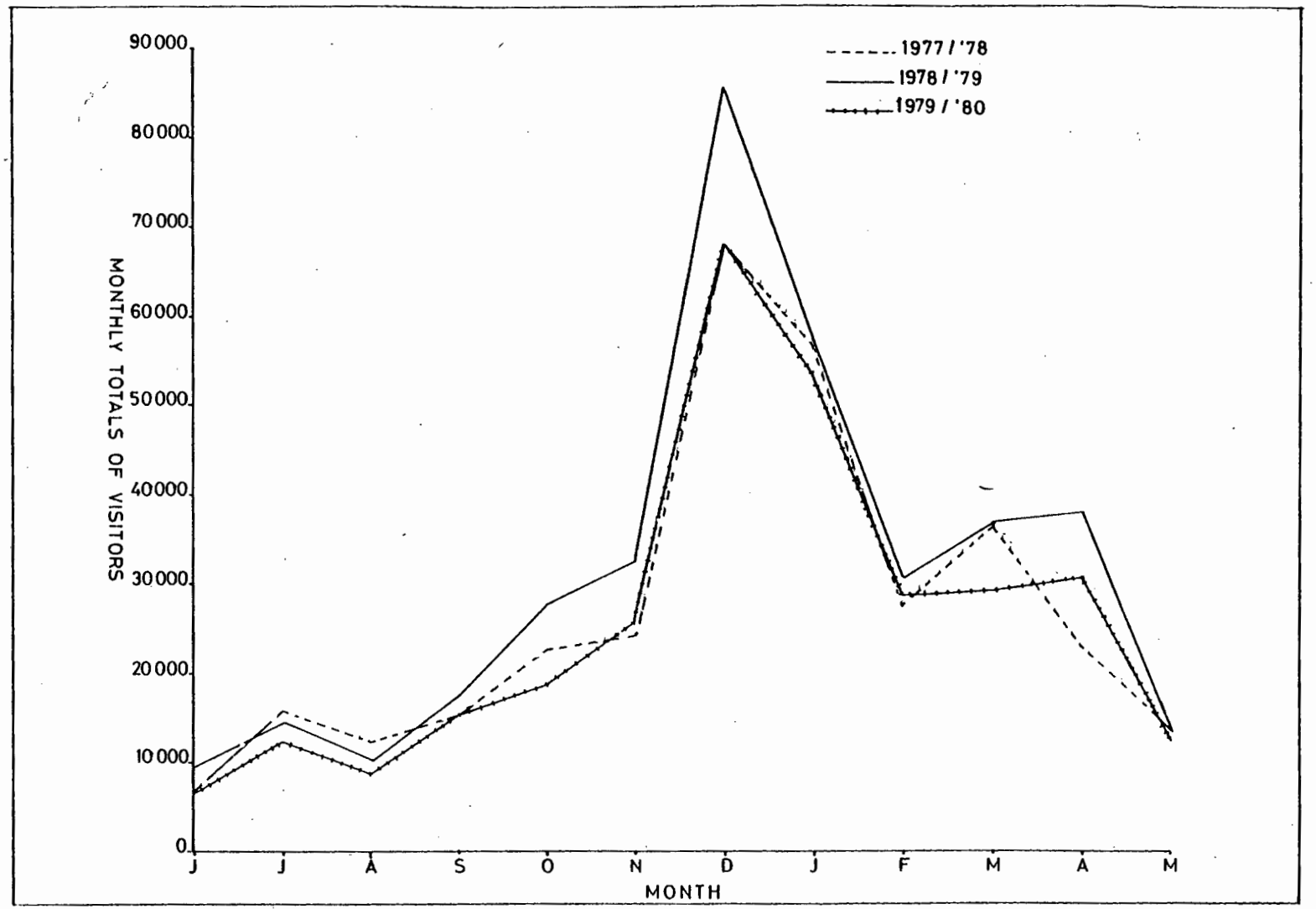


FIGURE 1.3 Graphs of monthly totals of visitors to the Cape of Good Hope nature reserve, 1977 to 1980

Biological impacts on the Cape of Good Hope nature reserve result from man's introduction to the Western Cape of alien plant species and his action in confining wild herbivores to the reserve in what amounts to a one-paddock grazing system. The former has resulted in the displacement of natural plant communities by alien species and the latter lowers stock carrying capacity. The physical impact of humans on the environment, the topic of this thesis, is also a problem because of the uneven distribution of visitors who confine themselves to specific areas of the reserve.

1.3 LITERATURE REVIEW

Outdoor recreation in a natural environment fulfills a basic human need. Lederman (1968) states that play is of decisive importance for the psychological development and maturing of man. Wurman (1972) states that the need for recreation is universal. He adds that a feature of modern-day living is a lack of open space in urban areas, with a corresponding inadequacy of recreational amenities. According to Lederman (1968) the "Homo faber" or working man is the key person for town planners, whilst the "Homo ludens" or playing person, is left to the realm of the philosophers. The social impact of metropolitan development has been to increase consumer demand for outdoor recreation, a modern trend which is manifested as a widespread urge to go to the country (Beazley 1969).

Aaron (1965) and Allen (1968) point out that a shortage of open space in urban areas, particularly in the vicinity of large apartment blocks is an acute problem for the recreational requirements of children, while Seely (1973) calls for a complete re-appraisal of consumer demand for outdoor recreation in urbanised regions. In the local context Villet (1974) contends that the built environment in Cape Town has created a shortage of outdoor recreation experience for the city's inhabitants. He makes

particular mention of the amount of space taken up by roads. Binckes (1969) recommended that new areas in the Cape of Good Hope nature reserve be opened up to intensify outdoor recreation there. Putteril (1978) discusses the extremely high consumer demand for recreational experience in the low-income sector of Cape Town.

Outdoor recreation in the U.S.A. was stated by Butler (1959) to be a rapidly expanding aspect of the American way of life. The increased usage in that country of natural forests for recreational purposes (United States Forest Service 1965) is but one of the many examples in the literature supporting this contention. Miles (1977) claims that informal countryside recreation in Britain probably outstrips all other out-of-home activities put together, apart from social drinking and visits to friends.

Increased leisure-time, prosperity (United States urban land institute 1970) and mobility (Barry 1968) are world-wide influences in a global outdoor recreation explosion which have enhanced the movement of people between town and country. The growth of tourism has had an added effect on the environment.

World tourism was estimated to have been the largest single item of foreign trade in 1967 (Organisation for economic co-operation and development 1967). It is evident from a regional study by Ritchie et al (1965) that the expansion of tourism in Central America has been considerable in recent years. Mention of the importance of tourism in Ireland is made by Lichfield (1966) in a report and plan for the development of tourism and recreation on the Shannon estuary. A study of the increase of tourism in Africa commissioned by the International Union of Travel Organisations furnishes further information on the world-wide boom in international tourism (International Union of Official Travel Organisations 1966). Joint studies by Bott (1973) and Renders (1974) on the supply and demand

considerations underlying the tourist industry in the region of Port Elizabeth provide evidence of the importance of tourism in South Africa.

The social importance of mass leisure activities has heightened the demand for outdoor recreation in natural areas. At a study conference in the U.S.A. the situation was summed up as follows;"A traditional viewpoint that viewed outdoor recreation as a valuable by-product of conservation is being superseded by a philosophy that holds recreation to be a primary public purpose." (United Stated Academy of Science 1969). Recreation, in other words, is a social welfare concern. As a result of the technological revolution it has become a necessity not a luxury. Thus a need has arisen for business policy solutions to contain the rapid expansion of the recreation industry. Authors such as Lavery (1971) and Appleton (1974) have presented in-depth analyses of the economics of outdoor recreation. The scrutiny that recreation receives in the literature is indicative of a heightened interest in the subject as a field for professional study. Clawson and Knetsch (1966) were of the opinion that the mounting demand for outdoor recreation would bring great pressure to bear on public authorities to change their business policy towards the use of the natural environment. This is very evident in the United States. In 1969 the annual expenditure of the Federal Government for acquisition and capital improvements on recreational areas amounted to US $800 million (United States Academy of Science 1969). The following year a nationwide plan for outdoor recreation required the expenditure of US $42 billion (Van Doren et al 1979). This serves to show the enormous importance of outdoor recreation in a modern industrial nation.

The social welfare problems arising from the diseconomy of supply against rising demand for the outdoor recreation experience has accelerated the growing interest in planned management of recreational resources (Van Doren et al 1979). The creation of the Outdoor Recreational

Resources Review Commission by an act of Congress on June 1958 in the U.S.A. was a milestone for outdoor recreation planners, This body commissioned nationally co-ordinated research into the resource economy of outdoor recreation in the U.S.A. The series of reports to the Commission in 1962 covered a broad range of topics on the quality of outdoor recreation, the economics behind it, and the future of outdoor recreation in the natural regions of the U.S.A (United States Outdoor Recreation Resources Review Commission [O.R.R.R.C.] 1962 a, b, c and d). These nationally co-ordinated programmes of research proceeded in parallel with projects at a State and regional level, such as the California Public Outdoor Recreation Plan Committee (1960) and the Detroit Metropolitan Area Regional Planning Commission study (1966).

These studies illustrate the need to relate resources to people rather than to merely relate facts about resources. This statement from a study conference on outdoor recreation highlights the growing mood of disenchantment with the "man apart from nature" approach to studying matters relating to our environment; "The growing importance and relevance of outdoor recreation has not yet been reflected in the research and systematic analysis on which planners and managers in the field must rely for guidance and direction. Current research endeavours are concerned predominantly with resources. In comparison little research emphasis is given to obtaining a better understanding of the social and psychological aspects of outdoor recreation." (United States Academy of Science 1969).

Man's actions are the root causes of environmental impact (Munn 1975) so it is logical to plan resource management by market research. Market research is a study of the human element in relation to resources. It is an orderly approach to resource planning based on principles

of economics. The market approach has many applications in commerce.

In the Republic of South Africa, Ferrario (1978) has carried out investigations which amount to a market research survey on tourism. His findings show consumer demand for the attractions of Cape Point to be third in a ranking of the tourist resources of South Africa. Some information on consumer preferences in the outdoor recreation industry in South Africa is available from a household survey of public attitudes to nature conservation conducted in the Cape Metropolitan region by Van Broembsen (1977). Van Broembsen showed that there was a higher consumer demand for recreation facilities in natural areas than there is for unmodified natural areas. In this connection, Cottrel (1978) states that visitor surveys in the Republic of South Africa and overseas show that consumer demand for outdoor recreation in nature reserves rates higher than demand for nature study activities.

Morris (1979) comments on the deficiency of relevant market research information on outdoor recreation in the Republic. He states that we in South Africa have had to rely heavily on the U.S.A. and overseas study experience in this regard. Morris has made use of data obtained in the U.S.A to anticipate the future demand for outdoor recreation facilities in the subsidised nature reserves of the Cape Province. A similar approach has been adopted by the Department of Environment Affairs in a regional study aimed at planning the utilization of the natural resources of the Drakensberg (South Africa Department of Planning 1979).

Tourism in the Republic of South Africa is a rapidly expanding section of this country's economy (South African Tourist Corporation 1978). A Cape Tourism authority has been specially created to expand the domestic and foreign market for the consumption of services from the

environment of Cape Town and surrounds because of the commercial benefits this will bring to the community as a whole (Cape Tourism authority 1st Annual Report 1978).

The importance of tourism in the Cape together with the forceful expansion of outdoor recreation pursuits by Capetonians themselves, has brought considerable pressure to bear on nature conservation authorities to change their policies to accommodate the growing need for outdoor recreation within conservation areas. The situation that exists is a microcosm of the global phenomenon. People from the town visit the country in the week-ends and this creates a human impact problem.

Information on human activities in the Cape of Good Hope nature reserve is limited. Hey (1978) states that a broad spectrum of activities including picnicking, sightseeing, scuba-diving and power-boating take place. There is a wealth of literature about matters concerning environmental conservation in the reserve. Van der Merwe (1979) in a bibliographic survey lists no less that 40 contributions, many of which have been published in journals or as university theses, but information presented in this literature is related to resource rather than market research.

Millar (1970) in a report and management plan on the reserve emphasises the need for a clearly-defined management policy to settle the controversy surrounding matters concerning environmental conservation. It is felt there that the root cause of the controversy is a policy failing. It is a conflict of ideals that causes disagreement. A better environment is the common aim of both public and nature conservation bodies and a unity of purpose might be found in a management policy for the reserve which is based on principles of environmental economics.

1.4 PROBLEM AND RESEARCH OBJECTIVES

The problem is how to formulate a land management policy which reconciles two apparently incompatible forms of land use in the Cape of Good Hope nature reserve, namely, recreation and conservation. The objectives of this study are to formulate a management policy solution to the human impact problem caused by outdoor recreation and to recommend measures for implementing it.

1.5 APPROACH

The unifying theme in this study is environmental conservation. Conservation policy and land management of the Cape of Good Hope nature reserve are the areas of enquiry. Since policy and management are business concepts, it should be possible to apply business management principles used in policy formulation to arrive at a management policy solution which would allow the Cape of Good Hope nature reserve to be used for recreation and conservation with minimum human impact on the environment. Three key questions are posed;

a) What is the "business" of the Cape of Good Hope nature reserve?

b) What will its "business" be in 10 year's time?

c) What should its "business" be?

These questions follow a scheme for policy formulation used in the the field of business administration (Drucker 1968). The approach in this study is thus to formulate a business policy for conservation in the Cape of Good Hope nature reserve.

The discipline of economics provides some useful concepts for understanding the nature of business concerns. In the language of economists, business produces either goods or services. The reserve falls in the

latter category. It "produces" services, but from an "open space" environment instead of a "built environment". Goods and services are consumed according to supply and demand in the market. In business terms the Cape of Good Hope nature reserve conserves the services produced by open space. In the economic regions relevant to this study - Cape Town and the Western Cape - demand for open space is high because of the growth of the built environment.

In order to answer the first of the three policy questions, field research on the distribution and activities of visitors was carried out. The information obtained was used to make a cost-benefit analysis of the business of production of service commodities in the reserve. The methods of obtaining this information are given in Chapter 2. The results are presented in Chapter 3. The results provide a data base for the discussion in Chapter 4 which attempts to answer the policy questions outlined earlier. The conclusions about policy and a summary of the results of the research are given in Chapter 5, together with management recommendations.

CHAPTER 2

METHODS

2.1 QUANTITATIVE ASSESSMENT OF HUMAN ACTIVITIES

2.1.1 Sampling

The summer holiday period over the months of December and January was chosen as the period for studying human activities because recreation in the reserve shows a peak intensity at this time (Fig. 1.3). The dates bracketing the research program, 24th November 1979 to 13th January 1980 were deliberately selected to coincide with this intensity-peak. The choice was made from an inspection of the 1978/79 daily record of ticket sales. A trial run to test methods and apparatus in the field was made from 1st November to 23rd November 1979 but these results are not included in the analyses.

Eleven known focal areas of activity (Fig 2.1) were divided into three categories for study. Priority for study was decided from personal knowledge of the intensity of activity at specific sites. The priority listing is given below.

Cape Point Buffelsbay Bordjiesrif	HIGH PRIORITY
Black Rocks, Booiseskerm, Venus Pool Platboom Oliphantsbosch Homestead Restaurant Rooikrans	MEDIUM PRIORITY

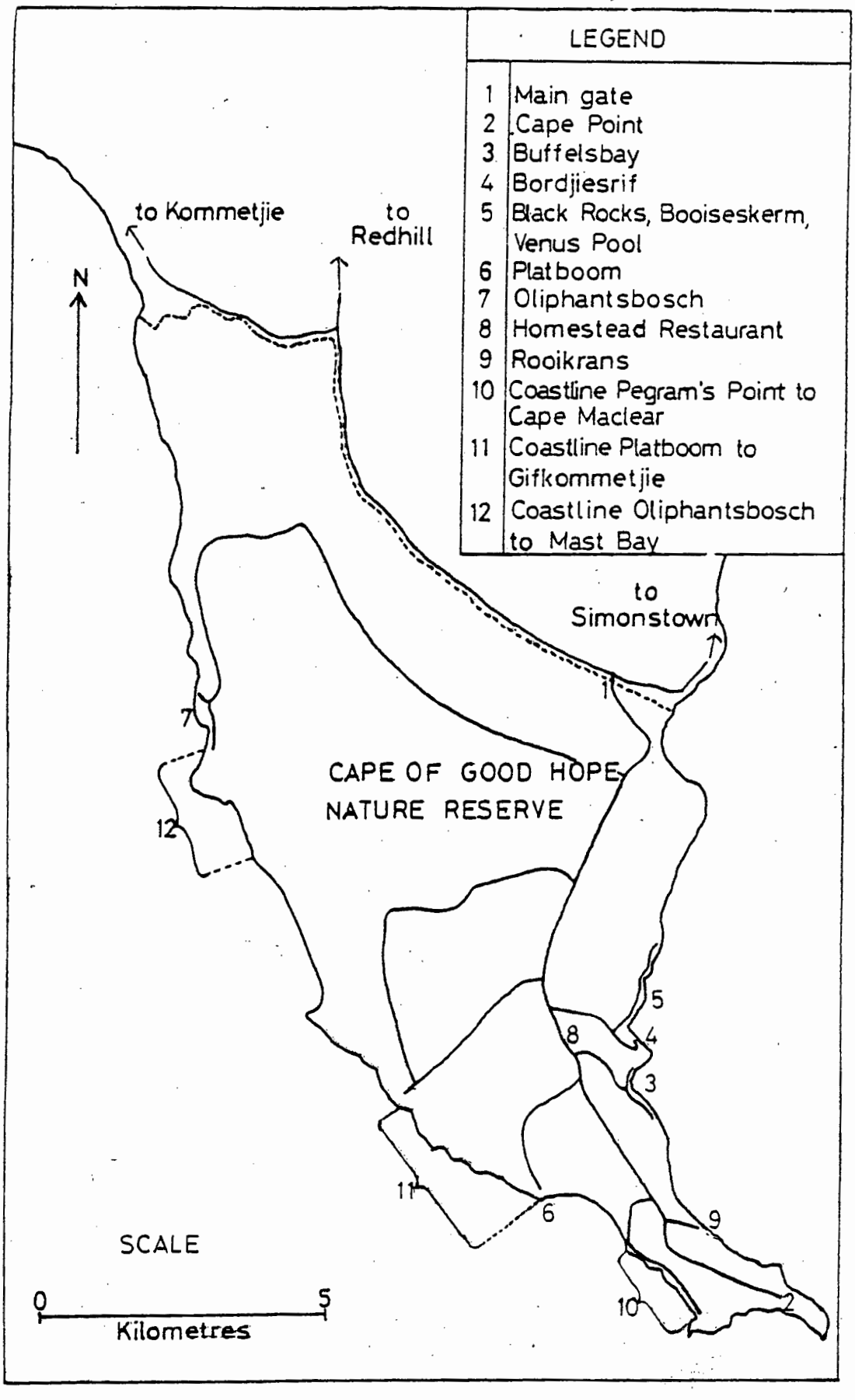


FIGURE 2.1 Map of study localities in the Cape of Good Hope nature reserve

Coastline Pegram's Point to Cape Maclear
Coastline Platboom to Gifkommetjie
Coastline Oliphantsbosch to Mast Bay
} LOW PRIORITY

The plan for sampling these sites is given in Appendix 1.

The main Gate was also studied to obtain a sample count of visitors to the reserve. Appendix 2 shows the format used to record this information. Appendix 3 shows the results of a whole day's activities and Appendix 4 the results of all the information collected. Every tenth car and all buses were sampled as they stopped at the Main Gate to pay the admission fee.

2.1.2 Traffic data

Traffic data were collected with the aid of traffic-counters designed by the Environmental Studies technician, Mr. A. Flepp. These were mounted on posts at the roadside inside protective wooden boxes. In order to record traffic flow, the pneumatic traffic counting tubing attached to the counters was set to span the whole road, or part of a single lane only, depending on whether total flow or directional flow data were required. Graphs of the amount of traffic present in the reserve and at particular study localities were drawn (Figs 3.3 to 3.9). Traffic data (Appendix 5) from counters at the main gate and counts of parked vehicles at study localities themselves (Appendix 6) were used to construct these graphs. The areas under the curves, which represented axle-hours (Appendix 7 columns 1 to 5) were summed and multiplied by visitors per axle to obtain an expression of the number of visitor-hours of service provided by the whole reserve and the study localities in it (Appendix 7 columns 6 to 9). The number of visitors per axle varied according to the classes of people and vehicles visiting a particular study locality. (Table 2.1)

TABLE 2.1 CLASSES OF PEOPLE AND VEHICLES VISITING STUDY LOCALITIES

LOCALITY NO.	STUDY LOCALITY	CLASSES OF VISITORS AND VEHICLES VISITING STUDY LOCALITY
1	Main Gate	Whites, non-whites in buses and cars
2	Cape Point	Whites in buses, whites and non-whites in cars
3	Buffelsbay	Whites in cars
4	Bordjiesrif	Non-whites in buses and cars
5	Black Rocks, Booiseskerm, Venus Pool	Non-whites in cars
6	Platboom	Non-whites in buses and cars
7	Oliphantsbosch	Whites and non-whites in cars
8	Homestead Restaurant	Whites in buses and cars
9	Rooikrans	Whites in cars
10	Coastline Pegram's Point to Cape Maclear	Whites in cars
11	Coastline Platboom to Gifkommetjie	Not accessible to vehicles
12	Coastline Oliphantsbosch to Mast Bay	Not accessible to vehicles
13	Remainder of reserve	Whites and non-whites in cars and buses.

Average vehicle occupancy values for each study locality were calculated from main gate sampling data (Appendix 4) and are shown in Appendix 8.

The number of visitor-hours of service provided by the whole reserve for each day of the research program (Appendix 9) was estimated by first finding the average value of visitor-hours per visitor for the five days on which the Main Gate was sampled and then multiplying the daily visitor totals by this factor. Daily visitor totals were worked out from ticket-sales.

The number of visitor-hours of service provided by each study locality (Appendix 10) was estimated by first finding the average value of visitor hours per axle-entry and then multiplying the sum of all recorded axle-entries at a particular locality by this factor. Values were expressed as a percentage of the visitor hours of service provided by the whole reserve for the same period. Appendix 11 shows the records of total axle entries to study localities on full sampling days and on days when traffic counters were left in place. On full sampling days, research was actively conducted at the study locality but extra counts were obtained by leaving counters in place when work was being carried out elsewhere.

Other information extracted from the traffic data included the percentage popularity of each study locality (Appendix 12) and the use-intensity of study localities (Appendix 13). Percentage popularity, the number of visitors to a particular locality expressed as a percentage of total visitors to the reserve, was worked out by multiplying axle-entries to a particular locality by vehicle occupancy, dividing by the number of visitors who had entered the reserve during the same period (data extracted from Appendix 9) and multiplying this value by 100. Use-intensity was calculated by dividing the average number of visitor-hours per day at each locality by the site area in hectares. Site area was determined from 1:10 000 orthophotos using a planimeter.

Estimates of the distribution of people in the reserve on weekdays, Saturdays and Sundays were also made, using the traffic data available. (Appendix 14).

2.1.3 Human activities

Graphs were drawn of the number of people in activity zones within study localities. The data for constructing these graphs is given in Appendix 15. The areas under the curves of these graphs, representing visitor-hours (Appendix 16), were summed and expressed as a percentage of the number of visitor hours of service provided by the whole reserve over the same period (Appendix 17). Visitor hours spent at whole study localities was available from traffic data. By subtracting the time spent in parts of the whole i.e. activity zones, it was possible to arrive at a remainder which represented the most important activity zone, usually the picnic site/braai area. This meant that it was not necessary to make head counts of the number of people in the braai/picnic areas.

The behaviour of people in the activity zones was analysed by recording observations on chosen subjects every two minutes (Appendix 18) for 30-minute observation periods. These analyses were combines for the full day's observation (Appendix 19) and for all sampling days in the research program (Appendix 20 columns 1 to 6). The observation time in minutes of each activity was first converted to visitor-hours. This value was expressed as a percentage of the visitor-hours spent in the whole reserve (Appendix 20 columns 7 to 11). Where possible, subjects chosen for observation were selected from different activity zones or at least from different parts of a given activity zone in order to obtain as wide a coverage of the study localities as possible. At Cape Point, a group of subjects who arrived at the site at the same time were

chosen instead because the cyclic pattern of movement made it impossible to keep track simultaneously of subjects going to the top of Cape Point and those returning to the car-park. If the 30-minute period of observation ended when subjects were halfway down the hill on their way back to the car-park, then the next 30-minute period commenced at the same location on different subjects at the same point in the cycle. When they left the Cape Point study locality mid-way through the observation period another set of subjects who had just arrived at the site were immediately chosen. In this way it was possible to ensure that all parts of the study locality were evenly represented in the behavioural study. Appendix 21 shows the results of this study. The results were combined into an analysis of fifteen behavioural patterns (Appendices 22 and 23) and further condensed to show the amount of activity taking place in seven environmental zones (Fig 2.2) in the reserve. (Appendices 24 and 25).

2.2 VISITOR SURVEY

A visitor survey was carried out in the reserve as part of the field investigations. The format of the questionnaire forms is shown in Appendices 26 a) and b). A total of 684 questionnaire sheets were completed in personal interviews with respondents over a period which included the summer holiday seasons of 1977/78, 1978/79 and 1979/80 (Appendix 27). A number of minor alterations were made to the questionnaire during this period. These are also shown in Appendix 27. The questionnaire was originally drawn up by the Chief Warden of the reserve, Mr. G. Wright, but modifications to its format have been made for the purposes of this study to aid data processing. Data were processed using a computer program written by Mr. G. Russel, a former University colleague. The graphs of visitor numbers for the period of June 1977 to May 1980 (Fig 1.3) showed similar profiles. On the strength of this, it was assumed that

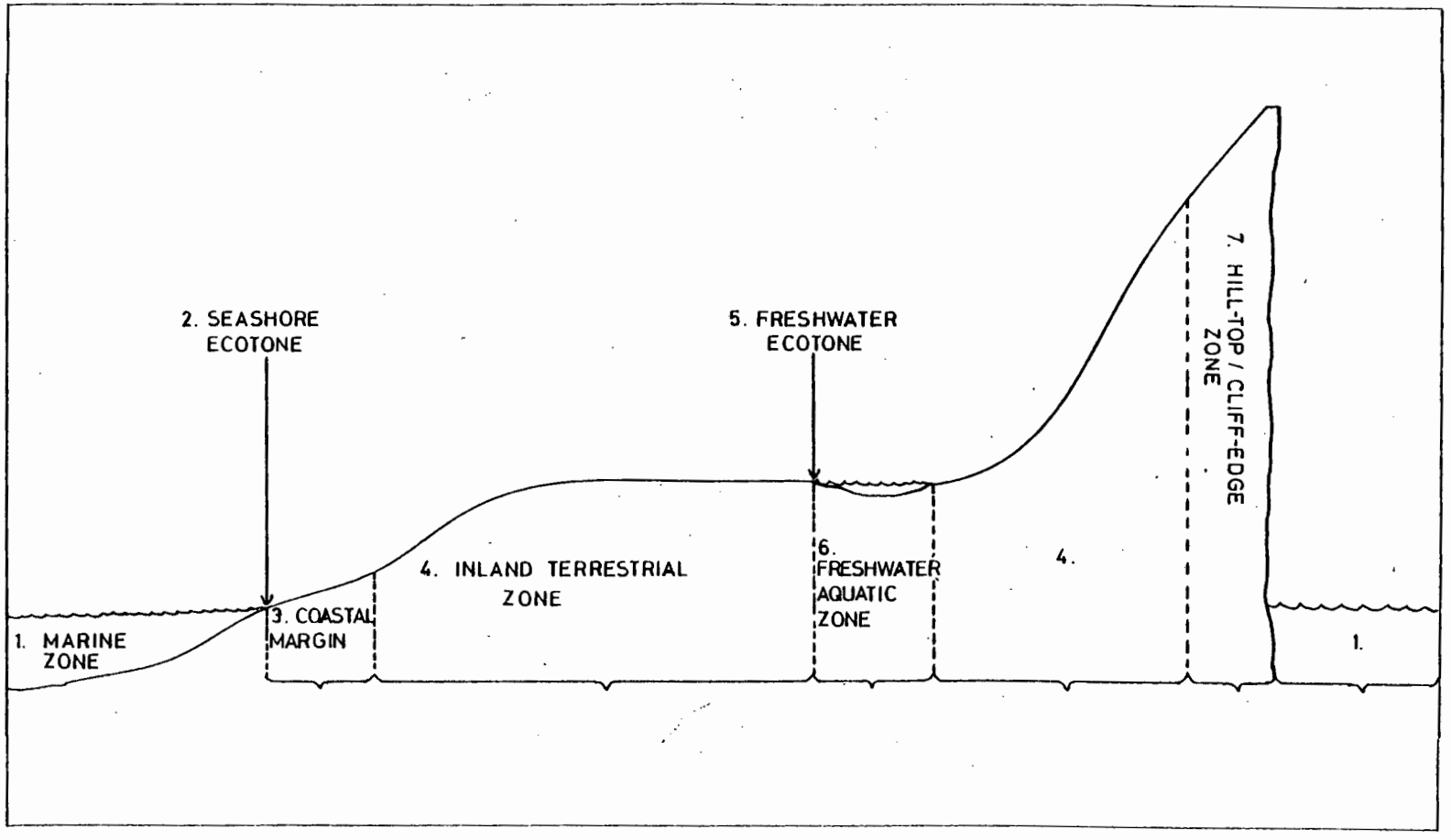


FIGURE 2.2 Diagram of nature reserve environmental zones

no marked changes in general usage of the reserve had occurred in this period, and questionnaire data were therefore pooled.

2.3 COST-BENEFIT ANALYSIS OF THE RESERVE AS A BUSINESS CONCERN

The seven environmental zones of the reserve were ranked in order of the amount of visitor time spent in each, using data from Appendix 25. They were ranked again in descending order of scarcity of services produced. This assessment was made from information available in the literature and the visitor survey questionnaire.

It is assumed that the supply curve of resource services is upward and the demand curve downward sloping. Marginal costs of services will increase as additional units of service are consumed. As the scarcity of services increases, the demand curve will shift upwards and to the right. At a given level of consumption, the most scarce services will therefore yield the highest benefits. The two ranks of environmental zones referred to in the previous paragraph therefore provide the basis for a cost benefit analysis of the reserve as a business concern. This is illustrated in graphic form by two histograms, (Appendix 28), marginal cost of visitor time and marginal benefit of visitor exposure to particular environmental zones. The highest-ranked environmental zone on each histogram was at first assigned a bar length of ten and the lowest-ranked, a bar-length of four. (The reason for choosing this particular scale is that a modal value of seven is the optimum for seven ranked units. Above seven, numerical distinction between units decreases and below seven value distortion increases). A refinement to the model was then made because the marginal costs of visitor time in the coastal margin are exceptional, as are the marginal benefits of exposure to the inland terrestrial

zone and the cliff/hilltop zone. Accordingly the length of the coastal margin histogram bar was extended from ten to eleven units in the marginal cost histogram. Similarly, bar-lengths of the inland terrestrial zone and the Cliff/ Hilltop zone on the marginal benefit histogram were also extended to eleven length units. The heights of the bars represent "utils" of satisfaction or utility. It is not known what a "util" of satisfaction is but it can be said of such quantities that many would represent exceptional satisfaction value, fewer, high satisfaction value, fewer still, medium satisfaction value, and fewest of all, low satisfaction value. Accordingly, the eleven unit scale in the two histograms was divided equally into four class intervals representing utils of satisfaction value.

The final step in the analysis was to rank study localities within each histogram bar according to marginal cost and marginal benefit. In the case of marginal cost, this was done using the information available from Appendix 24. In the case of marginal benefit, judgements were made on the basis of personal familiarity with the reserve, information from the literature and the results of the visitor survey. The location of each point shown on the histogram bars (refer to Appendix 28) was obtained by dividing the bar into the number of equal spacings required to accommodate all study localities in a particular environmental zone, and placing study locality numbers in the appropriate positions in the correct ranking order. The distances of study localities on the histogram chart, from baseline zero, were calculated in Appendix 29. The final analysis appears in Table 3.2. A four-point rating scheme corresponding to the four class intervals in Appendix 28 was used to score satisfaction value. Four points were assigned to exceptional satisfaction value, three to high satisfaction value, two to medium satisfaction value and one to low satisfaction value. Further details of the rationale used in the ranking scheme presented in Appendix 28 are given in Appendix 30.

CHAPTER 3

RESULTS

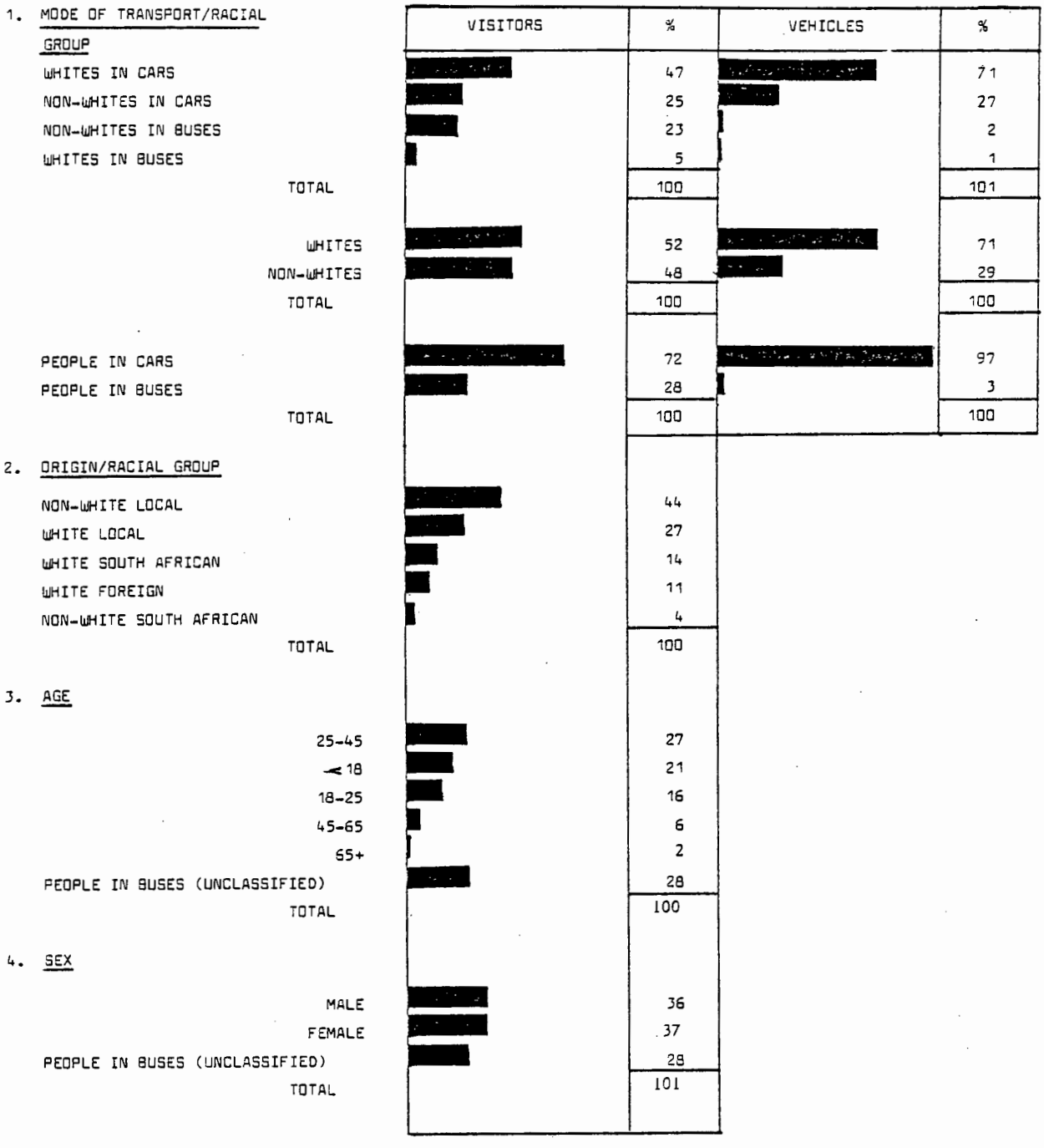
3.1 HUMAN IMPACT

3.1.1 Composition of Visitors (Fig 3.1)

The results show that the local population is largely responsible for human impact on the Cape of Good Hope nature reserve. Seventy-one per cent of visitors come from Cape Town and environs, 44% being non-whites and 27% whites. Half of the non-whites come by bus and half by car. Less than one-tenth of whites entered the reserve by bus. This shows that the low-income sector economises by making more extensive use of mass transport, and indicates that an increase in bus outings might offset the decrease in private vehicles entering the reserve if fuel prices rise. Twenty-seven per cent of visitors were tourists, 11% of them foreign. This shows that although Cape Point is a major national tourist attraction, local conditions of supply and demand for open space largely control the intensity of human impact.

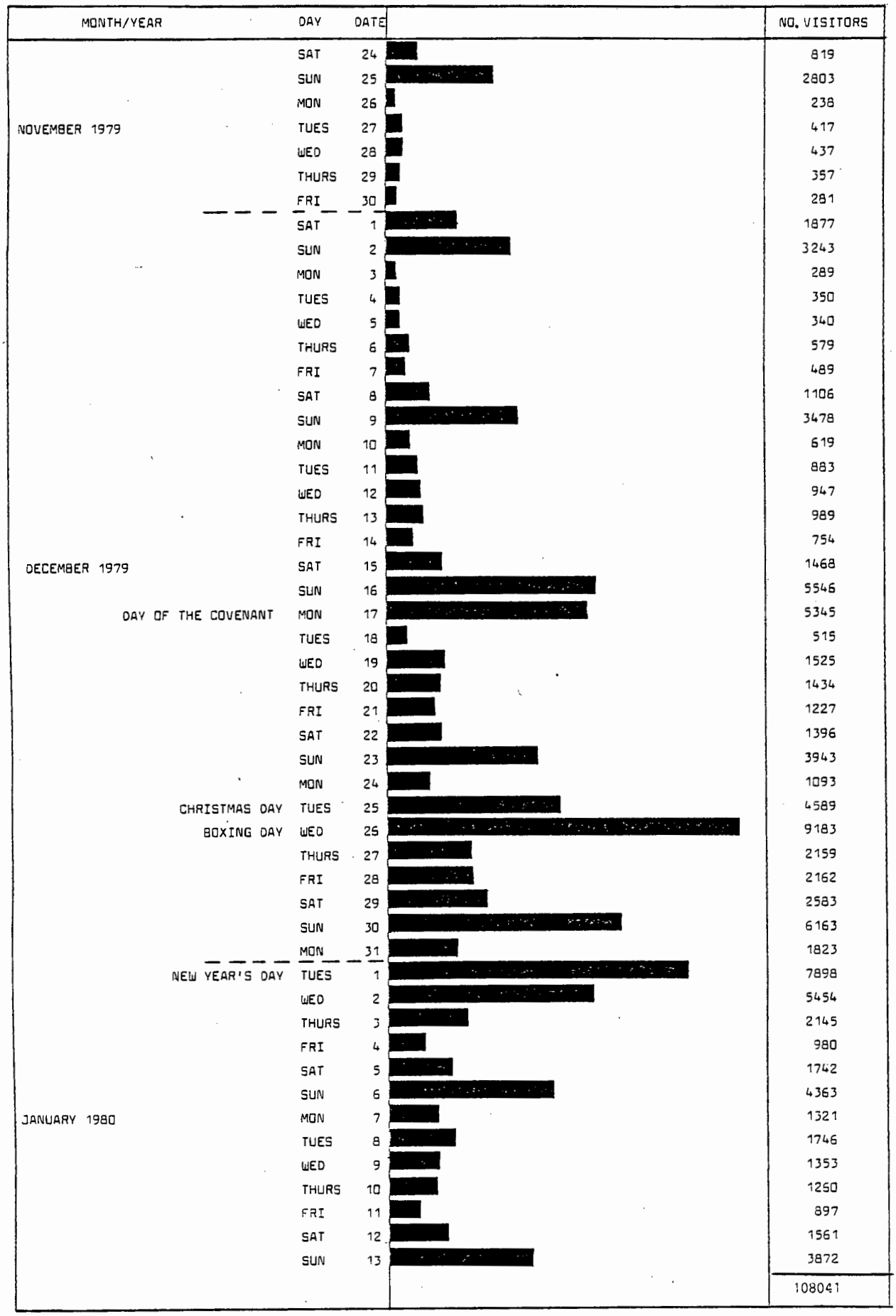
3.1.2 Daily visitor totals (Fig 3.2)

An examination of daily visitor totals shows that human impact rises to a peak in the reserve over the Christmas/New Year period. The heaviest use occurred on Sundays and public holidays. There were half as many visitors on Saturdays compared with Sundays. The smallest proportion of visitors come on weekdays but this rose over the Christmas/New Year period to equal the proportion arriving on Saturdays. The two highest visitor totals recorded were on Boxing day (9183 people) and on New Year's day (7898 people).



	VISITORS	%	VEHICLES	%
1. MODE OF TRANSPORT/RACIAL GROUP				
WHITES IN CARS		47		71
NON-WHITES IN CARS		25		27
NON-WHITES IN BUSES		23		2
WHITES IN BUSES		5		1
TOTAL		100		101
WHITES		52		71
NON-WHITES		48		29
TOTAL		100		100
PEOPLE IN CARS		72		97
PEOPLE IN BUSES		28		3
TOTAL		100		100
2. ORIGIN/RACIAL GROUP				
NON-WHITE LOCAL		44		
WHITE LOCAL		27		
WHITE SOUTH AFRICAN		14		
WHITE FOREIGN		11		
NON-WHITE SOUTH AFRICAN		4		
TOTAL		100		
3. AGE				
25-45		27		
<18		21		
18-25		16		
45-65		6		
65+		2		
PEOPLE IN BUSES (UNCLASSIFIED)		28		
TOTAL		100		
4. SEX				
MALE		36		
FEMALE		37		
PEOPLE IN BUSES (UNCLASSIFIED)		28		
TOTAL		101		

FIGURE 3.1 Composition profiles of visitors and vehicles 24/11/79 to 13/1/80



MONTH/YEAR		DAY	DATE	NO. VISITORS
		SAT	24	819
		SUN	25	2803
		MON	26	238
NOVEMBER 1979		TUES	27	417
		WED	28	437
		THURS	29	357
		FRI	30	281
		SAT	1	1877
		SUN	2	3243
		MON	3	289
		TUES	4	350
		WED	5	340
		THURS	6	579
		FRI	7	489
		SAT	8	1106
		SUN	9	3478
		MON	10	619
		TUES	11	883
		WED	12	947
		THURS	13	989
		FRI	14	754
DECEMBER 1979		SAT	15	1468
		SUN	16	5546
	DAY OF THE COVENANT	MON	17	5345
		TUES	18	515
		WED	19	1525
		THURS	20	1434
		FRI	21	1227
		SAT	22	1396
		SUN	23	3943
		MON	24	1093
	CHRISTMAS DAY	TUES	25	4589
	BOXING DAY	WED	26	9183
		THURS	27	2159
		FRI	28	2162
		SAT	29	2583
		SUN	30	6163
		MON	31	1823
	NEW YEAR'S DAY	TUES	1	7898
		WED	2	5454
		THURS	3	2145
		FRI	4	980
		SAT	5	1742
		SUN	6	4363
JANUARY 1980		MON	7	1321
		TUES	8	1746
		WED	9	1353
		THURS	10	1260
		FRI	11	897
		SAT	12	1561
		SUN	13	3872
				108041

FIGURE 3.2 Profile of daily entries of visitors to the reserve 24/11/79 to 13/1/80

3.1.3 Traffic counts (Fig 3.3 to 3.9)

Traffic counts were used as a basis for assessing visitor activity. Peak-hours for the number of vehicles in the reserve were between 12h00 and 15h00. Vehicle numbers at Bordjiesrif began to drop after 16h00. At Buffelsbay this tended to occur before 14h00. Two peaks occurred at Cape Point. The trough between these two peaks occurred between 14h00 and 15h00. The curves of axles versus time are flat at Cape Point in contrast to the bell-shaped profiles obtained for Buffelsbay. The former would tend to reduce the effect of human impact and the latter would tend to increase it. A hidden factor is the high turnover at Cape Point which would offset the effect of a flat curve by increasing human impact through increased visitor movement. The profiles of the curves obtained for Bordjiesrif were intermediate in character, being neither flat nor bell-shaped. A similar profile was obtained for the adjacent localities of Black Rocks, Booiseskerm and Venus Pool. Platboom had a bell-shaped curve. Counts at Oliphantsbosch were too low to enable any definite assessment to be made.

3.1.4 Distribution of visitors (Figs 3.10 and 3.11)

The results show that human impact is greatest at Bordjiesrif, the major non-white picnic site in the reserve. Here forty per cent of all visitor activity in the reserve is concentrated on 41 ha of land. Buffelsbay, the major white picnic site in the reserve, sustains 16% of visitor activity on 121 ha of land. Use-concentration is six times less than at Bordjiesrif. Cape Point is the most popularly visited locality but only 10% of visitor time is spent here. The concentration of activity is three times greater than that at Buffelsbay but only half as concentrated as at Bordjiesrif. The rest of the picnic sites in the reserve together account

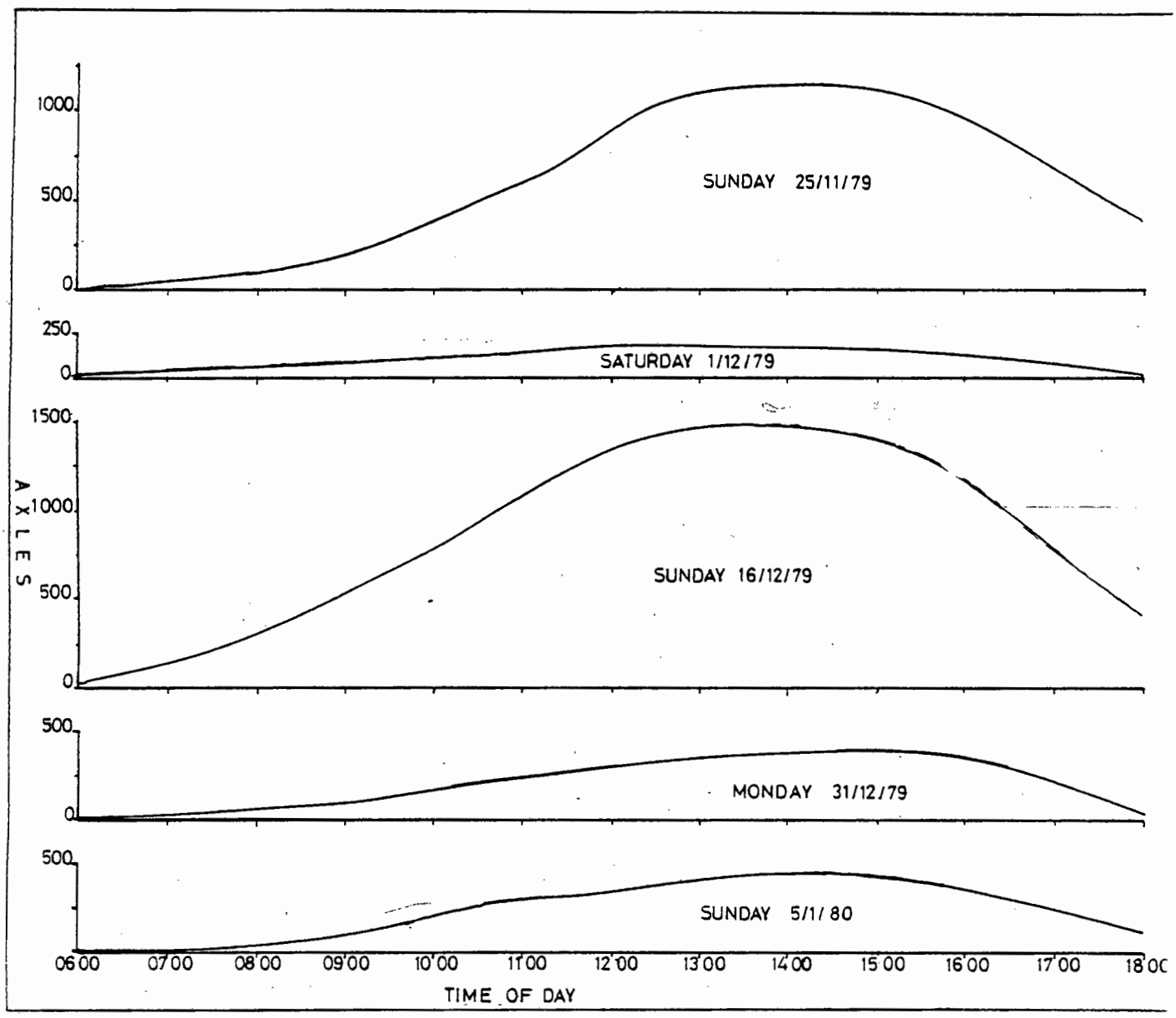


FIGURE 3.3 Graphs showing the daily flux of traffic in the Cape of Good Hope nature reserve

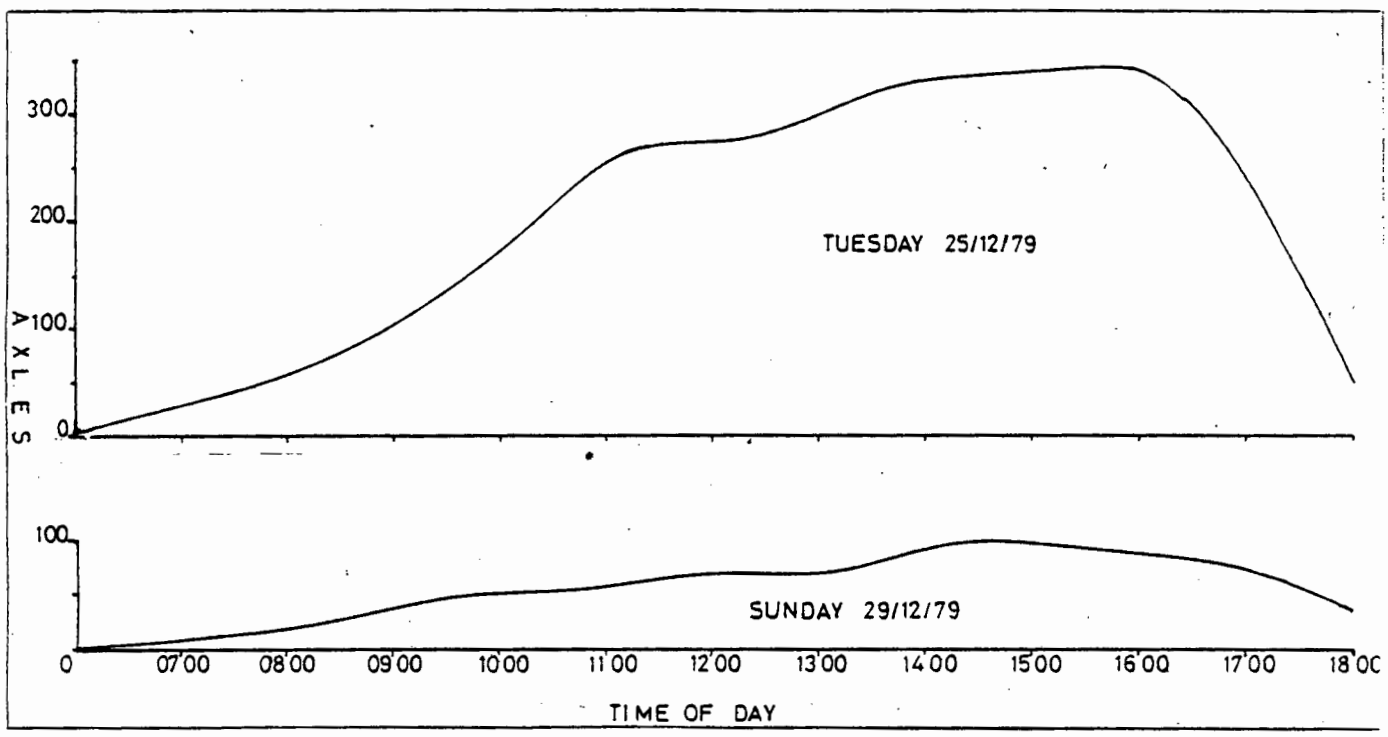


FIGURE 3.4 Graphs showing the daily flux of traffic at Bordjiesrif

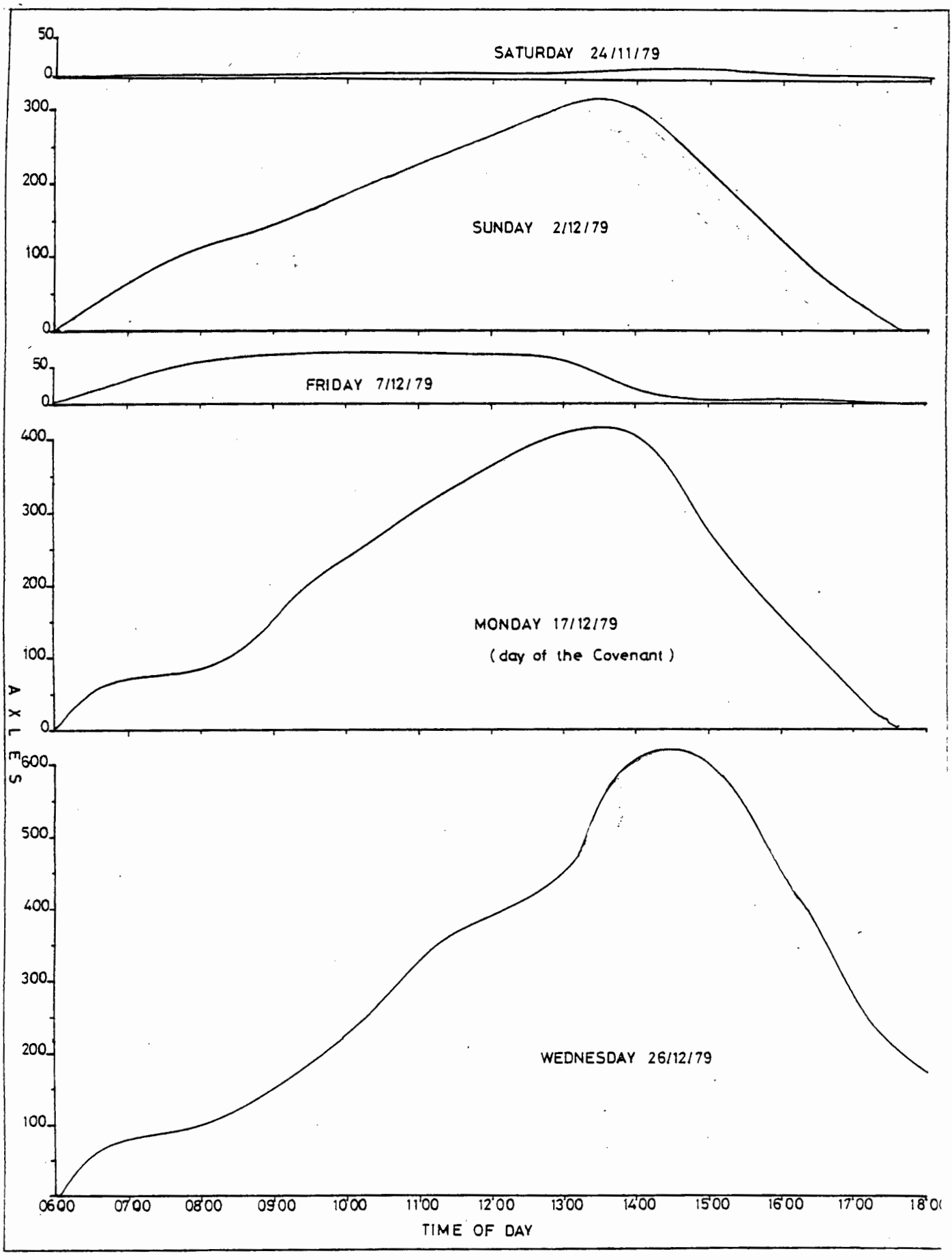


FIGURE 3.5 Graphs showing the daily flux of traffic at Buffelsbay.

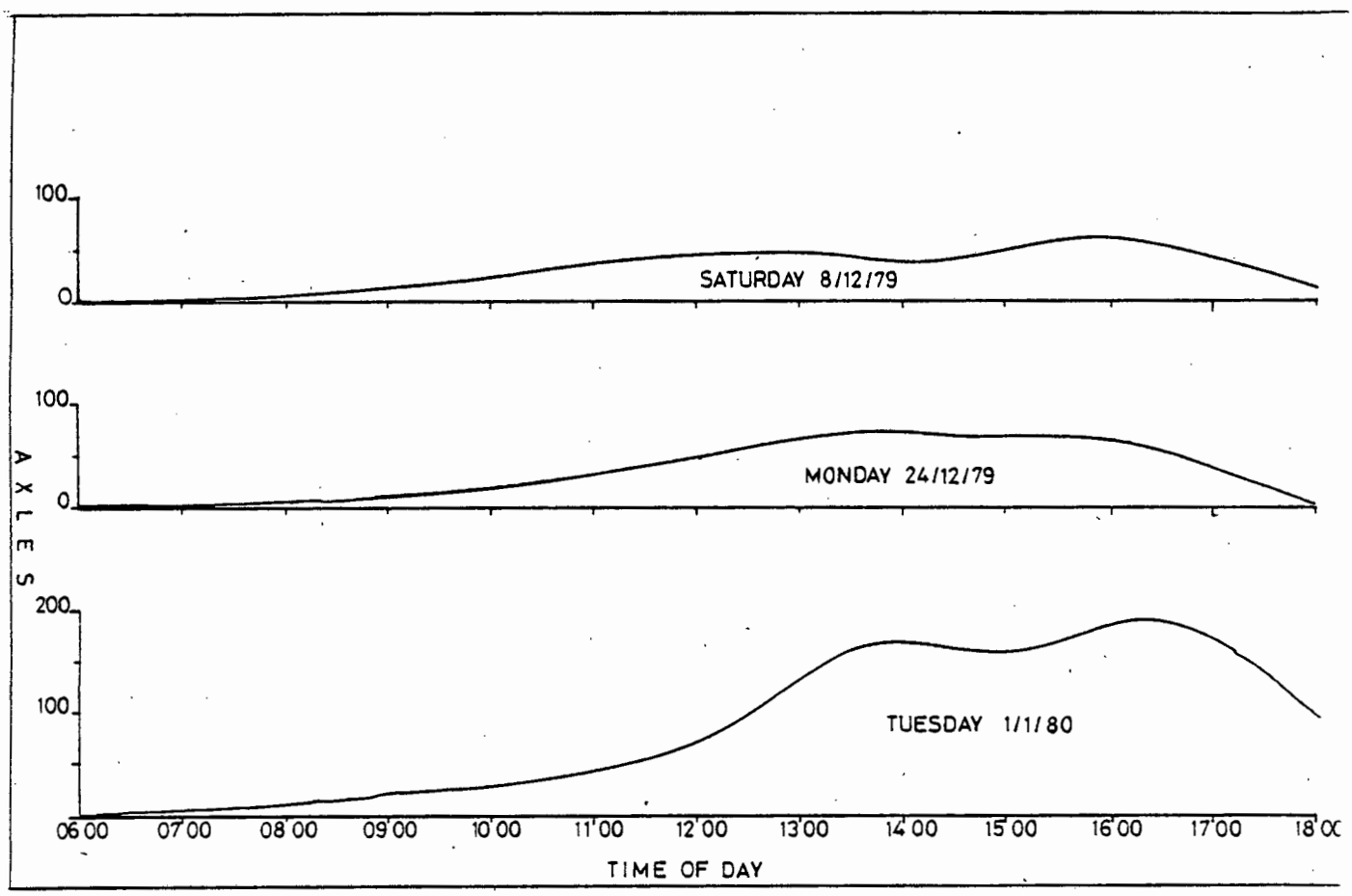


FIGURE 3.6 Graphs showing the daily flux of traffic at Cape Point

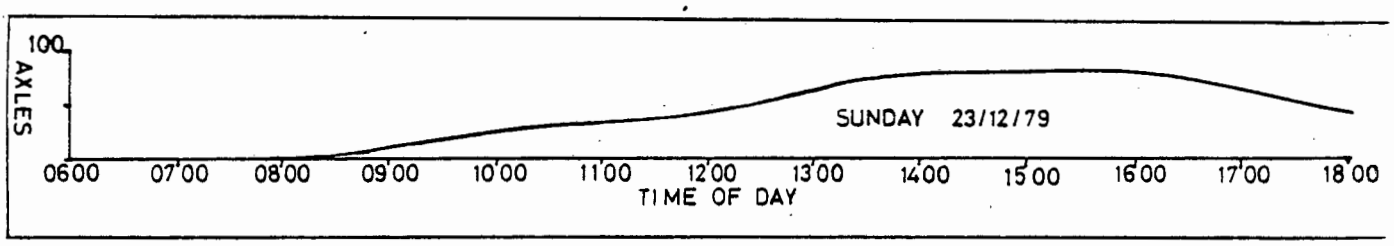


FIGURE 3.7 Graph showing the daily flux of traffic at Black Rocks, Booiseskerm, Venus Pool

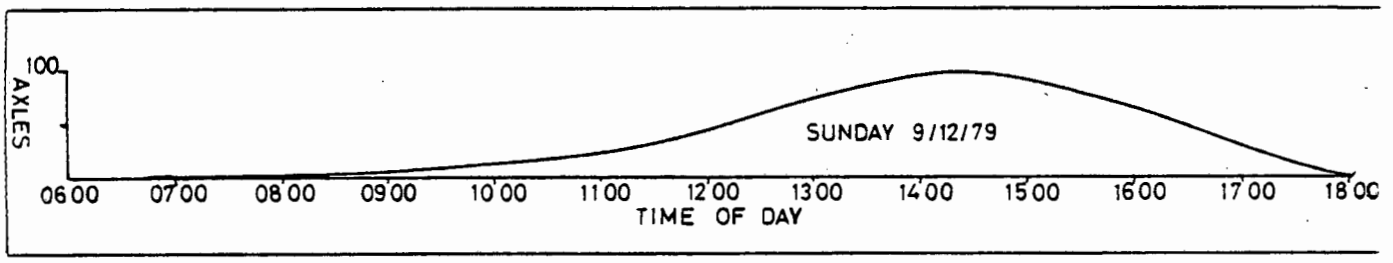


FIGURE 3.8 Graph showing the daily flux of traffic at Platboom

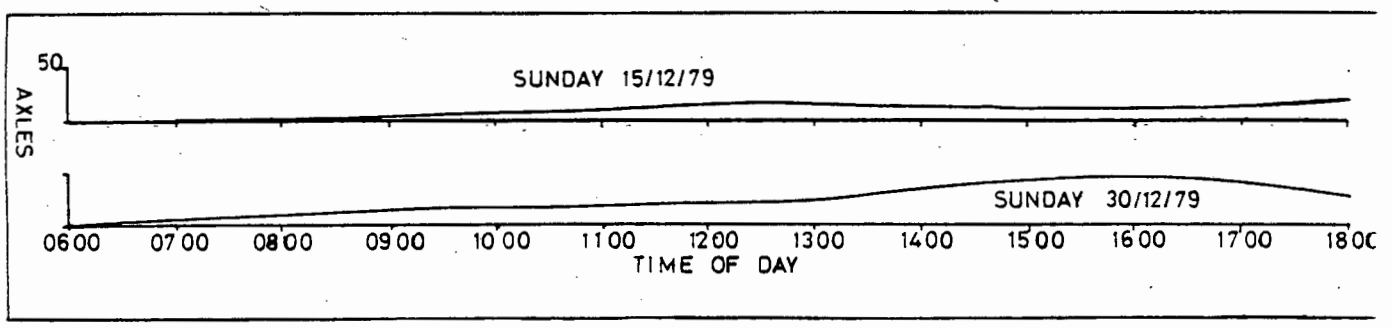


FIGURE 3.9 Graphs showing the daily flux of traffic at Oliphantsbosch

STUDY LOCALITY	LOCALITY POPULARITY	% OF PEOPLE VISITING	VISITOR TIME BUDGET	% VIS- h	USE-CONCENTRATION	VIS-h/ d/ha	AREA (ha)	% OF HUMAN INHABITED AREA
BORDJIESRIF		45		40		114	41	7
CAPE POINT		49		10		63	15	2
BUFFELSBAY		21		16		19	121	20
BLACK ROCKS, BOOISESKERM, VENUS POOL		11		6		16	32	5
PLATBOOM		23		8		12	43	7
OLIPHANTSBOSCH		7		2		3	69	11
HOMESTEAD RESTAURANT							<1	<0,5
ROOIKRANS		12					<1	<0,5
COASTLINE PEGRAM'S POINT TO CAPE MACLEAR		15					10	2
COASTLINE PLATBOOM TO GIFKOMMETJIE				18 *			94	15
COASTLINE OLIPHANTSBOSCH TO MAST BAY							188	31
REMAINDER OF RESERVE NOT INHABITED BY HUMANS							7137	
				100			7750	

* BY SUBTRACTION

FIGURE 3.10 Popularity, visitor time-budget and use-concentration of study localities

STUDY LOCALITY	WEEKDAYS	% VIS-h	SATURDAYS	% VIS-h	SUNDAYS	% VIS-h
CAPE POINT		14		11		7
BUFFELSBAY		15		14		15
BORDJIESRIF		26		30		58
BLACK ROCKS, BOOISESKERM, VENUS POOL		4				8
PLATBOOM						10
OLIPHANTSBOSCH		4		-0,5		2

FIGURE 3.11 Profile of activity distribution at particular study localities on weekdays, Saturdays and Sundays

for only 16% of visitor activity on 144 ha of ground. Eighteen per cent of visitor time was left unaccounted for in the quantitative analysis of visitor distribution. Of this, 10% is likely to be spent en route between the Main Gate and Cape Point, since it takes as long to travel this distance as people on average stay at Cape Point, which occupies 10% of visitor-time. Travelling time to other localities would be additional to this, so less than eight per cent of the time-budget is likely to be spent at localities other than the picnic spots and Cape Point. A large portion of this remainder is probably spent at the Homestead restaurant, since this locality is often inundated with visitors over the lunchtime period. Less time is likely to be spent at the famous fishing ledges at Rooikrans or at the car-parks on the coastal drive from Pegram's Point to Cape Maclear, since these localities seldom contained many vehicles. The amount of time spent on the coastline Platboom to Gifkommetjie is included in the estimates given for Platboom itself. Similarly the amount of time spent on the coastline Oliphantsbosch to Mast Bay is included in the estimates for Oliphantsbosch. This is because road access ends at Platboom and Oliphantsbosch and estimates of visitor activity are based on vehicle presence at the limits of access.

Further analysis of visitor distribution in the reserve shows that the emphasis on Bordjiesrif is greater on Sundays than on Saturdays and is lowest on weekdays, whereas Cape Point appears to receive a greater proportion of visitor time on weekdays. Human impact at Bordjiesrif is therefore likely to be more intense than is shown by the results. A fairly constant proportion of time was allocated to Buffelsbay on weekdays, Saturdays and Sundays.

3.1.5 Human impact on particular environmental zones (Fig 3.12 and 3.13)

An analysis of visitor activity by environmental zones shows that human impact is greatest on the coastal margin of the reserve. Fifty-six per cent of visitor time is spent here and 15% on the seashore ecotone. The cliff/hilltop zone, where the Cape Point study locality is situated, takes up only 10% of visitor time. Similar use-patterns were found at the four coastal picnic spots for which quantitative data on visitor activity were available. More time was spent on the seashore ecotone at the adjacent sites Black Rocks, Booiseskerm and Venus Pool than at the other two picnic spots.

3.1.6 Littering

The litter problem is created by eating, drinking and smoking in the outdoors. Organic waste such as water melon rind and fruit pips and peels form only a small proportion of the total garbage accumulation in the reserve. Packaging and bottles were the characteristic garbage items in the whites only picnic site at Buffelsbay but newspaper wrapping for food-stuffs was a common garbage item in the neighbouring site at Bordjiesrif, which is for non-whites only. A large proportion of the litter here appeared to be in the form of discarded toilet paper or tissues for wiping peoples' hands or faces after eating.

Estimates of the amount of litter at Bordjiesrif and Buffelsbay were made by counts at the day's end of all pieces of litter bigger than a twenty pack of cigarettes (Table 3.1).

ENVIRONMENTAL ZONE	VISITOR-ACTIVITY	% VIS-h
COASTAL MARGIN		56
SEASHORE ECOTONE		15
CLIFF/HILLTOP ZONE		10
INLAND TERRESTRIAL ZONE		+
MARINE ZONE		+
FRESHWATER ECOTONE		+
FRESHWATER AQUATIC ZONE		+
		81

FIGURE 3.12 Activity profile illustrating the pattern of use of the environment by visitors to the Cape of Good Hope nature reserve
(+ = Activities observed but not quantified)

ENVIRONMENTAL ZONE	VISITOR-ACTIVITY AT CAPE POINT	% VIS-h	VISITOR-ACTIVITY AT BUFFELSBAY	% VIS-h	VISITOR-ACTIVITY AT BORDJIESRIF	% VIS-h	VISITOR-ACTIVITY AT BLACK ROCKS, BOOISE-SKERM AND VENUS POOL	% VIS-h	VISITOR-ACTIVITY AT PLATBOOM	% VIS- h
COASTAL MARGIN		–		82		76		65		89
SEASHORE ECOTONE		–		17		24		35		11
CLIFF/HILLTOP ZONE		100		–		–		–		–
INLAND TERRESTRIAL ZONE		–		–		–		–		–
MARINE ZONE		–		1		<0,5		–		–
FRESHWATER ECOTONE		–		–		–		–		–
FRESHWATER AQUATIC ZONE		–		–		–		–		–
		100		100		100		100		100

FIGURE 3.13 Activity profiles illustrating the pattern of use of the environment at the principal venues for visitors to the Cape of Good Hope nature reserve

TABLE 3.1 LITTER-COUNTS AT BUFFELSBAY AND BORDJIESRIF

LOCALITY	DATE	LITTER ITEMS RECORDED	USE CONCEN-TRATION VIS-h/ha/d	LITTERING RATE.ITEMS/ VIS-h/ha/d
BORDJIESRIF	25/12/79	775	59,1	13,1
BORDJIESRIF	29/12/79	146	16,2	9,0
BUFFELSBAY	12/1/80	74	31,3	7,4

Two items of information can be gleaned from this rough method of estimating litter density; firstly that littering rate per visitor-hour seems to increase with crowd size and secondly that crowds at Bordjiesrif apear to litter more than crowds at Buffelsbay. A plausible idea to account for the difference in littering tendencies shown by whites and non-whites is that non-whites have more in the way of newspaper and cheap disposable packaging material to discard than whites, as a consequence of their lower income status. Whites were observed to cook meat at a braaivleis more frequently than non-whites; even on a crowded day at Bordjiesrif not all the braai places would be used. This is logical, for meat is expensive. Preparations of vegetable dishes are cheaper and these prevailed at Bordjiesrif, but a consequence of this is a requirement for paper plates and newspaper wrapping or plastic bags for food containers. In addition to this, more paper tissues are required for wiping hands and faces because the high bulk vegetable meal with a little meat is a messy proposition compared to individual pieces of meat with a little lettuce or tomatoes, particularly when children are involved. Garbage

accumulation as an economic consequence seems to be a sensible way to account for littering prevalence in the low income sector at picnic sites in the Cape of Good Hope nature reserve. The solution to this problem might lie in the success of being able to market of low-cost modular plastic Tupperware-type containers together with plastic eating utensils which fit into bowl contours for ease of transport. This would cut down on packaging required for sealing food containers in transit and would also make eating more convenient, thereby reducing the amount of tissue that would have to be used to wipe hands and faces after a meal.

The presence of garbage bins in relation to the private space of a picnic spot also appears to be a factor controlling litter density. The site design at Buffelsbay is such that garbage bin locations are more or less related to individual picnic spots, so more bins automatically become available as these spots are occupied. At Bordjiesrif the use-concentration is such that bin availability decreases as the crowd increases, for picnic spots have no geographical individuality and private space is created wherever people put their posessions down on the ground. If private litter bins were to be marketed to appear as a socially acceptable item of camping equipment this might well provide a practical solution to the problem. In concept, the private litter bin could take the form of a plastic hoop with a pole attached at right-angles to the circular plane. A large disposable municipal garbage bag could be attached to this frame by placing it inside the bag, folding the ends of the bag into the hoop and clamping the plastic film in place by fitting another hoop of the appropriate dimensions inside the first. The advantage of this design is that it would allow people to throw their garbage into the mouth of the bin without having to get up. At the same time, the mechanics of the bin rolling in the wind would hold paper inside as the mouth would always tend to point to leeward.

All in all, the results of observations made on littering indicate that a market approach using the linkages of our economic universe in conjunction with a consideration of the human factors involved in littering is likely to be more successful in creating a proper garbage cycle than anti-litter propaganda.

3.2 HUMAN BEHAVIOUR (Figs 3.14 and 3.15)

It was possible to specify behaviour by the location in which it took place, but more difficult to specify its nature because human outdoor recreation behaviour appears to be composed of a random series of events rather than following a set pattern. On the whole, activities at picnic sites in the reserve were not strongly directed. Although energetic games took place on the lawns, relatively small numbers of individuals were involved, most people being occupied in a sedentary fashion, engaged in conversation with others, indulging in moods of contemplation, or merely sleeping or sunbathing. Picnicking activities occupied 52% of visitors' time (Fig 3.14). The proportion of visitor time spent on seashore, beach and tidal pool recreation amounted to 16%. These results show that bathing amenities are a relatively small part of the coastal attraction of the reserve and that the most important human requirements are places to have a picnic. The attractive features of the coastline at Cape Point occupy only four per cent of visitor time. Six per cent is spent gaining access to the viewing points and returning to the car-park from them. This shows that scenic viewing is not an attractive feature of the environment on its own but must be combined with some form of preoccupation if it is to fulfil its rôle in providing the feeling of open space in human experience.

Four per cent of visitor-time was spent on ski-boat fishing trips. This activity has a direct impact on the environment in the form of the

ACTIVITY	VISITOR TIME BUDGET	% VIS-h
RECREATION AT BRAAI/PICNIC SPOTS		36
RECREATION BETWEEN BRAAI/PICNIC SPOTS		16
SEASHORE RECREATION (EXCL. BEACH)		9
TIDAL POOL RECREATION		6
MOVING BETWEEN VEHICLE AND VIEWPOINT		6
APPRECIATION OF VISTA		4
SKI-BOAT FISHING EXCURSION		4
SCENIC DRIVING / LOOKING AT ANIMALS		+
VISITING RESTAURANT		+
SKIN-DIVING / ROCK FISHING		+
BEACH RECREATION		1
VISIT LAVATORY		0,5
HIKING / LOOKING AT FLOWERS		+
RIVERSIDE / LAKESHORE ACTIVITIES		+
FRESHWATER AQUATIC ACTIVITIES		+
		≈ 82

FIGURE 3.14 Profile of the principal activities of visitors in the Cape of Good Hope Nature reserve

(+ = Activities observed but not quantified)

ACTIVITY	TIME BUDGET AT CAPE POINT	% VIS-h	TIME BUDGET AT BUFFELSBAY	% VIS-h	TIME BUDGET AT BORDJIESRIF	% VIS-h	TIME BUDGET AT BLACK ROCKS, BOOISE-SKERM AND VENUS POOL	% VIS-h	TIME BUDGET AT PLATBOOM	% VIS-h
RECREATION AT BRAAI/PICNIC SPOTS		–		46		55		48		29
RECREATION BETWEEN BRAAI/PICNIC SPOTS		–		12		21		17		61
SEASHORE RECREATION (EXCL. BEACH)		–		5		12		35		11
TIDAL POOL RECREATION		–		7		11		–		–
MOVING BETWEEN VEHICLE & VIEWPOINT		56		–		–		–		–
APPRECIATION OF VISTA		42		–		–		–		–
SKI-BOAT FISHING EXCURSION		–		23		–		–		–
SCENIC DRIVING/LOOKING AT ANIMALS		–		–		–		–		–
VISITING RESTAURANT		–		–		–		–		–
SKIN-DIVING/ROCK-FISHING		–		1		≈0,5		–		–
BEACH RECREATION		–		5		–		–		≈1
VISIT LAVATORY		2		1		≈0,5		≈0,5		≈0,5
HIKING/LOOKING AT FLOWERS		–		–		–		–		–
RIVERSIDE/LAKESHORE ACTIVITIES		–		–		–		–		–
FRESHWATER AQUATIC ACTIVITIES		–		–		–		–		–
		100		100		99		100		101

FIGURE 3.15 Profile of activities at the principal venues for visitors to the Cape of Good Hope nature reserve

slipway and a trailer-park which has excluded picnickers from a certain amount of ground close to the seashore at Buffelsbay. The analysis shows that time spent ski-boat fishing is equal to time spent viewing from Cape Point, but ski-boat fishermen comprise only two per cent of visitors (from Appendix 9 and 15) whereas 49% of people visited Cape Point (Appendix 12). It can be seen from the above that ski-boat fishing is a time-consuming activity enjoyed by few people whereas viewing from Cape Point is a more transitory experience enjoyed by many. Four per cent of time spent viewing from Cape Point would be worth more than the same time spent ski-boat fishing because of diminishing marginal returns associated with a downward sloping demand curve. This perspective provides a more satisfactory interpretation of the relative values of the two activities to the consumer than an assessment based on time values alone.

Scenic driving, visiting the Homestead restaurant, diving, fishing, walking along the coast, along rivers, visiting and swimming in Sirkelsvlei, a small inland lake, and looking at the flowers, add to the diversity of activities taking place in the reserve. In the absence of quantitative data the only comment that can be made is that field observations indicated that the activities associated with the botany of the reserve were the least noticeable.

A more detailed analysis of human activity is shown in Fig. 3.15. A singular feature of this analysis is the markedly higher proportion of time spent in recreation between braai/picnic spots at Platboom, compared with the other three picnic sites. The most attractive feature at Platboom appeared to be a small lawn which is situated at the focus of a crescent of picnic spots. This lawn, which is approximately 20m x 15m and roughly oval in shape, was a meeting place for people, a place to relax or sleep and also a miniature sports-ground for communal

games like football or volleyball. Buffelsbay posesses much larger open rolling expanses of lawn, but people tended to keep more to the picnic spots on the edge. The results show that the smaller scale environment at Platboom suits human requirements better.

Only five per cent of visitor-time at Buffelsbay was spent on the beach. This is surprising because Buffelsbay has a bathing beach of excellent quality. These results emphasise the fact that picnic spots rather than bathing amenities are the most important human requirements in the reserve.

The ledges at Rooikrans are a focus for the activities of fishermen, but fishing was seen to occur at many points along the coastline. A concentration of fishing, crayfish-netting and skin-diving activities was noted on the coastline Platboom to Gifkommetjie. On an excursion to this locality between 12h00 and 13h00 on Sunday 8/12/79, 89 people were counted, 21 fishermen, 22 crayfish netters, 18 skin-divers and 28 persons merely accompanying those engaged in harvesting sea-foods. These activities were also observed but were less concentrated on the coastline Oliphantsbosch to Mast Bay. Behaviour associated with this group of activities was goal-orientated in contrast to recreation in the picnic-sites and took place whether there were rewards in sea-foods harvested or not. Rooikrans was the only place on the coastline of the reserve where anglers were seen to have caught fish of edible size. It was seldom that individuals were seen returning with their full daily quota of five crayfish, yet divers would expend considerable effort in carrying their equipment over one kilometre down the coastline along beaches with loose sand or over uneven terrain in order to reach diving spots. These observations indicate that harvesting of sea-foods might be a natural feeding behaviour pattern which occurs whether food is caught or not. This feeding

drive appears to be a link between humans and their environment.

3.3 RESULTS OF THE VISITOR SURVEY (Fig 3.16)

3.3.1 Sampling errors (Fig 3.16.2 to 4)

The objective of the visitor survey was to relate consumer demand for natural resource services to four market components; local non-whites, local whites, South African whites not from the local area, and foreign visitors. A comparison with the main gate survey (Fig 3.16.2) showed that there was a strong bias in the questionnaire sample towards local white visitors and that non-white locals were under-represented, but foreign tourists appeared to be adequately sampled. No non-white South African tourists were interviewed but their numbers in the reserve were low so this ommission is not felt to be significant. As the data were interpreted according to percentage responses in the individual categories of visitors, sampling bias became largely irrelevant for comparisons of consumer preference between the categories. An unavoidable bias did however arise from the tendency of males in a group to act as spokesmen. Female opinion was consequently under-represented. (Fig 3.16.4). As far as could be ascertained from incomplete data, the age-profile in the questionnaire sample appeared to agree with figures obtained from the Main Gate sample (Fig 3.16.3).

3.3.2 Demand for service commodities (Fig 3.16.5)

Whites, local South African and foreign, expressed strong preferences for particular service commodities rendered by the environment. (Fig 3.16.5). On the whole non-whites did not show any strong preferences. Instead, they expressed a requirement simply to have a change of scene

and to be out of doors. "Outing" was a term frequently used in this connection. People said that they preferred Bordjiesrif to places like Strandfontein because it was "private". The character of open space at Bordjiesrif is more random than the uniformity of an open beach like the one at Strandfontein. It is this "randomness" that gives rise to a feeling of relative privacy rather than the absence of other people. Bordjiesrif was the most crowded site in the reserve and could hardly be called private in the usual sense. Local people and South African tourists had a common lack of interest in wild flowers. Foreign visitors showed a greater interest in botanical aspects of the environment and also showed a greater interest in wild animals.

Scenic qualities of the reserve were, on the whole, the strongest requirement in the white sector of the market, although local whites apparently preferred picnicking to scenic requirements.

The demand to see wild animals was second-last in the ratings in the local market, but rated third amongst South African tourists and second amongst foreign visitors.

After scenic and picnicking requirements, fishing appeared to be the next most popular requirement in the local sector of the market.

Swimming amenities, as far as could be ascertained from incomplete data, were an important requirement in the local sector of the market.

3.3.3 Demand for artificial structures (Fig 3.16.6)

In the local non-white sector of the market there was a high demand for structural development of the environment. Demand for structural development followed a downward progression through the local white, South African white and foreign sectors of the market (Fig 3.16.6).

There was a universal demand for toilets indicating that these

are considered the most important structures in recreational areas. Toilets appear to be the only really important man-made structure for tourists. In general, tourists were indifferent to the provision of any other facilities because they did not use them, so it could be said that providing for tourists presents less of a threat to the quality of the natural environment than providing for the local populace.

The hierachy of demand for particular kinds of structures was consistent in each of the four sectors of the market. Toilets were in highest demand, followed by braai places, tidal pools, tables/benches/swings/slides etc. and more playing areas. Toilets received a rating of over eighty-three per cent in all four sectors of the market. All structural developments scored over seventy per cent in the local non-white sector of the market but braai places were the only structures to score this high in the white sector. Amusement park facilities were in high demand only in the local non-white sector.

3.3.4 Demand for more picnic spots (Fig 3.16.7 to 9)

A firm "yes" vote for more picnic spots was given only by the local non-white sector (Fig 3.16.7). All other sectors of the market were not in favour of more picnic sites. South African tourists and foreign visitors were more against additional picnic sites than the local white sector of the market.

Non-whites mostly felt that more picnic spots were necessary to reduce the crowding problems (Fig 3.16.9) but fifteen per cent felt that more picnic spots should be provided in any case as a matter of policy. Eight per cent felt that this sould be done to ease the restriction on non-whites and five per cent felt that more people would be attracted to the reserve in this way. Whites who voted in favour of more picnic

sites did so mainly because they felt this would reduce the crowding problem.

Local non-whites, whites and South African whites who voted against more picnic sites felt mainly that more picnic sites were unnecessary because amenities were adequate (Fig 3.16.8). The foreign sector objected to more picnic spots for another reason. Here it was felt that provision of more picnic spots would not be in keeping with the natural surroundings. This sentiment was also expressed although not so strongly, by local whites and South African whites.

3.3.5 Demand for restaurant facilities (Fig 3.16.10 to 14)

Over sixty per cent of the white sector of the market stated that they had not used the restaurant (Fig 3.16.10) and could therefore express no opinion on whether or not a bigger restaurant was necessary. Foreign visitors were less familiar with the restaurant than local whites or South African whites.

Non-white locals were uncertain how to answer the question put to them about restaurant facilities because they did not know whether the restaurant was multiracial or not. Those who were uncertain had not been to the restaurant and stated as much. Other respondents took it for granted that the restaurant was for whites only and expressed a desire for a non-racial restaurant.

Very few respondents, less than six per cent felt that the reserve should have a bigger restaurant. Visitors who felt they were qualified to answer were on the whole opposed to a bigger restaurant.

Opinion was generally favourable towards the amenities at the restaurant. The bulk of the respondents who felt that they were qualified to express an opinion said they thought that the restaurant was a good one

(Fig 3.16.11).

3.3.6 Demand for roads (Fig 3.16.15)

Visitors were overwhelmingly of the opinion that there were enough roads in the reserve (Fig 3.16.15). Over eighty per cent of respondents in all sectors of the market stated as much. There does not therefore appear to be any support for proposals to build more scenic roads in the reserve.

3.3.7 Demand for animals (Fig 3.16.16 and 20-22)

Respondents in all sectors of the market felt that there were not enough animals in the reserve (Fig 3.16.16). To put this in its proper perspective, however, it must be remembered that animal viewing was only of middle-order importance (Sect 3.3.2) and that a strong response to the effect that more animals are required is relative to the strength of the demand for animal viewing itself. Scenic qualities of the reserve and picnicking remain far more important considerations. Although foreign tourists showed a stronger response for animal viewing than other sectors of the market, catering for foreign tourists alone cannot be an important environmental consideration because foreign tourists apparently comprise only eleven per cent of the visitors to the reserve.

The Cape Point baboons attract a good deal of attention. Visitors in all sectors of the market were overwhelmingly against the practice of feeding baboons (Fig 3.16.20). It was evidently realised that the feeding of baboons is a dangerous practice or causes baboons to make a nuisance of themselves (Fig 3.16.21). Other reasons given for not feeding baboons were that it was not natural and might even be unhealthy for the baboons.

Less than four per cent of respondents felt that people should feed baboons (Fig 3.16.22). Foreign visitors showed a greater tendency to feed baboons than any other sector of the market. Amusement value was the reason given for doing so.

3.3.8 Public opinion on crowding (Fig 3.16.17 to 19)

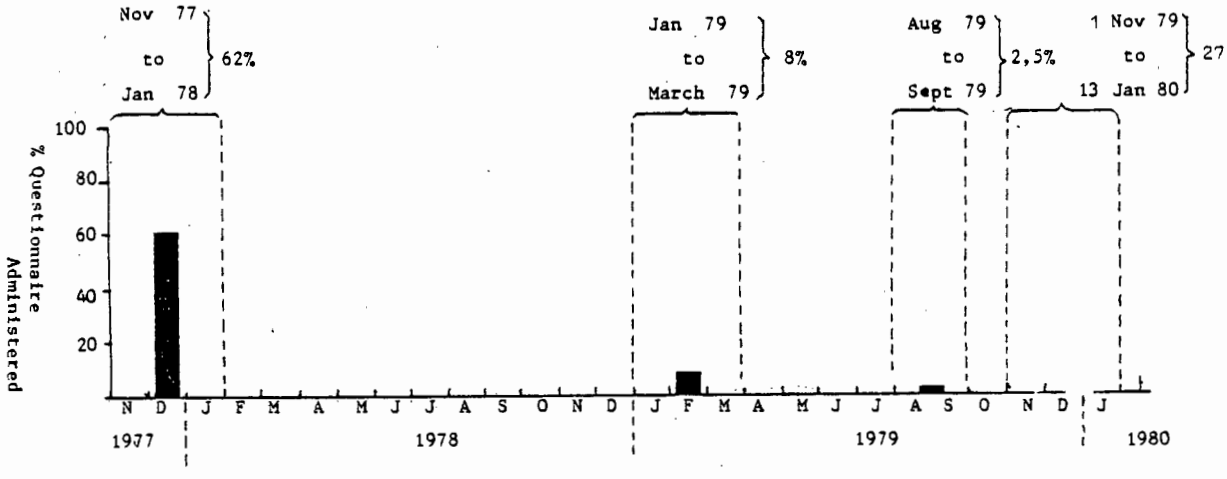
People objected strongly to the idea that the number of visitors to the reserve should be limited. (Fig 3.16.17). Over seventy-three per cent of respondents in all sectors of the market felt this way. Thirty to forty per cent of visitors in all sectors of the market felt that the reserve is not crowded enough to warrant this measure (Fig 3.16.18). Approximately twenty-five per cent of respondents from all sectors expressed the opinion that it would be unfair to do so and that practical difficulties of deciding when and how to limit visitors would make it impossible to apply these measures.

Only a small proportion of respondents, less than twenty per cent in all sectors of the market felt that the number of visitors to the reserve should be limited. Prevention of overcrowding was the main reason given for limiting visitor numbers (Fig 3.16.19).

3.3.9 Public opinion on environmental quality
(Fig 3.16.23 to 25)

Over ninety-three per cent of visitors in all sectors of the market felt that the reserve was a clean place (Fig 3.16.23). The white sector of the market in the main did not recognise a litter problem in the reserve (Fig 3.16.24). People in general were nonplussed when asked for solutions to the litter problem. In the non-white sector, the most commonly offered solution was that the responsibility rested with the people themselves. Prov-

1. SAMPLING TIMES



2. ORIGIN/RACIAL GROUP

3. AGE

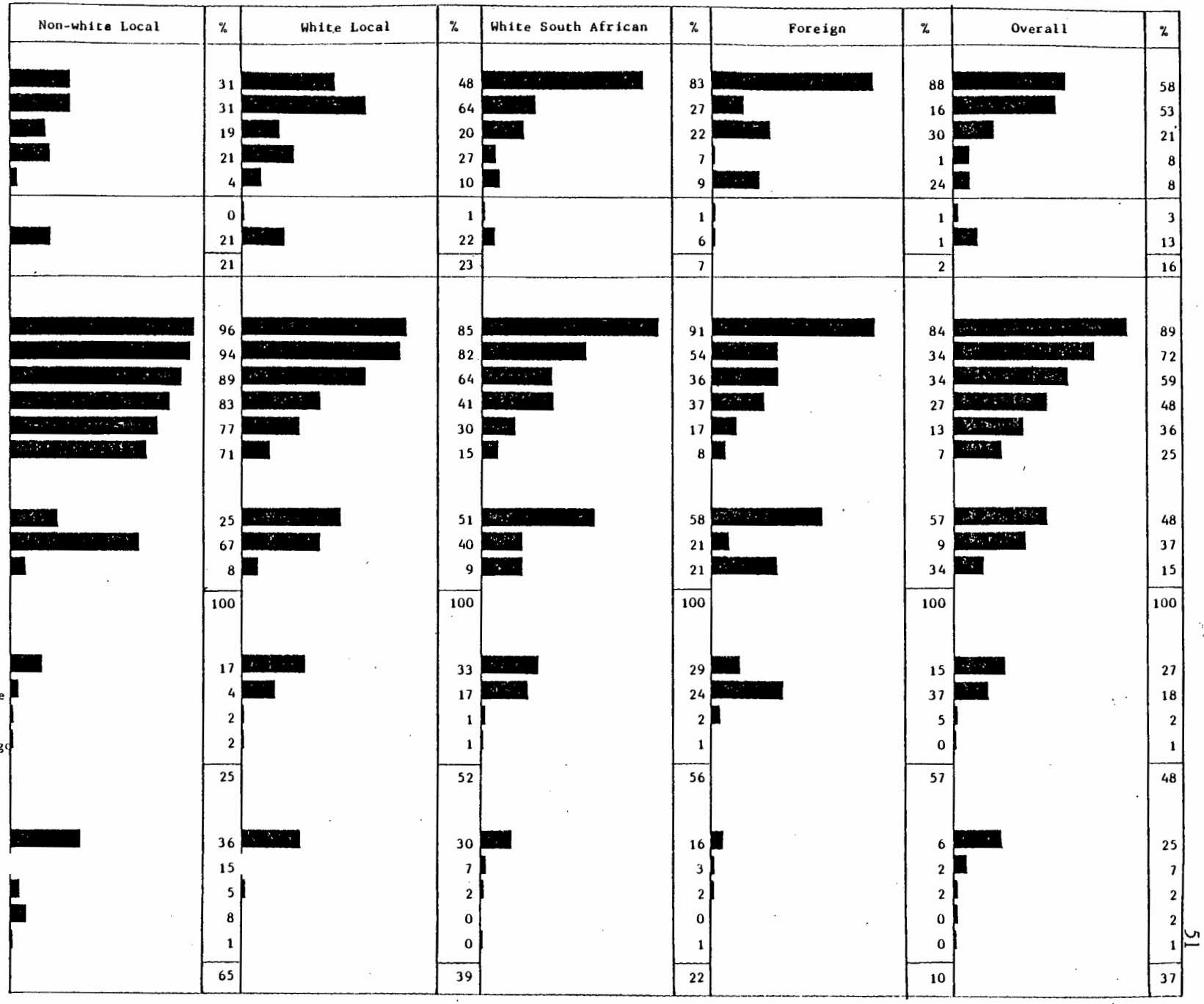
4. SEX

		Questionnaire Sample Nov 77-Jan 80 %	Main Gate Sample 24/11/79 - 13/1/80 %
Non-white	local	22	44
White	local	42	27
White	South African	25	14
	Foreign	10	11
Non-white	South African	0	4
	TOTAL	99	100
	25 - 45	19	27
	< 18	0	21
	18 - 25	9	16
	45 - 65	4	7
	65+	0	1
	Unclassified	*68	28
	TOTAL	100	99
	Female	31	36
	Male	69	36
	Unclassified	0	28
	TOTAL	100	100

*See appendix 27c

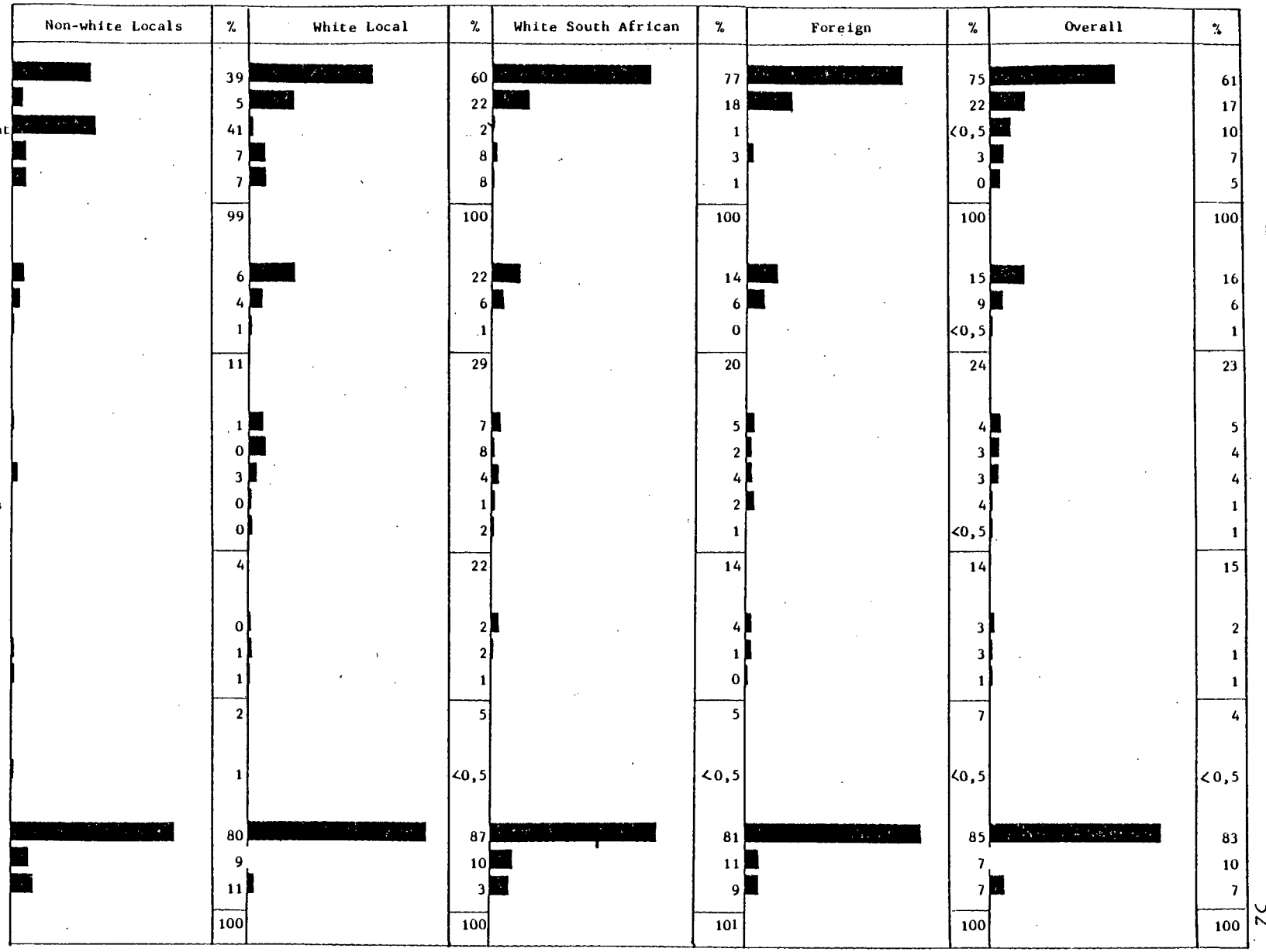
FIGURE 3.16 Results of a visitor survey conducted in the Cape of Good Hope nature reserve between November 1977 and January 1980

FIGURE 3.16 (CONTINUED)



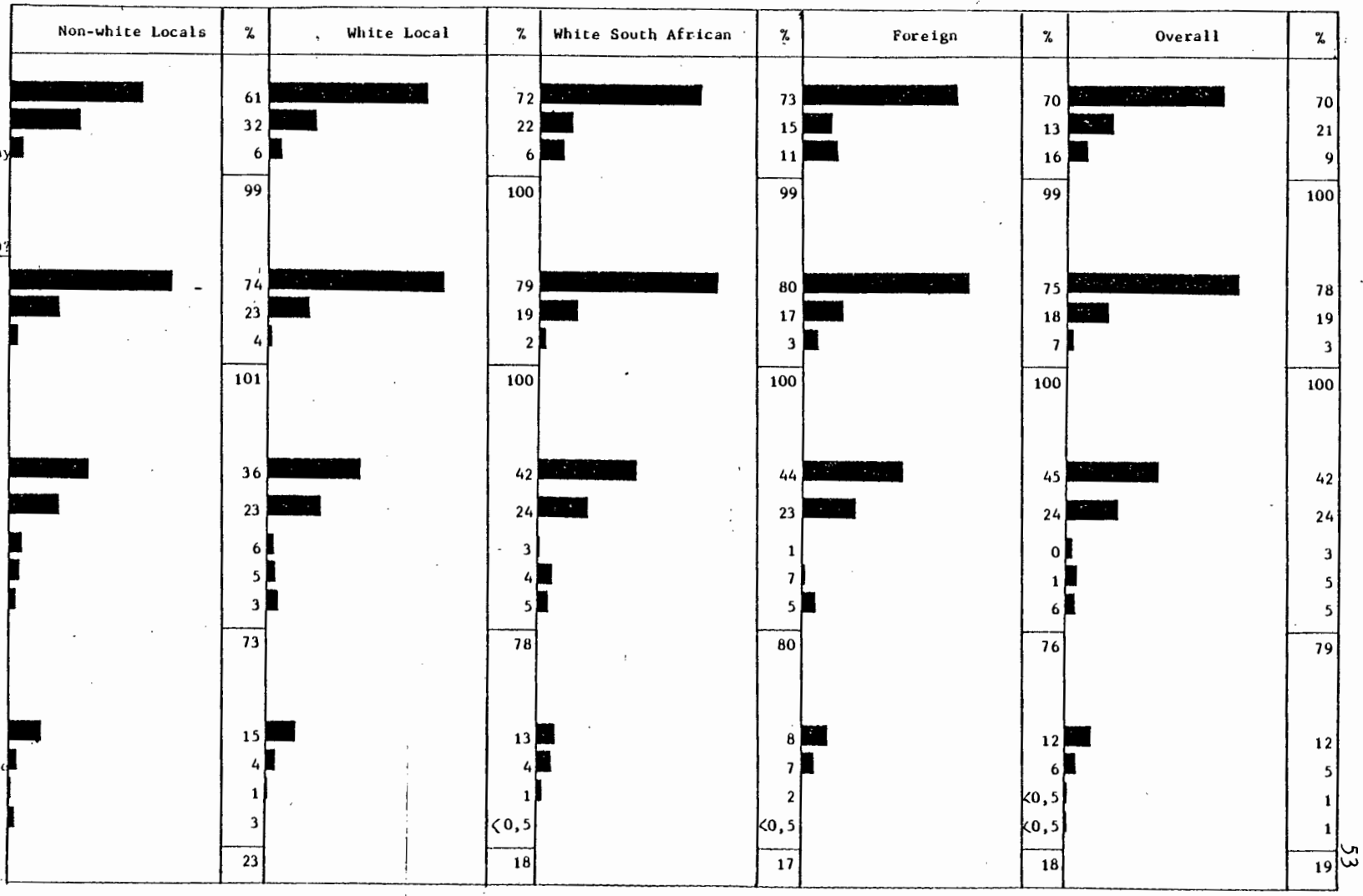
		Non-white Local	%	White Local	%	White South African	%	Foreign	%	Overall	%
5. REASON FOR VISIT											
	Scenic drive		31		48		83		88		58
	Picnic		31		64		27		16		53
	Animals		19		20		22		30		21
	Fish		21		27		7		1		8
	Walk/Flowers		4		10		9		24		8
Possible Maximum 79%	Nothing else to do		0		1		1		1		3
Possible Maximum 21%	Swim		21		22		6		1		13
Possible Maximum 100% (See Appendix 27)	3. TOTAL		21		23		7		2		16
6. FACILITIES EXPECTED											
	Toilets		96		85		91		84		89
	Braai places		94		82		54		34		72
	Tidal pool		89		64		36		34		59
	Tables/benches		83		41		37		27		48
	Swings/slides etc.		77		30		17		13		36
	More playing areas		71		15		8		7		25
7. SHOULD RESERVE HAVE MORE PICNIC SPOTS ?											
	No		25		51		58		57		48
	Yes		67		40		21		9		37
	Don't know		8		9		21		34		15
	TOTAL		100		100		100		100		100
8. REASONS FOR NO											
	Unnecessary, amenities are adequate		17		33		29		15		27
	To preserve its integrity as a Nature Reserve		4		17		24		37		18
	To prevent it becoming overrun with people		2		1		2		5		2
	There are a number of alternative places to go		2		1		1		0		1
	TOTAL		25		52		56		57		48
9. REASONS FOR YES											
	To reduce the crowding problem		36		30		16		6		25
	To improve the amenities of the Reserve		15		7		3		2		7
	To attract more visitors to the Reserve		5		2		2		2		2
	To ease the restrictions on non-whites		8		0		0		0		2
	In deference to visitors to Cape Town		1		0		1		0		1
	TOTAL		65		39		22		10		37

FIGURE 3.16 (CONTINUED)



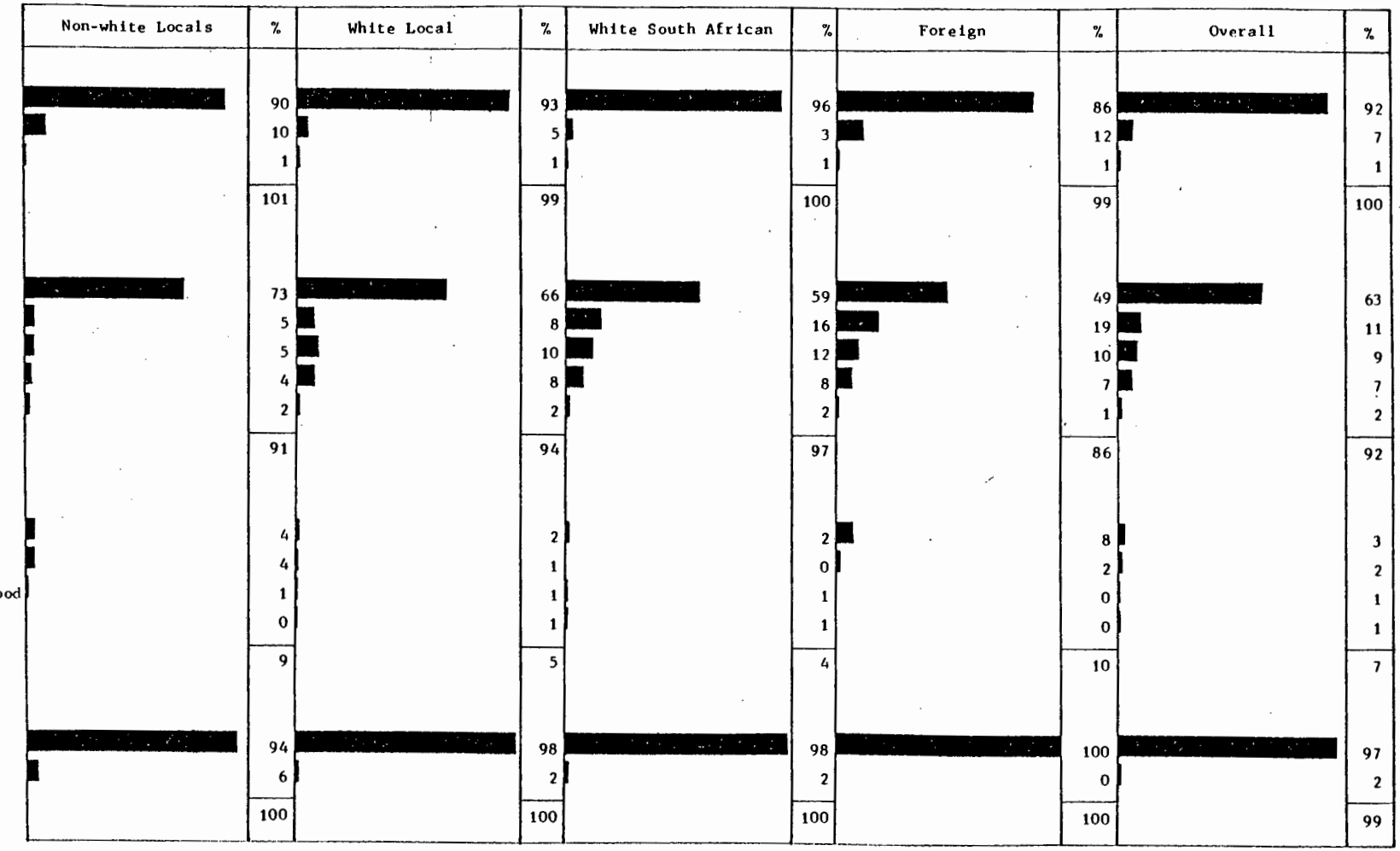
	Non-white Locals	%	White Local	%	White South African	%	Foreign	%	Overall	%
10. SHOULD RESERVE HAVE A LARGER RESTAURANT ?										
Haven't used restaurant		39		60		77		75		61
No		5		22		18		22		17
Should have non-racial restaurant		41		2		1		<0,5		10
Yes		7		8		3		3		7
No comment		7		8		1		0		5
TOTAL		99		100		100		100		100
11. ARE AMENITIES GOOD/INDIFFERENT/POOR										
Good		6		22		14		15		16
Indifferent		4		6		6		9		6
Poor		1		1		0		<0,5		1
TOTAL		11		29		20		24		23
12. REASONS FOR "GOOD"										
Amenities quite adequate		1		7		5		4		5
Good food		0		8		2		3		4
Good service		3		4		4		3		4
High standard of cleanliness		0		1		2		4		1
Nice atmosphere		0		2		1		<0,5		1
TOTAL		4		22		14		14		15
13. REASONS FOR "INDIFFERENCE"										
Amenities just adequate		0		2		4		3		2
Service not good		1		2		1		3		1
No comment		1		1		0		1		1
TOTAL		2		5		5		7		4
14. REASONS FOR "POOR"										
Not enough items sold		1		<0,5		<0,5		<0,5		<0,5
15. ARE THERE ENOUGH ROADS ?										
Yes		80		87		81		85		83
No		9		10		11		7		10
Don't know		11		3		9		7		7
TOTAL		100		100		101		100		100

FIGURE 3.16 (CONTINUED)



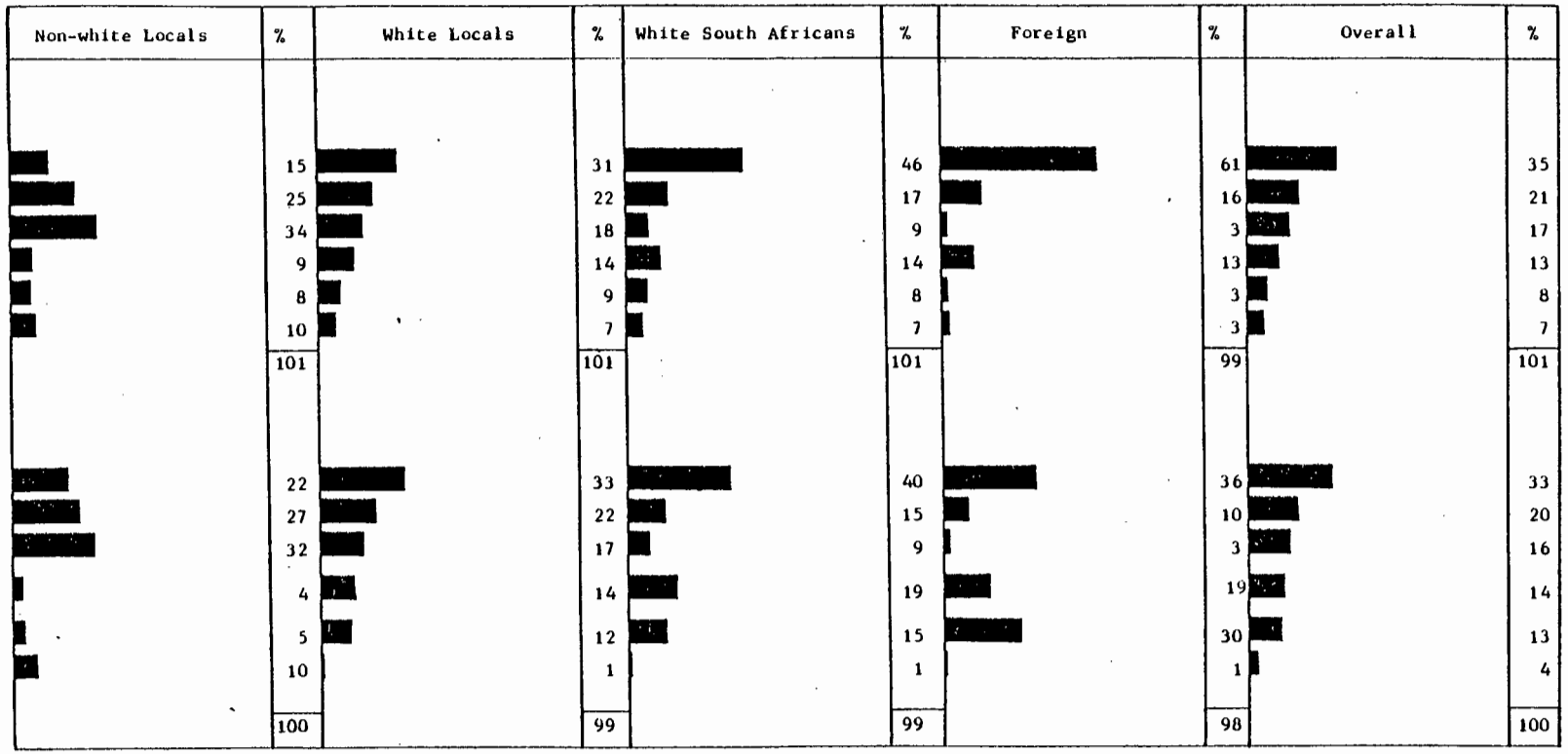
	Non-white Locals	%	White Local	%	White South African	%	Foreign	%	Overall	%
16. ARE THERE ENOUGH ANIMALS ?										
No		61		72		73		70		70
Yes		32		22		15		13		21
Haven't seen many		6		6		11		16		9
TOTAL		99		100		99		99		100
17. SHOULD NUMBER OF VISITORS TO RESERVE BE LIMITED?										
No		74		79		80		75		78
Yes		23		19		17		18		19
Don't know		4		2		3		7		3
TOTAL		101		100		100		100		100
18. REASONS FOR "NO"										
It is not crowded enough to warrant it		36		42		44		45		42
Everybody has a right to come/practical difficulties		23		24		23		24		24
Because of popular demand		6		3		1		0		3
More people should visit the Reserve		5		4		7		1		5
Might prevent tourists from seeing Reserve		3		5		5		6		5
TOTAL		73		78		80		76		79
19. REASONS FOR "YES"										
To prevent overcrowding		15		13		8		12		12
To preserve the natural character of the Reserve		4		4		7		6		5
To prevent damage to the environment		1		1		2		<0,5		1
Limit buses/eliminate the bad element		3		<0,5		<0,5		<0,5		1
TOTAL		23		18		17		18		19

FIGURE 3.16 (CONTINUED)



	Non-white Locals	%	White Local	%	White South African	%	Foreign	%	Overall	%
20. SHOULD THE BABOONS BE FED BY VISITORS ?										
No		90		93		96		86		92
Yes		10		5		3		12		7
No opinion		1		1		1		1		1
TOTAL		101		99		100		99		100
21. REASONS FOR "NO"										
Dangerous/make a nuisance of themselves		73		66		59		49		63
Not natural/can feed themselves		5		8		16		19		11
Unhealthy for baboons		5		10		12		10		9
Become dependent on food supply		4		8		8		7		7
No opinion/don't know		2		2		2		1		2
TOTAL		91		94		97		86		92
22. REASONS FOR "YES"										
Amusement value		4		2		2		8		3
No reason not to		4		1		0		2		2
If they give them the right food		1		1		1		0		1
Attracts baboons to people		0		1		1		0		1
TOTAL		9		5		4		10		7
23. RESERVE CLEAN/DIRTY ?										
Clean		94		98		98		100		97
Dirty		6		2		2		0		2
TOTAL		100		100		100		100		99

FIGURE 3.16 (CONTINUED)



	Non-white Locals	%	White Locals	%	White South Africans	%	Foreign	%	Overall	%
24. WHAT WOULD YOU DO TO COMBAT THE LITTER PROBLEM ?										
No litter problem recognized		15		31		46		61		35
More bins/litter bags/clean up litter		25		22		17		16		21
Responsibility rests with the people		34		18		9		3		17
Fines/more control		9		14		14		13		13
Signboards/anti-litter education		8		9		8		3		8
Don't know		10		7		7		3		7
TOTAL		101		101		101		99		101
25. ANY FURTHER SUGGESTIONS REGARDING THE RESERVE ?										
No		22		33		40		36		33
Provide new amenities		27		22		15		10		20
Expand/improve existing facilities		32		17		9		3		16
More information/promote conservation measures"		4		14		19		19		14
Leave Reserve as it is		5		12		15		30		13
Eliminate racial segregation		10		1		1		1		4
TOTAL		100		99		99		98		100

ision of more litter bins was also a commonly-suggested solution. This was the most commonly offered solution in the white sector. Less than fourteen per cent of respondents advocated littering fines or other forms of law enforcement. Anti-litter propaganda was not a popularly-offered solution to this problem. Less than nine per cent of respondents made this suggestion. Seven per cent of respondents simply stated that they did not know what the solution was.

The white sector of the market in the main had no further suggestions to make about the reserve at the end of the round of questions put to them, but non-whites suggested that existing facilities be further improved and that further new amenities be provided. This was also suggested in the white sector of the market, but not as strongly. (Fig 3.16.25). The foreign sector felt quite strongly that the reserve should be left as it is. The white sector of the market suggested that more conservation measures should be implemented. The non-white sector on the whole appeared to be less conservation-conscious.

3.4 COST-BENEFIT ANALYSES OF THE "BUSINESS" OF THE CAPE OF GOOD HOPE NATURE RESERVE.

The "business" of the reserve was conceived to be the production of service commodities from the natural environment. The objective of the analysis is to examine economic efficiency in the production system with a view to formulating a management policy to counter the human impact problem. The criterion for economic efficiency is that marginal cost should be equal to marginal benefit (McKenzie and Tullock 1978). This requirement will not be met when marginal costs differ from marginal benefits. The differences between marginal costs and benefits in terms of units of user satisfaction (Table 3.2) therefore indicate the magnitude

TABLE 3.2 COST-BENEFIT ANALYSIS OF THE PRODUCTION OF SERVICE COMMODITIES IN THE CAPE OF GOOD HOPE NATURE RESERVE (UNITS OF SATISFACTION VALUE), FOR THE SUMMER SEASON 1979/80

ENVIRONMENTAL ZONE / STUDY LOCALITY	MARGINAL COST							MARGINAL BENEFIT							SHORTFALL							SURPLUS							MODULUS OF SURPLUS + SHORTFALLS							SUM OF MARGINAL COSTS	SUM OF MARGINAL BENEFITS	SUM OF SHORTFALLS	SUM OF SURPLUSES	ECONOMIC INEFFICIENCY
	MARINE	SEASHORE ECOTONE	COASTAL MARGIN	INLAND TERRESTRIAL	FRESHWATER ECOTONE	FRESHWATER AQUATIC	CLIFF/HILLTOP ZONE	MARINE	SEASHORE ECOTONE	COASTAL MARGIN	INLAND TERRESTRIAL	FRESHWATER ECOTONE	FRESHWATER AQUATIC	CLIFF/HILLTOP ZONE	MARINE	SEASHORE ECOTONE	COASTAL MARGIN	INLAND TERRESTRIAL	FRESHWATER ECOTONE	FRESHWATER AQUATIC	CLIFF/HILLTOP ZONE	MARINE	SEASHORE ECOTONE	COASTAL MARGIN	INLAND TERRESTRIAL	FRESHWATER ECOTONE	FRESHWATER AQUATIC	CLIFF/HILLTOP	MARINE	SEASHORE ECOTONE	COASTAL MARGIN	INLAND TERRESTRIAL	FRESHWATER ECOTONE	FRESHWATER AQUATIC	CLIFF/HILLTOP ZONE					
LOCUS 2 CAPE POINT				3			3				3			4													1								1	6	7		1	1
LOCUS 3 BUFFELSBAY	3	3	4					1	3	3					2		1											2		1					10	7	3		3
LOCUS 4 BORDJIESRIF	2	4	4					1	3	3					1	1	1											1	1	1					10	7	3		3
LOCUS 5 BLACK ROCKS BOOISESKERM VENUS POOL	1	3	3					1	1	3						2													2						7	5	2		2
LOCUS 6 PLATBOOM	2	2	3					2	2	2							1													1					7	6	1		1
LOCUS 7 OLIPHANTSBOSCH	2	2	2	2	2	2		2	1	2	1	1	1			1		1	1	1									1		1	1	1		12	8	4		4
LOCUS 8 HOMESTEAD RESTAURANT				1	1	1					2	1	1												1					1					3	4		1	1
LOCUS 9 ROOIKRANS	1	2					2	1	1					2		1													1						5	4	1		1
LOCUS 10 COASTLINE PEGRAM'S POINT TO CAPE MACLEAR	1	1	2					1	1	1							1													1					4	3	1		1
LOCUS 11 COASTLINE PLATBOOM TO GIFKOMMETJIE	3	3	1					2	2	1					1	1												1	1						7	5	2		2
LOCUS 12 COASTLINE OLIPHANTSBOSCH TO MAST BAY	2	1	1					2	2	1													1						1						4	5		1	1
LOCUS 13 REMAINDER OF RESERVE	1	1	1	1	1	1	1	3	2	2	4	2	2	1								2	1	1	3	1	1	2	1	1	3	1	1	7	16		9	9
TOTAL	18	22	21	7	4	4	6	16	18	18	10	4	4	7	4	6	4	1	1	1		2	2	1	4	1	1	1	6	8	5	5	2	2	1	82	78	17	12	30

LEGEND	
SATISFACTION (UTILS)	RELATIVE VALUE
1	LOW
2	MEDIUM
3	HIGH
4	EXCEPTIONAL

of economic inefficiencies in the production process. The most economic way of making use of limited funds and manpower is to direct management initiative to the least efficient parts of the reserve in order to optimise production in the system as a whole. This is compatible with the goal of minimising human impact because it minimises the marginal cost of rationalising the distribution of visitors in relation to natural resources.

The results in Table 3.2 show that the parts of the reserve which people travel through in order to reach destinations within its boundaries is more than twice as inefficiently used as the most inefficient activity focus. The most inefficient activity focus was Oliphantsbosch, followed by the two major picnic sites in the reserve, Buffelsbay and Bordjiesrif. These results show how a cost-benefit analysis can be used as a means of assessing the parts of the reserve in a whole and related fashion and its purpose is to provide an information base which is sufficiently general to be of use in policy formulation.

CHAPTER 4

DISCUSSION

4.1 WHAT IS THE "BUSINESS" OF THE RESERVE?

The Cape of Good Hope nature reserve provides a service which takes the form of a type of human experience, whose cost can be measured in terms of opportunities which have to be foregone in order to feel the experience. The business of the reserve is therefore a form of trading with the environment, where the value of a particular kind of human experience associated with a specific environment provides the economic incentive which causes people to visit it. According to the economist Von Mises (cited in McKenzie and Tullock, [1978]), the incentive that impels a man to act is always some uneasiness. It is reasonable to assume that the source of the uneasiness which causes people to seek rural environment is rooted in some characteristic of the urban environment. The essential difference between the urban and rural environments is that natural processes do not predominate in the former but predominate in the latter. In a closed system all natural processes proceed in such a way that the total entropy of the system increases (Frauenfelder and Heuber [1966]). It would follow from this natural law, known as the principle of increase of entropy, that the organisation of mass in space will tend to be more random in the Cape of Good Hope nature reserve than in the metropolitan area of greater Cape Town, that is, the demand for entropy will tend to be lower in a natural environment, and space entropy rather than space organisation would be the feeling experienced in such an environment. The business of the reserve could therefore be defined as a form of trading based on the reduction of the demand for entropy in human experience. The real value in this experience would be an in-

creased ability to think in an organised fashion. In other words a visit to the country might make us better able to cope with the organised routine of our working lives.

The form of human experience encountered in a predominantly natural environment can be explained in terms of time, for human experience is a time-related phenomenon. The results of the behavioural studies undertaken in the reserve showed that generally speaking, human activities here were not strongly directed. This indicates that time is spent more freely here than in an office working routine or a factory production line, where time is budgeted, and linear action trains characterise human behaviour. The outdoor recreational experience could therefore be defined as a feeling of relative timelessness. In its extreme form this could result in unconsciousness, where time is not experienced, a state of mind called sleep. This type of behaviour was not uncommon in the reserve picnic sites and the practice of sunbathing, which embodies a state of mind fairly close to sleep, was very common. Sleepiness was particularly noticeable amongst whites in buses which arrived at the reserve gates. This could be explained in terms of extreme timelessness induced as a result of exposure to high entropy environments during the process of viewing the scenic grandeur of the Table mountain chain and peninsula coastline. The Cape of Good Hope nature reserve, as a business concern, could therefore be said to function as a release from the time-constraints of the economic universe, giving us a pause for thought; - time to reflect on the world that surrounds us in the light of our own experience; a facet of living which allows us to plan our efforts more economically.

4.2 WHAT WILL THE "BUSINESS" OF THE RESERVE BE IN 1990?

If the organised space of cities and towns is the root cause

of human impact on natural environments then the market situation in 1990 is unlikely to favour a decline in the number of visitors to the Cape of Good Hope nature reserve, since the metropolitan area of greater Cape Town is growing, and it is reasonable to assume that it will continue to do so. Space entropy in the economic regions 01, 04 and 05, Cape Town and the Western Cape (All Media and Products Survey 1980) will decrease, and marginal utility of "natural" or "open space" areas, which have a high degree of space entropy, will therefore increase. The question of whether or not this can be offset by increases in the price of fuel does not arise if it is appreciated that mass transport in the form of bus outings can soon overcome this obstacle. An increase in the entry-fee per person is likely to have a more potent controlling influence on the numbers of visitors to the reserve than transport costs, but a rise in the entry fee does not fundamentally change the market situation, since the demand for the feeling of space entropy will remain high in a metropolitan area whatever the cost of the experience. The "business" of the reserve will therefore be the same in 1990 as in 1980 in the sense that it will continue to be used to provide an open space experience, but the demand for this experience is likely to be higher. Trade is therefore likely to increase.

4.3 WHAT SHOULD THE "BUSINESS" OF THE RESERVE BE?

The business of the reserve should be to provide a feeling of space non-organisation in human experience. Artificial improvements are necessary to optimise the use of space for this purpose. Maximum use should be made of existing infra-structure to minimise space organisation introduced by these improvements. In effect this would result in an equalisation of marginal costs and benefits in Table 3.2 and an increase of economic efficiency in the reserve as a whole. Economic efficiency and the use of existing infra-structure should therefore be management priorities.

The cost-benefit analysis (Table3.2) identifies the part of the reserve which lies outside the recreational foci as the area of greatest economic inefficiency. The next most inefficient area is Oliphantsbosch picnic site, followed by the two major picnic sites of the reserve, Buffelsbay and Bordjiesrif.

An appraisal of existing infra-structure shows that unused parts of the reserve are permeated by a road system and have a single recreational focus, the Homestead restaurant, roughly in the middle. The road system and the Homestead restaurant should therefore be the target areas for management initiative. A system of roadway environmental interpretation signs legible from moving vehicles which give information on the surrounding vegetation, should be introduced. An environmental interpretation centre should be created at the Homestead restaurant to give further details on these signs. During the holiday season a student ranger employed by the Divisional Council of the Cape could be stationed at the Homestead restaurant to provide an environmental education service and conduct short inland guided walks to see the animals or natural vegetation. This would reinforce the links between restaurant and the environment.

At Oliphantsbosch, economic efficiency could be increased by removing more of the alien vegetation which presently chokes the lower reaches of the small stream flowing into Olifantsbaai. This would increase the amount of open glades that could be used for picnicking. To compliment this, a short loop nature trail could be constructed up the course of the stream and back. A further attraction that could be provided is a guided walk to the wreck of the Thomas T. Tucker, supervised by a student ranger. This service should be aimed at providing field interpretation of seashore ecology and at giving some of the historical back-

ground to shipwrecks off the Cape of Storms.

The overall effect of the strategy outlined above could be to change the geometry of visitor movement in the reserve, creating a more active central zone and a more even balance between northern and southern sectors. In addition to the above, an information centre at Cape Point should be built by extending the existing Cape Point kiosk. The function of this centre should be to advertise strategic points in order to lend effect to the changes intended to increase economic efficiency. A student ranger should be stationed at Cape Point to man the information centre. The centre should display a large map of the reserve showing the Homestead restaurant environmental interpretation centre and photographs of the vegetation at each roadway environmental interpretation sign, as well as the essential details and location of every recreational focus. Cape Point is the best place to advertise what the reserve has to offer because it is the most popularly visited locality (Fig 3.10). There is already an information centre in the reserve, opposite the Homestead restaurant. It should be replaced by a Cape Point information centre in order to secure a wider readership for the information presented.

The introduction of road signs indicating the type of surrounding vegetation, the creation of an environmental interpretation centre at the Homestead restaurant to provide more details on the road-signs, and partial removal of alien vegetation at Oliphantsbosch to provide more riverine picnic sites should be primary management objectives. The establishment of an advertising centre at Cape Point is essential as a catalyst for the whole operation. The portion of the reserve largely unused by visitors and the Oliphantsbosch picnic site are the most important areas for management initiative. Other areas of economic inefficiency exit but these are of secondary importance.

The surplus and shortfall totals in the three coastal environmental zones (Table 3.2) indicate that these would be promising areas for further site improvements. Methods of environmental interpretation should be used to increase economic efficiency in these zones. A guided walk aimed at giving instruction on seashore ecology at Oliphantsbosch could form part of this scheme. Weatherproof graphics depicting the biology of the Cape Rock Lobster (Jasus lalandii), Perlemoen (Haliotis midae) and Alikreukel (Turbo sarmaticus) should be fixed to the outside walls of the lavatories at Oliphantsbosch and Platboom because the coastline adjacent to these two localities is the region where most seafood harvesting activities take place. The advantages of using lavatory walls for this purpose are firstly that they are stable supporting structures which already exist at all picnic sites and secondly that they are high readership areas, since picnickers will visit a lavatory at least once during their stay particularly if social drinking is taking place. At Buffelsbay, details of the biology of pelagic fish should be displayed on the walls of the lavatory next to the slipway where the fishermen launch their boats. At Bordjiesrif, the theme presented could be rock-pool ecology and the rôle played by kelp, because the site is rocky and kelp abounds there.

The consequences of increasing economic efficiency in the reserve amount to a reinforcement of human behavioural links with the environment. This is the outcome of applying concepts of economics and a business administration method to the human impact problem. The approach to the problem is essentially a multidisciplinary one and its advantage is that it provides both the economist and the ecologist with satisfactory solutions, for it embodies a management policy which is economic from the point of view of optimum usage of scarce open

space resources, and ecological in the sense that it is calculated to reduce the impact on the environment by creating a better distribution of visitors. The policy solution is a fundamental one because it attacks the problem at the root, the cause - effect relationship which produces environmental impact; it reverses the process of organisation of human movement caused by man's actions in creating geometrically planned cities and towns. It does so by maximising the efficiency of exposure of humans to an environment with a high degree of space entropy.

The business of the reserve should form part of a greater whole designed to release us from the time-constraints of our economic universe by introducing a measure of non-organisation into human biomass movement. The civil engineer in cities and towns is generally committed to forms of structural alteration of the environment which arrest natural processes and maintain organisation. It is self-evident that a permanent state of organisation in the human environment is not a natural requirement, for otherwise the demand for open space would not be as great as it is now. The solution to the human impact problem is areas such as the Cape of Good Hope nature reserve therefore lies in the hands of the engineer who is able to create human living environments where natural processes are allowed to predominate in some well-defined areas without adversely affecting the organisation of structures such as roads and buildings which are necessary for economic growth. The flow of water is probably the most powerful natural process altering the shape of the terrestrial landscape. The waterways of urban areas should therefore be developed as green belts since the principle of increase of entropy inherent in all natural processes will tend to create an aesthetically pleasing effect in the urban setting. Conservation of urban waterways may reduce human impact in rural areas to a greater extent than action taken

in the rural areas themselves. The problem is really one for the engineer to solve for it boils down to the design of a channel profile which can take away flash floods without undue erosion of the river banks in the absence of canalisation.

CHAPTER 5

SUMMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY AND CONCLUSIONS

5.1.1 Human impact

A study of the distribution of visitors in the Cape of Good Hope nature reserve showed that 40% of human activities took place at Bordjiesrif, 16% at Buffelsbay and 10% at Cape Point. A further 16% of visitor-time was spent at other localities on the coastline. Eighteen per cent of visitor time was not accounted for by coastline activities. The results indicate that at least 10% of this is spent on the road between Cape Point and the Main Gate. Of the remainder, the Homestead restaurant is likely to occupy a significant proportion.

It can be concluded that human impact is greatest on the coastline of the reserve and that little activity takes place inland, apart from scenic viewing from moving vehicles.

5.1.2 Human activities

Picnicking occupies 52% of the time spent in the reserve by visitors. A further 14% of visitor time is spent on seashore and tidal pool activities associated with the picnic sites. "Non-white" picnic sites occupied 54% of visitor time and "white" picnic sites no more than 18%. Only four per cent of visitor time was spent actually appreciating the vista at Cape Point. A further six per cent of the time was spent in transit between Cape Point viewing sites and parked vehicles at this locality.

It can be concluded that although a diversity of activities take

place in the Cape of Good Hope nature reserve, it is primarily a coastal picnicking area for non-whites.

5.1.3 Environmental assessment

The Cape of Good Hope nature reserve was treated as a business concern that supplies services to the community. The environment was assessed according to concepts of supply and demand for these services. A cost-benefit analysis of the business showed that the greatest "economic inefficiency" occurred in the portion of the reserve largely unused by visitors. The second-largest "inefficiency" occurred at the Oliphantsbosch picnicking area and smaller inefficiencies were found to occur at the picnic sites Buffelsbay and Bordjiesrif.

It is concluded that a conceptual approach to the human impact problem based on environmental economics can provide useful guidelines for assessing the environment in a whole and related fashion. This approach shows where management priorities lie and at the same time provides an insight into the best means of developing a broad strategy to cope with the situation at hand.

5.1.4 Policy solution

A policy solution to the human impact problem in the Cape of Good Hope nature reserve could be to reinforce human behavioural links with the environment. The philosophy behind such a policy would be consistent with an ecological approach to nature conservation because any links between an organism and its environment are ecological relationships, and one of the objectives of nature conservation is to build better ecological relationships. This philosophy applies particularly to urbanised human populations, where the links between organism and the natural

environment have become strained. A management policy of reinforcing human behavioural links with the environment could be a solution to the human impact problem in the study area under consideration because it reconciles the objectives of public outdoor recreation with those of nature conservation, rendering these traditionally incompatible forms of land usage complementary rather than antagonistic to one another.

5.2 RECOMMENDATIONS

1 It is recommended that the policy for managing the Cape of Good Hope nature reserve be clearly stated.

2 It is recommended that a management policy of reinforcing human behavioural links with the environment be adopted for the purpose of furthering the aims of environmental conservation in the reserve.

3 The following broad strategy is recommended as a means of implementing the policy outlined above; The Homestead restaurant should be developed as an environmental interpretation centre. The information centre, presently located opposite the Homestead restaurant, should be shifted to Cape Point and incorporated as an extension to the Cape Point kiosk. Picnic site improvements should be carried out at Oliphantsbosch, in the northern part of the reserve, to reduce human impact on the southern portion. A system of roadway environmental interpretation signs relating to natural fynbos vegetation should be introduced to the reserve and advertised on a map of suitably artistic format located at the proposed Cape Point information centre, with further details appearing in graphic displays at the proposed Homestead restaurant environmental interpretation centre. The latter should be designed to maximise visitor turnover in order to increase visitor movement in what is currently a "hollow" recreational centre to the reserve, consistent with the findings of the cost-benefit analysis, which indicate that the greatest "economic inefficiencies" exist in this region. A plan to create

a more even human distribution in the reserve by the principle of strategic facility placement would also provide new opportunities for conservation extension. In this connection, it is recommended that student rangers employed by the Divisional Council of the Cape be stationed at Cape Point, the Homestead restaurant and Oliphantsbosch in order to provide an environmental education service to the public during the summer holiday season. This exercise would provide an entry point for a conservation professional such as the Public Relations Officer, Department of Nature and Environmental Conservation, Cape Provincial Administration, who could be called upon to brief students on how to answer the questions that people might wish to ask them.

4 It is recommended that professional market research organisations be used to gather information on outdoor recreational requirements of people in Cape Town and the Western Cape, because such information is essential for the planned management of open space areas like the Cape of Good Hope nature reserve, which have become scarce and therefore valuable community assets.

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STUDY LOCALITY NO. / SITE NO.	KEY	■ FULL SAMPLING DAY	X ONE-HOUR EXCURSION	+ TRAFFIC COUNTERS LEFT IN PLACE
	MONTH	NOVEMBER	DECEMBER	JANUARY
	DATE	24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6 7 8 9 10 11 12 13
	DAY	S SU M T W TH F S SU M T W TH F S SU M T W TH F S SU M T W TH F S SU M T W TH F S SU M T W TH F S SU M T W TH F S SU
	RESEARCH DAY NO.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
1	MAIN GATE	■ ■ ■ ■ ■
2	CAPE POINT	■ + + + + + + ■ + + + + + ■ + + + + + + + +
3	BUFFELSBAY	■ ■ ■ ■ ■ ■ ■ ■ ■ + + + +
4	BORDJIESRIF	+ + ■ + + + ■ + + + +
5	BLACK ROCKS BOOISESKERM VENUS POOL	+ + + ■ + + + + + + +
6	PLATBOOM	■ + + + + + + + + + +
7	OLIPHANTSBOSCH	■ ■ ■
8	HOMESTEAD RESTAURANT	X X
9	ROOIKRANS	+ + + X
10	PEGRAM'S POINT TO CAPE MACLEAR	+ + + + + X
11	PLATBOOM TO GIFKOMMETJIE	X
12	OLIPHANTSBOSCH TO MAST BAY	X X

APPENDIX 1 Study locality sampling plan

APPENDIX 2 EXAMPLE OF A VEHICLE SURVEY LOGGING SHEET (RESEARCH-DAY 43)

SATURDAY 5/1/80 SHEET NO.1

VEHICLE NO.	ORIGIN	RACE / AGE (YR)		18		25		45		65		65+	
		W	N/W	M	F	M	F	M	F	M	F	M	F
10	MILNERTON	3		2				1					
20	GRASSY PARK		1					1					
30	STEENBERG		6	1		3	2						
40	ROODEPORT	4		2				1	1				
	BELLVILLE	1						1					
	BAPTIST SUNDAY SCHOOL LOTUS RIVER		40										
50	MILNERTON	5		1	2			1	1				
60	GRASSY PARK		6	2	1			3					
70	PORT ELIZABETH	4		2				1	1				
80	FISHOEK	2				1	1						
	KOMMETJIE	1				1							
90	ENGLAND	6		1	1			1	2				1
100	RONDEBOSCH	3		1				1	1				
110	CLIFTON	1						1					
	SPRINGBOK ATLAS SAFARIS (COLUMBIA)	9											
120	GRASSY PARK		2					2					
130	MITCHELL'S PLAIN		5		2			2	1				
140	WOODSTOCK MOWBRAY KENILWORTH		3			2	1						
	S A R BUS (ARGENTINA)	27											
	SPRINGBOK ATLAS SAFARIS S. AMERICA	20											
	TOTAL OCCUPANTS CARS	30	23	12	6	7	4	16	7	0	0	0	1
	TOTAL OCCUPANTS BUSES	56	40										

		CARS	Vehicles	People	BUSES	Vehicles	People
WHITES	LOCAL		6	16		0	0
	S. AFRICAN		1	8		0	0
	FOREIGN		1	6		3	56
NON-WHITES	LOCAL		6	23		1	40
	S. AFRICAN		0	0		0	0
	TOTAL		14	53		4	96

W : WHITES

N/W : NON-WHITES

M : MALE

F : FEMALE

APPENDIX 3 EXAMPLE OF VEHICLE SURVEY DATA EXTRACTED FROM THE LOGGING-SHEETS OF RESEARCH-DAY 43

ANALYSIS OF VISITORS AND VEHICLES \ LOGGING-SHEET NO.			1	2	3	TOTAL
a) AXLE-COUNTS						
	BUSES	WHITES	6	6	2	14
		NON-WHITES	2	0	0	2
	CARS	WHITES	16	18	16	50
		NON-WHITES	12	8	0	20
b) MODE OF TRANSPORT/RACIAL GROUP						
	BUSES	WHITES	56	94	11	161
		NON-WHITES	40	0	0	40
	CARS	WHITES	30	37	32	99
		NON-WHITES	23	32	0	55
c) ORIGIN						
	BUSES	WHITES	LOCAL	0	0	0	0
			S. AFRICAN	0	0	0	0
			FOREIGN	56	94	11	161
		NON-WHITES	LOCAL	40	0	0	40
			S. AFRICAN	0	0	0	0
			FOREIGN	0	0	0	0
	CARS	WHITES	LOCAL	16	19	14	49
			S. AFRICAN	8	11	13	32
			FOREIGN	6	7	5	18
		NON-WHITES	LOCAL	23	18	0	41
			S. AFRICAN	0	14	0	14
			FOREIGN	0	0	0	0
d) AGE						
	BUSES-UNCLASSIFIED			96	94	11	201
	CARS		-18	18	19	12	49
			18-25	11	14	1	26
			25-45	23	32	16	71
			45-65	0	4	3	7
			65+	1	0	0	1
e) SEX							
	BUSES-UNCLASSIFIED			96	94	11	201
	CARS		MALE	35	34	17	86
			FEMALE	18	35	15	68

APPENDIX 4 a) COMPUTATION SHEET FOR THE MAIN GATE SURVEY OF VISITORS AND VEHICLES

ANALYSIS OF VISITORS AND VEHICLES \ COLUMN NO.			1	2 +	3 +	4 +	5 +	6 =	7 ÷	8 x	9 =	10 ÷	11 x	12 =
a) AXLE-COUNTS		DAY NO.	2	8	23	38	43							
	BUSES	WHITES	6	12	4	16	14	52	170	170	52	6641	100	0,8
		NON-WHITES	14	54	42	6	2	118	170	170	118	6641	100	1,8
	CARS	WHITES	92	22	146	64	50	374	516	6471	4690	6641	100	70,6
		NON-WHITES	56	6	52	8	20	142	516	6471	1781	6641	100	26,8
b) MODE OF TRANSPORT/RACIAL GROUP														
	BUSES	WHITES	93	143	84	192	161	673	3861	3861	673	13791	100	4,9
		NON-WHITES	340	1483	1180	145	40	3188	3861	3861	3188	13791	100	23,1
	CARS	WHITES	191	42	285	115	99	732	1116	9930	6513	13791	100	47,2
		NON-WHITES	136	24	152	17	55	384	1116	9930	3417	13791	100	24,8
c) ORIGIN														
	BUSES	WHITES	LOCAL	0	0	0	0	0	0	3861	3861	0	13791	100	0,0
			S. AFRICAN	0	0	40	133	0	173	3861	3861	173	13791	100	1,3
			FOREIGN	93	143	44	59	161	500	3861	3861	500	13791	100	3,6
		NON-WHITES	LOCAL	340	1483	1180	0	40	3043	3861	3861	3043	13791	100	22,0
			S. AFRICAN	0	0	0	145	0	145	3861	3861	145	13791	100	1,0
			FOREIGN	0	0	0	0	0	0	3861	3861	0	13791	100	0,0
	CARS	WHITES	LOCAL	135	20	176	44	49	424	1116	9930	3773	13791	100	27,4
			S. AFRICAN	33	10	74	45	32	194	1116	9930	1726	13791	100	12,5
			FOREIGN	23	12	35	26	18	114	1116	9930	1014	13791	100	7,4
		NON-WHITES	LOCAL	129	24	135	13	41	342	1116	9930	3043	13791	100	22,1
			S. AFRICAN	7	0	17	4	14	42	1116	9930	374	13791	100	2,7
			FOREIGN	0	0	0	0	0	0	1116	9930	0	13791	100	0,0
d) AGE														
	BUSES-UNCLASSIFIED			433	1626	1264	337	201	3861	3861	3861	3861	13791	100	28,0
	CARS	-18		75	19	146	33	49	322	1116	9930	2864	13791	100	20,8
		18-25		105	13	75	28	26	247	1116	9930	2198	13791	100	15,9
		25-45		126	17	154	57	71	425	1116	9930	3782	13791	100	27,4
		45-65		20	13	48	11	7	99	1116	9930	881	13791	100	6,4
		65+		1	4	14	3	1	23	1116	9930	205	13791	100	1,5
e) SEX														
	BUSES-UNCLASSIFIED			433	1626	1264	337	201	3861	3861	3861	3861	13791	100	28,0
	CARS	MALE		157	29	215	64	86	551	1116	9930	4903	13791	100	35,5
		FEMALE		170	37	222	68	68	565	1116	9930	5027	13791	100	36,5

APPENDIX 4 b) KEY TO APPENDIX 4 a)

1	2 +	3 +	4 +	5 +	6 =	7 ÷	8 ×	9 =	10 ÷	11 ×	12 =
SAMPLE-DATA FROM RESEARCH-DAY 2	SAMPLE-DATA FROM RESEARCH-DAY 8	SAMPLE-DATA FROM RESEARCH-DAY 23	SAMPLE-DATA FROM RESEARCH-DAY 38	SAMPLE-DATA FROM RESEARCH-DAY 43	POOLED SAMPLE-DATA FROM ALL RESEARCH-DAYS AT MAIN GATE		TRUE POPULATION	NUMBER OF AXLES/ VISITORS		100	% ANALYSES OF AXLES AND VISITORS
						SAMPLE POPULATION			NUMBER OF AXLE IN TRAFFIC-COUNTS/NUMBER OF VISITORS ENTERING MAIN GATE		

APPENDIX 5 HOURLY AXLE-COUNTS AT THE MAIN GATE ON SPECIFIC DAYS

RESEARCH DAY NO.	TRAFFIC-COUNTER MODE	06h00	07h00	08h00	09h00	10h00	11h00	12h00	13h00	14h00	15h00	16h00	17h00	18h00
2	ENTRY	0	20	80	162	444	620	988	1201	1365	1497	1565	1622	1653
	EXIT	0	0	2	10	21	24	74	158	259	391	584	928	1273
	ENTRY-EXIT	0	20	78	152	423	596	914	1043	1106	1106	981	694	380
	TOTAL AXLE-COUNT	0	20	82	172	462	644	1066	1358	1623	1887	2147	2557	2929
	ENTRY+EXIT	0	20	82	172	465	644	1062	1359	1624	1888	2149	2550	2926
	ERROR	0	0	0	0	-3	0	4	-1	-1	-1	-2	7	3
	% ERROR	0	0	0	0	1	0	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5
8	ENTRY	0			112	158	238		368		465	512	547	554
	EXIT	0			16	64	115		208		307	398	492	548
	ENTRY-EXIT	0			96	94	123		160		158	114	55	6
	TOTAL AXLE-COUNT	0			126	220	350		573		775	907	1037	1100
	ENTRY+EXIT	0			128	222	353		576		772	910	1039	1102
	ERROR	0			-2	-2	-3		-3		3	-3	-2	-2
	% ERROR	0			2	1	1		1		<0,5	<0,5	<0,5	<0,5
23	ENTRY	0	162	341	583	857	1184	1575	1863	2095	2309	2421	2545	2567
	EXIT	0	4	6	14	46	88	199	349	609	863	1230	1732	2130
	ENTRY-EXIT	0	158	335	569	811	1096	1376	1514	1486	1446	1191	813	437
	TOTAL AXLE-COUNT	0	166	343	593	899	1269	1767	2201	2693	3159	3636	4260	4678
	ENTRY+EXIT	0	166	347	597	903	1272	1774	2212	2704	3172	3651	4277	4697
	ERROR	0	0	-4	-4	-4	-3	-7	-11	-11	-13	-15	-17	-19
	% ERROR	0	0	1	1	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5
38	ENTRY	0	55	95	136	223	276	402	497	609	739	817	881	910
	EXIT	0	2	6	18	36	52	101	151	216	330	446	649	
	ENTRY-EXIT	0	53	89	118	187	224	301	346	393	409	371	232	
	TOTAL AXLE-COUNT	0												
	ENTRY+EXIT	0	NO TOTAL AXLE-COUNT - COUNTER DEPLOYED AT CAPE POINT											
	ERROR	0												
	% ERROR	0												
43	ENTRY	0		46	126	236	330	441	561	735	805	925	949	957
	EXIT	0		2	9	17	25	64	142	268	354	573	655	844
	ENTRY-EXIT	0		44	117	219	305	377	419	467	451	352	294	113
	TOTAL AXLE-COUNT	0		48	137	255	357	509	704	1004	1156	1498	1604	1801
	ENTRY+EXIT	0		48	135	253	355	505	703	1003	1159	1498	1604	1801
	ERROR	0		0	2	2	2	4	1	1	-3	0	0	0
	% ERROR	0		0	1	1	1	1	<0,5	<0,5	<0,5	0	0	0

APPENDIX 6 HOURLY AXLE-COUNTS AT PARTICULAR STUDY LOCALITIES ON SPECIFIC DAYS

STUDY-LOCALITY	RESEARCH DAY NO.	TIME OF DAY 06h00	07h00	08h00	09h00	10h00	11h00	12h00	13h00	14h00	15h00	16h00	17h00	18h00
MAIN GATE	2	0	20	78	152	423	596	914	1043	1106	1106	981	694	380
	8	0			96	94	123		160		158	114	55	6
	23	0	158	335	569	811	1096	1376	1514	1486	1446	1191	813	437
	38	0	53	89	118	187	224	301	346	393	409	371	232	
	43	0		44	117	219	305	377	419	467	451	352	294	113
CAPE POINT	15	0	0	6			36	42	50	30	54	64		12
	31	0	4	4	4	20	30	54		74		70	40	8
	39	0		6		36	44	66	150	178	160	206	182	108
OUFFELSBAY	1	0	0	0	0	2	12	10		18		12	0	0
	9	0	61	118	147				326	314	216	133	43	
	14	0		60		65	68	68	68	20				0
	24	0	83	83	165	235	301		398	422	278	178	56	
	33	0	88		153	229	339		447	624		483	267	178
BORDJIESRIF	32	0	16	50	102	172	256	272	310	330	346	346	240	50
	36	0		14	46	54		74	74	94		88	82	34
BLACK ROCKS, BOOISESKERM, VENUS POOL	30	0		2		26	36		68	78	78	80		40
PLATOOOM	16	0	4		14	14	22			104	88	68	28	
OLIPHANTSBOSCH	3	0			0					2				0
	22	0		4		6		18		10		4		12
	37	0		12		22		24		34		46		24

APPENDIX 7 a) COMPUTATION OF VISITOR-HOUR TOTALS AT PARTICULAR STUDY LOCALITIES ON SPECIFIC RESEARCH DAYS

STUDY LOCALITY / COLUMN NO.	1	2 +	3 +	4 +	5 +	6 =	7 x	8 ÷	9 =
RESEARCH-DAY NO.	2	8	23	38	43				
WHOLE RESERVE (MAIN GATE)	7800	1130	10975	2710	3175	25790	13791	6641	53556,7
RESEARCH DAY NO.	15	31	39						
CAPE POINT	393	450	1092			1935	10603	6523	3145,3
RESEARCH-DAY NO.	1	9	14	24	33				
BUFFELSBAY	93	2070	487	2565	3792	9007	6513	4690	12508,0
RESEARCH-DAY NO.	32	36							
BORDJIESRIF	2425	664				3089	6605	1899	10744,0
RESEARCH-DAY NO.	30								
BLACK ROCKS BOOISESKERM, VENUS POOL	374					374	3417	1781	717,6
RESEARCH-DAY NO.	16								
PLATBOOM	320					320	6605	1899	1113,0
RESEARCH-DAY NO.	3	22	37						
OLIPHANTSBOSCH	8	91	274			373	9930	6471	572,4

APPENDIX 7 b) KEY TO APPENDIX 7 a)

1	2 +	3 +	4 +	5 +	6 =	7 x	8 ÷	9 =
GRAPHICAL ESTIMATES OF NUMBERS OF AXLE-HOURS AT PARTICULAR SITES ON SPECIFIC RESEARCH-DAYS					TOTAL AXLE-HOURS	VISITORS		VISITOR-HOURS
							AXLES	

APPENDIX 8 a) COMPUTATION SHEET FOR ESTIMATING VEHICLE OCCUPANCY AT PARTICULAR STUDY LOCALITIES

STUDY LOCALITY NO.	1	2 +	3 +	4 +	5 =	6	7 +	8 +	9 +	10 =	11 ÷	12 =
1	52	118	4690	1781	6641	673	3188	6513	3417	13791	6641	2,08
2	52		4690	1781	6523	673		6513	3417	10603	6523	1,63
3			4690		4690			6513		6513	4690	1,39
4		118		1781	1899		3188		3417	6605	1899	3,48
5				1781	1781				3417	3417	1781	1,92
6		118		1781	1899		3188		3417	6605	1899	3,48
7			4690	1781	6471			6513	3417	9930	6471	1,53
8	52		4690		4742	673		6513		7186	4742	1,52
9			4690		4690			6513		6513	4690	1,39
10			4690		4690			6513		6513	4690	1,39
11	} NO VEHICLE ACCESS											
12												
13	52	118	4690	1781	6641	673	3188	6513	3417	13791	6641	2,08

APPENDIX 8 b) KEY TO APPENDIX 8 a)

1	2 +	3 +	4 +	5 =	6	7 +	8 +	9 +	10 =	11 ÷	12 (= 5 ÷ 11)
AXLE-COUNT OF BUSES WITH WHITE PASSENGERS	AXLE-COUNT OF BUSES WITH NON-WHITE PASSENGERS	AXLE-COUNT OF CARS WITH WHITE PASSENGERS	AXLE-COUNT OF CARS WITH NON-WHITE PASSENGERS	AXLE-TOTAL SPECIFIC TO PARTICULAR LOCALITY	WHITES IN BUSES	NON-WHITES IN BUSES	WHITES IN CARS	NON-WHITES IN CARS	VISITOR-TOTAL SPECIFIC TO PARTICULAR LOCALITY	AXLE-TOTAL SPECIFIC TO PARTICULAR LOCALITY	AVERAGE VEHICLE OCCUPANCY SPECIFIC TO PARTICULAR LOCALITY

APPENDIX 9 a) COMPUTATION SHEET FOR THE ESTIMATION OF DAILY TOTALS OF VISITOR-ACTIVITY 24/11/79 TO 13/1/80

RESEARCH DAY NO. \ COLUMN NO.	1	2 +	3 -	4 =	5 ×	6 ÷	7 =
1	758	61	0	819	25790	6641	3180,5
2	2834	39	70	2803	"	"	10885,3
3	228	11	0	238	"	"	924,3
4	390	35	20	417	"	"	1619,4
5	390	47	0	437	"	"	1697,0
6	343	14	0	357	"	"	1386,4
7	236	45	0	281	"	"	1091,2
8	2087	20	230	1877	"	"	7289,2
9	3426	27	210	3243	"	"	12594,0
10	425	14	150	289	"	"	1122,3
11	550	0	200	350	"	"	1359,2
12	355	25	40	340	"	"	1320,4
13	720	29	170	579	"	"	2248,5
14	654	25	190	489	"	"	1899,0
15	1278	98	270	1106	"	"	4295,1
16	3847	31	400	3478	"	"	13506,6
17	610	29	20	619	"	"	2403,9
18	963	0	80	883	"	"	3429,1
19	858	89	0	947	"	"	3677,6
20	1010	9	30	989	"	"	3840,7
21	871	43	160	754	"	"	2928,1
22	1753	45	330	1468	"	"	5700,9
23	5906	40	400	5546	"	"	21537,6
24	5700	45	400	5345	"	"	20757,0
25	765	0	250	515	"	"	2000,0
26	1458	67	0	1525	"	"	5922,2
27	1434	0	0	1434	"	"	5568,9
28	1188	39	0	1227	"	"	4765,0
29	1318	78	0	1396	"	"	5421,3
30	3856	87	0	3943	"	"	15312,4
31	1105	18	30	1093	"	"	4244,6
32	4544	45	0	4589	"	"	17821,2
33	9254	77	150	9183	"	"	35661,7
34	2242	17	100	2159	"	"	8384,4
35	2124	38	0	2162	"	"	8396,0
36	2578	45	40	2583	"	"	10031,0
37	6115	118	70	6163	"	"	23933,7
38	1768	105	50	1823	"	"	7079,5
39	7997	31	130	7898	"	"	30671,5
40	5410	44	0	5454	"	"	21180,3
41	2116	29	0	2145	"	"	8330,0
42	1022	58	100	980	"	"	3805,8
43	1729	83	70	1742	"	"	6764,5
44	4510	53	200	4363	"	"	16943,5
45	1279	42	0	1321	"	"	5130,0
46	1856	0	110	1746	"	"	6780,5
47	1310	43	0	1353	"	"	5254,3
48	1260	-	0	1260	"	"	4893,1
49	897	-	0	897	"	"	3483,5
50	1721	-	160	1561	"	"	6062,1
51	4202	-	330	3872	"	"	15936,7
				108041			419572,0

APPENDIX 9 b) KEY TO APPENDIX 9 a)

1	2 +	3 -	4 =	5 x	6 ÷	7 =
DAILY TOTAL TICKETS SOLD	* VISITORS IN SOUTH AFRICAN RAILWAYS BUSES	** 10 x TOTAL BOATS ENTERING RESERVE	VISITOR TOTAL	GRAPHICAL ESTIMATE OF AXLE-HOURS ON 5 SPECIFIC RESEARCH-DAYS		TOTAL VISITOR-ACTIVITY (VISITORS-HOURS)
					TOTAL AXLES ON 5 SPECIFIC RESEARCH-DAYS	

* South African Railways buses are issued with entry vouchers. The Divisional Council of the Cape then claims the entry fee for the visitors from the Railways against the number of visitors recorded on the entry vouchers.

** Ten tickets are issued against the entry of every boat to the reserve.

APPENDIX 10 a) COMPUTATION SHEET FOR THE DETERMINATION OF ACTIVITY-DISTRIBUTION AT PARTICULAR STUDY LOCALITIES

STUDY LOCALITY / COLUMN NO.	1	2 ÷	3 ×	4 ÷	5 ×	6 =
CAPE POINT	11198,5	2483,5	3145,3	143357,5	100	9,89
BUFFELSBAY	7455,5	3163	12508,0	188824,9	100	15,61
BORDJIESRIF	6959	891,5	10744,0	210389,8	100	39,86
BLACK ROCKS, BOOISESKERM, VENUS POOL	1686	170,0	717,6	120103,4	100	5,93
PLATBOOM	1426	233,5	1113,0	85731,0	100	7,93
OLIPHANTSBOSCH	366,5	366,5	572,4	30558,9	100	1,87
REST OF RESERVE						18,91
						100,00

APPENDIX 10 b) KEY TO APPENDIX 10 a)

1	2 ÷	3 ×	4 +	5 ×	6 =
TOTAL AXLE-ENTRIES ON ALL DAYS ON WHICH TRAFFIC COUNTS WERE MADE AT A PARTICULAR LOCALITY		ESTIMATE OF VISITOR-HOURS FROM GRAPHS CONSTRUCTED FROM TRAFFIC-COUNT DATA		100	ESTIMATE OF % VISITOR-HOURS SPENT AT A PARTICULAR LOCALITY
	TOTAL AXLE-ENTRIES FROM DAYS ON WHICH GRAPHS WERE MADE		ESTIMATE OF VISITOR-HOURS IN THE WHOLE RESERVE ON ALL DAYS ON WHICH TRAFFIC-COUNTS WERE MADE AT THE PARTICULAR LOCALITY SPECIFIED IN COLUMN 1		

APPENDIX 11 TOTAL AXLE-ENTRIES TO PARTICULAR STUDY LOCALITIES ON SPECIFIC DAYS

STUDY LOCALITY NO.		FULL SAMPLING DAYS						TRAFFIC-COUNTERS LEFT IN PLACE							ALL DAYS TRAFFIC COUNTS MADE
1	DAY NO.	2	8	23	38	43	TOTAL							TOTAL	
	AXLES	1653	554	2567	910	957	6641							-	6641
2	DAY NO.	15	31	39			TOTAL	16	17 to 21	36	37	38	40 to 42	TOTAL	
	AXLES	370	501,5	1612			2483,5	1051,5	1856	879,5	1679	635,5	2613,5	8715	11198,5
3	DAY NO.	1	9	14	24	33	TOTAL	34 to 35	36	37	39	40 to 42		TOTAL	
	AXLES	91	653	138,5	1022,5	1258	3163	645	386	1053	1008,5	1200		4292,5	7455,5
4	DAY NO.	32	36				TOTAL	13	30	33	34-35, 40-42	39	44 to 50	TOTAL	
	AXLES	678	213,5				891,5	41	417	1724	308,5 1011,5	1060	1505,5	6067,5	6959
5	DAY NO.	30					TOTAL	10 to 12	33	34 to 35	44 to 50			TOTAL	
	AXLES	170					170	35,5	682,5	125	673			1516	1686
6	DAY NO.	16					TOTAL	25 to 29	44 to 50					TOTAL	
	AXLES	233,5					233,5	470	722,5					1192,5	1426
7	DAY NO.	3	22	37			TOTAL							TOTAL	
	AXLES	26,5	59	281			366,5							-	366,5
8	NO TRAFFIC COUNTS MADE														
9	DAY NO.							10 to 12						TOTAL	
	AXLES							81						81	81
10	DAY NO.							17 to 21						TOTAL	
	AXLES							453						453	453
11	NO TRAFFIC COUNTS MADE														
12	NO TRAFFIC COUNTS MADE														
13	NO TRAFFIC COUNTS MADE														

APPENDIX 12 a) COMPUTATION SHEET FOR THE DETERMINATION OF PERCENTAGE POPULARITY OF STUDY LOCALITIES

STUDY LOCALITY / COLUMN NO.	1	2 ×	3 ÷	4 ×	5 =
CAPE POINT	11198,5	1,63	36915	100	49,4
BUFFELSBAY	7455,5	1,39	48623	100	21,3
BORDJIESRIF	6959	3,48	54176	100	44,7
BLACK ROCKS, BOOISESKERM, VENUS POOL	1686	1,92	30927	100	10,5
PLATBOOM	1426	3,48	22076	100	22,5
OLIFHANTSBOSCH	366,5	1,53	7869	100	7,1
HOMESTEAD RESTAURANT	-	1,52	-	100	-
ROOIKRANS	81	1,39	979	100	11,5
COASTLINE PEGRAM'S POINT TO CAPE MACLEAR	453	1,39	4192	100	15,0
COASTLINE PLATBOOM TO GIFKOMMETJIE COASTLINE OLIPHANTSBOSCH TO MAST BAY	NO VEHICLE ACCESS				-

APPENDIX 12 b) KEY TO APPENDIX 12 a)

1	2 ×	3 ÷	4 ×	5 =
TOTAL AXLE-ENTRIES FOR ALL DAYS ON WHICH TRAFFIC-COUNTS WERE MADE	VISITORS PER AXLE		100	% VISITORS FREQUENTING PARTICULAR LOCALITY UNDER CONSIDERATION
		TOTAL VISITORS TO RESERVE ON THE DAYS ON WHICH TRAFFIC-COUNTS WERE MADE		

APPENDIX 13 a) COMPUTATION SHEET FOR THE DETERMINATION OF USE-INTENSITY AT PARTICULAR LOCALITIES

STUDY LOCALITY / COLUMN NO.	1	2 ×	3 ÷	4 ÷	5 ÷	6 =
CAPE POINT	11198,5	3145,3	2483,5	15	15	63,0
BUFFELSBAY	7455,5	12508,0	3163	13	121	18,7
BORDJIESRIF	6959	10744,0	891,5	18	41	113,6
BLACK ROCKS, BOOISESKERM, VENUS POOL	1686	716,6	170	14	32	15,9
PLATBOOM	1426	1113,0	233,5	13	43	12,2
OLIPHANTSBOSCH	366,5	572,4	366,5	3	69	2,8
HOMESTEAD RESTAURANT						
ROOIKRANS	81	NO DATA FOR GRAPH-BASED ESTIMATES OF VISITOR-HOURS				
COASTLINE PEGRAM'S POINT TO MACLEAR BEACH	453				10	
COASTLINE PLATBOOM TO GIFKOMMETJIE	-				94	
COASTLINE OLIPHANTSBOSCH TO MAST BAY	-				188	

APPENDIX 13 b) KEY TO APPENDIX 13 a)

1	2 ×	3 ÷	4 ÷	5 ÷	6 =
TOTAL AXLE-ENTRIES FOR ALL DAYS ON WHICH TRAFFIC-COUNTS WERE MADE	TOTAL VISITOR-HOURS FROM GRAPH-BASED ESTIMATES				USE-INTENSITY IN UNITS OF VIS-h / ha/d OF PARTICULAR LOCALITY UNDER CONSIDERATION
		TOTAL AXLE-ENTRIES FROM DAYS ON WHICH GRAPHS WERE MADE	NUMBER OF DAYS ON WHICH GRAPHS AND ADDITIONAL TRAFFIC-COUNTS WERE MADE	SIZE IN HECTARES OF PARTICULAR LOCALITY UNDER CONSIDERATION	

APPENDIX 14 a) COMPUTATION SHEET FOR THE DETERMINATION OF ACTIVITY DISTRIBUTION AT PARTICULAR STUDY LOCALITIES ON WEEKDAYS, SATURDAYS AND SUNDAYS

STUDY LOCALITY		DAY CATEGORY	TRAFFIC COUNTS (AXLES)					1 Σ	2 ÷	3 x	4 ÷	5 x	6 =
CAPE POINT		WEEKDAYS DAY NO.	31	17 to 21	38								
		WEEKDAYS COUNT	501,5	1856	635,5			2993	2483,5	3179,0	27603,5	100	13,88
		SATURDAYS DAY NO.	15	36									
		SATURDAYS COUNT	370	879,5				1249,5	2483,5	3179,0	14326,1	100	11,16
		SUNDAYS/PUBLIC HOLIDAYS DAY NO.	39	37									
		SUNDAYS/PUBLIC HOLIDAYS COUNT	1612	1679				3291	2483,5	3179,0	54605,2	100	7,71
BUFFELSBAY		WEEKDAYS DAY NO.	14	34 to 35									
		WEEKDAYS COUNT	138,5	645				783,5	3163	11957,7	18679,4	100	15,86
		SATURDAYS DAY NO.	1	36									
		SATURDAYS COUNT	91	386				477	3163	11957,7	13211,5	100	13,65
		SUNDAYS/PUBLIC HOLIDAYS DAY NO.	9	24	33	37	39						
		SUNDAYS/PUBLIC HOLIDAYS COUNT	653	1022,5	1258	1053	1008,5	4995	3163	11957,7	123617,9	100	15,28
BORDJIESRIF		WEEKDAYS DAY NO.	13	34 to 35									
		WEEKDAYS COUNT	41	308,5				349,5	891,5	12639,9	19028,9	100	26,04
		SATURDAYS DAY NO.	36										
		SATURDAYS COUNT	213,5					213,5	891,5	12639,9	10031,0	100	30,18
		SUNDAYS DAY NO.	32	30	33								
		SUNDAYS COUNT	678	417	1724			2819	891,5	12639,9	68795,3	100	58,10
BLACK ROCKS, BOOISESKERM, VENUS POOL		WEEKDAYS DAY NO.	10 to 12	34 to 35									
		WEEKDAYS COUNT	35,5	125				160,5	170,0	854,1	20582,3	100	3,92
		SATURDAYS DAY NO.											
		SATURDAYS COUNT											
		SUNDAYS/PUBLIC HOLIDAYS DAY NO.	30	33									
		SUNDAYS/PUBLIC HOLIDAYS COUNT	170	682,5				852,5	170,0	854,1	50974,1	100	8,40
PLATBOOM		WEEKDAYS DAY NO.											
		WEEKDAYS COUNT											
		SATURDAYS DAY NO.											
		SATURDAYS COUNT											
		SUNDAYS/PUBLIC HOLIDAYS DAY NO.	16										
		SUNDAYS/PUBLIC HOLIDAYS COUNT	233,5					233,5	233,5	1309,4	13506,6	100	9,69
OLIPHANTSBOSCH		WEEKDAYS DAY NO.	3										
		WEEKDAYS COUNT	26,5					26,5	366,5	567,7	924,3	100	4,44
		SATURDAYS DAY NO.	22										
		SATURDAYS COUNT	59					59	366,5	567,7	5700,9	100	1,60
		SUNDAYS/PUBLIC HOLIDAYS DAY NO.	37										
		SUNDAYS/PUBLIC HOLIDAYS COUNT	281					281	366,5	567,7	23933,7	100	1,82

APPENDIX 14 b) KEY TO APPENDIX 14 a)

1	2 ÷	3 ×	4 ÷	5 ×	6 =
TRAFFIC-COUNT (AXLES) AT STUDY-LOCALITY FOR ALL DAYS IN THE DAY-OF-THE WEEK CATEGORY ON WHICH TRAFFIC COUNTS WERE MADE		VIS-h AT STUDY-LOCALITY FOR ALL FULL SAMPLING DAYS		100	ACTIVITY-DISTRIBUTION (% VIS-h) AT STUDY LOCALITY
	TRAFFIC-COUNT AT STUDY LOCALITY FOR ALL FULL SAMPLING DAYS		VIS-h IN WHOLE RESERVE FOR DAYS SPECIFIED IN 1		

APPENDIX 15 TABLE OF HOURLY VISITOR-COUNTS IN SPECIFIC ZONES AT PARTICULAR STUDY LOCALITIES

STUDY LOCALITY	RESEARCH DAY NO.	ACTIVITY ZONE	TIME OF DAY 06h00	07h00	08h00	09h00	10h00	11h00	12h00	13h00	14h00	15h00	16h00	17h00	18h00
BUFFELSBAY	1	TIDAL POOL	0	0	0	0	0	0	0	0	0	0	0	0	0
		BEACH	0	0	0	0	0	0	0	0	0	4	0	0	0
		SLIPWAY AND TRAILERPARK	0	0	0	0	0	0	0	0	0	0	0	0	0
		SEA	0	0	0	0	0	0	0	0	0	0	0	0	0
	9	TIDAL POOL	0	0	10	5	-	-	-	26	19	36	9	-	0
		BEACH	0	0	0	2	-	-	-	29	12	10	8	-	0
		SLIPWAY AND TRAILERPARK	0	72	118	131	-	-	-	97	68	34	13	-	13
		SEA	0	-	-	-	-	-	-	1	0	2	1	-	0
	14	TIDAL POOL	0	0	0	1	-	-	-	0	0	0	-	-	0
		BEACH	0	-	0	-	-	-	-	3	2	-	-	-	0
		SLIPWAY AND TRAILERPARK	0	-	84	89	-	-	-	84	17	-	-	-	0
		SEA	0	-	0	0	-	0	-	6	4	-	-	-	0
	24	TIDAL POOL	0	0	0	19	19	40	-	37	63	-	22	27	0
		BEACH	0	0	0	8	46	16	-	41	52	-	27	25	0
		SLIPWAY AND TRAILERPARK	0	97	97	97	97	97	-	143	68	-	25	17	0
		SEA	0	0	0	0	0	2	-	3	2	-	0	0	0
	33	TIDAL POOL	0	0	-	23	20	17	-	52	58	-	47	13	14
		BEACH	0	0	-	1	2	19	-	34	55	-	47	24	0
		SLIPWAY AND TRAILERPARK	0	34	-	46	46	46	-	46	25	-	13	13	0
		SEA	0	0	-	0	-	2	-	0	2	-	0	2	1
BORDJIESRIF	32	TIDAL POOL	0	5	12	79	105	165	79	76	95	90	78	48	0
		SEA	0	0	0	0	0	0	0	0	0	0	0	0	0
	36	TIDAL POOL	0	-	3	38	37	-	59	38	58	-	52	44	8
		SEA	0	-	-	0	2	-	0	0	0	-	2	0	0
BLACK ROCKS, BOOI-SESKERM, VENUS POOL	30	BOOISESKERM	0	0	0	0	9	23	32	32	41	41	50	23	5
		VENUS POOL	0	0	0	-	3	-	9	9	14	32	32	27	18
PLATBOOM	16	BEACH	0	3	2	-	3	4	-	-	26	27	-	-	0

APPENDIX 16 GRAPHICAL ESTIMATES OF VISITOR-HOURS (VIS-h) SPENT IN ACTIVITY ZONES WITHIN PARTICULAR STUDY LOCALITIES ON SPECIFIC RESEARCH DAYS

RESEARCH-DAY NO.		1	9	14	24	33	TOTAL VIS-h
	TIDAL POOL	0,0	161,8	1,0	331,0	331,8	825,6
	BEACH	0,2	113,8	9,0	290,4	265,0	678,4
BUFFELSBAY	SLIPWAY & TRAILERPARK	0,0	925,2	619,6	915,6	357,2	2817,6
	SEA	0,0	0,6	14,2	8,4	118,0	141,2
							4462,8
RESEARCH-DAY NO.		32	36				
BORDJIESRIF	TIDAL POOL	807,4	412,0				1219,4
	SEA	0,0	3,0				3,0
							1222,4
RESEARCH-DAY NO.		30					
BLACK ROCKS, BOOISESKERM, VENUS POOL	BOOISESKERM	256,4					256,4
	VENUS POOL	14,4					14,4
							270,8
RESEARCH-DAY NO.		16					
PLATBOOM	BEACH	122,0					122,0

APPENDIX 17 a) COMPUTATION SHEET FOR DETERMINING THE DISTRIBUTION OF VISITOR-ACTIVITY IN PARTICULAR STUDY LOCALITIES AND THEIR ACTIVITY-ZONES

STUDY LOCALITY	1	2 ÷	3 x	4 =	5 ÷	6 x	7 =
1. WHOLE RESERVE (MAIN GATE DATA)	53556,7	6641	6641	53556,7	53556,7	100	100,00
2. CAPE POINT	3145,3	2683,5	11198,5	14182,7	143357,5	100	9,89
3. BUFFELSBAY							
3.1 Braai/picnic areas	8045,2	3163	7455,5	18963,2	188824,9	100	10,04
3.2 Tidal pool	825,6	"	"	1946,0	"	"	1,03
3.3 Beach	678,4	"	"	1599,1	"	"	0,85
3.4 Slipway & trailerpark	2817,6	"	"	6641,4	"	"	3,52
3.5 Sea	141,2	"	"	332,8	"	"	0,18
	12508,0	"	"	29482,6	"	"	15,61
4. BOROJIESRIF							
4.1 Braai/picnic spots	9521,6	891,5	6959	74325,1	210389,8	100	35,33
4.2 Tidal pool	1219,4	"	"	9518,6	"	"	4,52
4.3 Sea	3,0	"	"	23,4	"	"	0,01
	10744,0	"	"	83867,1	"	"	39,86
5 BLACK ROCKS, BOOISESKERM VENUS POOL							
5.1 Black Rocks	446,8	170	1686	4431,2	120103,4	100	3,69
5.2 Booiseskerm	256,4	"	"	2542,9	"	"	2,12
5.3 Venus pool	14,4	"	"	142,8	"	"	0,12
	717,6	"	"	7116,9	"	"	5,93
6. PLATBOOM							
6.1 Braai/picnic areas	991,0	233,5	1426	6052,1	85731,0	100	7,06
6.2 Beach	122,0	"	"	745,1	"	"	0,87
	1113,0	"	"	6797,2	"	"	7,93
7 OLIPHANTSBOSCH	572,4	366,5	366,5	572,4	30558,9	100	1,87

APPENDIX 17 b) KEY TO APPENDIX 17 a)

1	2 ÷	3 x	4 =	5 ÷	6 x	7 =
ESTIMATE, FROM GRAPHS, OF TOTAL VISITOR-HOURS SPENT IN A PARTICULAR LOCALITY OR ITS ACTIVITY-ZONES		TOTAL TRAFFIC-COUNT FROM DAYS ON WHICH GRAPHS WERE MADE PLUS TOTALS FROM ALL OTHER ADDITIONAL COUNTS	ESTIMATE, FROM GRAPHS AND TRAFFIC-COUNTS OF TOTAL VISITOR-HOURS SPENT IN SPECIFIC ACTIVITY-ZONE/PARTICULAR LOCALITY		100	ESTIMATE, FROM GRAPHS AND TRAFFIC-COUNTS, OF TOTAL% VISITOR-HOURS SPENT IN PARTICULAR LOCALITIES AND THEIR ACTIVITY-ZONES
	TOTAL TRAFFIC-COUNT FROM DAYS ON WHICH GRAPHS WERE MADE AT A PARTICULAR LOCALITY OR ITS ACTIVITY-ZONES			ESTIMATE OF VISITOR-HR IN THE WHOLE RESERVE ON ALL DAYS ON WHICH TRAFFIC-COUNTS WERE MADE AT A PARTICULAR LOCALITY		

APPENDIX 18 EXAMPLE OF A BEHAVIOUR ANALYSIS SHEET TAKEN FROM BUFFELSBAY ON RESEARCH-DAY 24

LOCATION Top of car opposite fenced off freshwater sponge. 1.2.3. SHEET NO. 5

ZONE Braai Areas, Tidal Pool, Beach, Trailer Park and Slipway, Sea

SUBJECT	MAN <45 1	MAN <45 2	GIRL <18 3
START-TIME 13h00			
0-	Sit eat pudding braai place	Throw wine on meat	Wipe dirty meat pan
2-	Smile, converse	Stand drink wine	Paper tissue from car
4-	Hold radio, smile	" " "	Under Melkbos shade
6-	Hold radio	Turn meat	" " "
8-	Recline, hold radio	Inspect meat	" " "
10-	Sit up, smile	Stand talk at braai	" " "
12-	Stand by water tap	" " " "	" " "
14-	Smile, stand, talk	Drink, talk at braai	" " "
16-	Take costume towel	Stand, talk at braai	" " "
18-	Talk at braai place	" " " "	" " "
20-	Walk with toddler	Walk with beer	" " "
22-	Walk to Tidal pool	Beer to Tidal pool	" " "
24-	" " " "	Watch boats	" " "
26-	Stand watch boats	Watch at slipway	Shake blanket
28-	Taketoddler for swim	Return to braai place	Back under Melkbos
30-			
TIME (MIN)			

				TOTAL
At braai place	20	20	26	66
Between braai places	6	10	4	20
Stand Tidal pool	4			
	30	30	30	90

HUMAN APPRECIATION

Positive	Neutral	Negative
1 Social eating	1 Clean greasy meat dish with paper towel	-
2 Take child for swim		
3 Look at catch of fish coming in on boats		
4 Social cooking of meat		

APPENDIX 19 EXAMPLE OF THE DATA OBTAINED FROM BEHAVIOUR ANALYSIS SHEETS FOR BUFFELSBAY ON RESEARCH-DAY 24

ACTIVITY-TYPE \ SHEET NO.	1	2	3	4	5	6	TOTAL
3.1 BRAAI/PICNIC AREAS							
3.1.1 At braai/picnic spot		32	60	18	66	30	206
3.1.2 Between braai/picnic spots			30	16	20	4	70
3.1.3 On sand/rocks		58		4			62
3.1.4 Visit lavatory							
3.2 TIDAL POOL							
3.2.1 In water						2	2
3.2.2 At edge of tidal pool				16	4	28	48
3.2.3 Sunbathe							
3.2.4 Drink/eat							
3.3 BEACH							
3.3.1 In water				14		2	16
3.3.2 Stand/walk/run				22		24	46
3.3.3 Sunbathe							
3.3.4 Drink/eat							
3.4 SLIPWAY AND TRAILERPARK							
3.4.1 Parking of boat-trailers	90						90
3.5 SEA							
3.5.1 Snorkeling/diving							
	90	90	90	90	90	90	540

APPENDIX 20 a) COMPUTATION SHEET FOR DETERMINING THE PERCENTAGE IMPORTANCE OF SPECIFIC ACTIVITIES (% VISITOR HOURS) RELATIVE TO TOTAL VISITOR-ACTIVITY IN THE WHOLE RESERVE

TYPE OF ACTIVITY	1	2 +	3 +	4 +	5 +	6 =	7 ÷	8 ×	9 ÷	10 ×	11 =
STUDY LOCALITY 2 : CAPE POINT	RESEARCH DAY 15	RESEARCH DAY 31	RESEARCH DAY 39								
2.1 LIGHTHOUSE SITE											
2.1.1. Walk/run	56	64	84			204	1170	14182,7	143357,5	100	1,72
2.1.2 Stand view	70	42	82			194	"	"	"	"	1,64
2.1.3 Converse	6	8	0			14	"	"	"	"	0,12
2.1.4 Pose	0	6	12			18	"	"	"	"	0,15
2.1.5 Photography	4	22	0			26	"	"	"	"	0,22
2.1.6 Visit lavatory	4	4	0			8	"	"	"	"	0,07
2.2 CAR-PARK											
2.2.1 Walk/run	16	40	44			100	"	"	"	"	0,85
2.2.2 Stand view	0	26	100			126	"	"	"	"	1,06
2.2.3 Converse	0	12	0			12	"	"	"	"	0,10
2.2.4 Photography	0	6	0			6	"	"	"	"	0,05
2.2.5 Sit outside	0	0	12			12	"	"	"	"	0,10
2.2.6 Sit in car	18	24	46			88	"	"	"	"	0,74
2.2.7 In kiosk	18	12	32			62	"	"	"	"	0,52
2.2.8 Visit lavatory	0	6	6			12	"	"	"	"	0,10
2.3 BUS-TERMINI AND BETWEEN											
2.3.1 Rest/walk/run	66	58	114			238	"	"	"	"	2,01
2.3.2 Sit in bus	12	30	8			50	"	"	"	"	0,42
STUDY LOCALITY 3 : BUFFELSBAY	RESEARCH-DAY 1	RESEARCH-DAY 9	RESEARCH-DAY 14	RESEARCH-DAY 24	RESEARCH-DAY 33						
3.1 BRAAI/PICNIC AREAS											
3.1.1 At braai/picnic spot	76	174	30	206	302	788	1098	18963,2	188824,9	100	7,20
3.1.2 Between braai/picnic spots	10	14	0	70	118	212	"	"	"	"	1,94
3.1.3 On sand/rocks	4	16	0	62	4	86	"	"	"	"	0,79
3.1.4 Visit lavatory	0	2	4	0	6	12	"	"	"	"	0,11
3.2 TIDAL POOL											
3.2.1 In water	0	4	0	2	24	30	132	1946,0	"	"	0,23
3.2.2 At tidal pool	0	14	0	48	26	88	"	"	"	"	0,69
3.2.3 Sunbathe	0	14	0	0	0	14	"	"	"	"	0,11
3.2.4 Drink/eat	0	0	0	0	0	0	"	"	"	"	0,00
3.3 BEACH											
3.3.1 In water	0	26	0	16	0	42	122	1599,1	"	"	0,29
3.3.2 Stand/walk/run	0	4	0	46	30	80	"	"	"	"	0,55
3.3.3 Sunbathe	0	0	0	0	0	0	"	"	"	"	0,00
3.3.4 Drink/eat	0	0	0	0	0	0	"	"	"	"	0,00
3.4 SLIPWAY AND TRAILER PARK											
3.4.1 Parking of boat trailers	0	88	146	90	30	354	354	6641,4	"	"	3,52
3.5 SEA											
3.5.1 Snorkeling/diving	0	4	0	0	0	4	4	332,8	"	"	0,18

CONTINUED OVERLEAF

APPENDIX 20 a) (CONTINUED)

TYPE OF ACTIVITY		1	2 +	3 +	4 +	5 +	6 =	7 ÷	8 ×	9 ÷	10 ×	11 =
STUDY- LOCALITY 4 : BORDJIESRIF		RESEARCH-DAY 32	RESEARCH-DAY 36									
4.1	BRAAI/PICNIC AREAS											
4.1.1.	At braai/picnic spot	254	116				370	594	74325,1	210389,8	100	22,00
4.1.2	Between braai/picnic spots	42	22				64	"	"	"	"	3,81
4.1.3	On rocks	30	52				82	"	"	"	"	4,88
4.1.4	Visit lavatory	0	2				2	"	"	"	"	0,12
4.1.5	At kiosk	0	0				0	"	"	"	"	0,00
4.1.6	In car-park	42	32				74	"	"	"	"	4,40
4.1.7	In car	0	2				2	"	"	"	"	0,12
4.2	TIDAL POOL											
4.2.1	In water	132	0				132	292	9518,6	"	"	2,04
4.2.2	At tidal pool	130	30				160	"	"	"	"	2,48
4.2.3	Sunbathe	0	0				0	"	"	"	"	0,00
4.2.4	Drink/eat	0	0				0	"	"	"	"	0,00
4.3	SEA											
4.3.1	Snorkeling/diving	0	14				14	14	23,4	"	"	0,01
STUDY LOCALITY 5 : BLACK ROCKS, BOOISESKERM, VENUS POOL		RESEARCH-DAY 30										
5.1	BLACK ROCKS											
5.1.1	At braai/picnic spot	132					132	270	4431,2	120103,4	"	1,80
5.1.2	Between braai/picnic spots	46					46	"	"	"	"	0,63
5.1.3	On Rocks/sand	92					92	"	"	"	"	1,26
5.1.4	Visit lavatory	0					0	"	"	"	"	0,00
5.2	BOOISESKERM											
5.2.1	at braai/picnic spot	-					-	-	2542,9	"	"	-
5.2.2	Between braai/picnic spots	-					-	-	"	"	"	-
5.2.3	On rocks/sand	-					-	-	"	"	"	-
5.2.4	Visit lavatory	-					-	-	"	"	"	-
5.3	VENUS POOL											
5.3.1	On rocks	60					60	90	142,8	"	"	0,08
5.3.2	In car-park	30					30	"	"	"	"	0,04
STUDY LOCALITY 6 : PLATBOOM		RESEARCH-DAY 16										
6.1	BRAAI/PICNIC AREAS											
6.1.1	At braai/picnic spots	74					74	231	6052,1	85731,0	"	2,26
6.1.2	Between braai/picnic spots	105					105	"	"	"	"	3,21
6.1.3	In car	52					52	"	"	"	"	1,59
6.1.4	Visit lavatory	0					0	"	"	"	"	0,00
6.2	BEACH											
6.2.1	Sit/stand/walk/run	39					39	39	745,1	"	"	0,87
6.2.2	Sunbathe	0					0	"	"	"	"	0,00
6.2.3	Drink/eat	0					0	"	"	"	"	0,00

CONTINUED OVERLEAF

APPENDIX 20 a)(CONTINUED)

TYPE OF ACTIVITY	
STUDY LOCALITY 7 : OLIPHANTSBOSCH	NO QUANTITATIVE ANALYSIS ATTEMPTED
7.1 BRAAI/PICNIC AREA	
7.1.1. General picnicking activities	
STUDY LOCALITY 8 : HOMESTEAD RESTAURANT	
8.1 AT RESTAURANT	
8.1.1 Sit/drink/eat	
STUDY LOCALITY 9 : ROOIKRANS	
9.1 FISHING LEDGES	
9.1.1 Fishing/watch fishing	
STUDY LOCALITY 10 : COASTLINE PEGRAM'S POINT TO CAPE MACLEAR	
10.1 ROAD AND CAR-PARKS	
10.1.1 Scenic drive/watch sea	
STUDY LOCALITY 11 : COASTLINE PLATBOOM TO GIFKOMMETJIE	
11.1 SEASHORE	
11.1.1 Walk	
11.1.2 Angling/netting	
11.1.3 Sit on rocks	
11.2 SEA	
11.2.1 Snorkeling/diving	
STUDY LOCALITY 12 : COASTLINE OLIPHANTSBOSCH TO MAST BAY	
12.1 SEASHORE	
12.1.1 Walk	
12.1.2 Angling/netting	
12.1.3 Sit on sand	
12.2 SEA	
12.2.1 Snorkeling/diving	
STUDY LOCALITY 13 : REST OF RESERVE	
13.1 COASTLINE	
13.1.1 Walk/Angling	
13.1.2 Skin-diving	
13.2 ROAD NETWORK	
13.2.1 Scenic drive/look at animals	
13.2.2 Look at flowers	
13.3 INLAND AREA	
13.3.1 Scenic drive	
13.4 RIVERSIDE/LAKESIDE ZONE	
13.4.1 Riverside/lakeside activities	
13.5 FRESHWATER AQUATIC ZONE	
13.5.1 Freshwater aquatic activities	

APPENDIX 20 b) KEY TO APPENDIX 20 a)

1	2 +	3 +	4 +	5 +	6 =	7 ÷	8 ×	9 ÷	10 ×	11 =
RECORDINGS FROM PARTICULAR RESEARCH-DAYS OF THE TIME-ANALYSIS VALUES (MIN) PERTAINING TO SPECIFIC ACTIVITIES					TOTAL		ESTIMATE FROM GRAPHS AND TRAFFIC-COUNTS, OF TOTAL VISITOR-HOURS SPENT IN ACTIVITY-ZONE SPECIFIED IN COLUMN 7		100	% VISITOR-HOURS SPENT ON SPECIFIC ACTIVITY RELATIVE TO TOTAL VISITOR-ACTIVITY IN WHOLE RESERVE
						TOTAL OBSERVATION-TIME (MIN) LOGGED IN ACTIVITY-ZONE TO WHICH ACTIVITY SPECIFIED IN COLUMNS 1-6 BELONGS		ESTIMATE OF VISITOR-HOURS IN THE WHOLE RESERVE FOR THE DAYS ON WHICH THE GRAPHS AND TRAFFIC-COUNTS MENTIONED IN COLUMN 8 WERE MADE		

APPENDIX 21 LIST OF ACTIVITY-TYPES AND THEIR IMPORTANCE-VALUES (% VIS-h) (+ = ACTIVITIES OBSERVED BUT NOT QUANTIFIED)

LOCALITY 2 CAPE POINT	% VIS-h
2.1 LIGHTHOUSE SITE	
2.1.1. Walk/run	1,72
2.1.2 Stand view	1,64
2.1.3 Converse	0,12
2.1.4 Pose	0,15
2.1.5 Photography	0,22
2.1.6 Visit lavatory	0,07
2.2 CAR-PARK	
2.2.1 Walk/run	0,85
2.2.2 Stand view	1,06
2.2.3 Converse	0,10
2.2.4 Photography	0,05
2.2.5 Sit outside	0,10
2.2.6 Sit in car	0,74
2.2.7 In kiosk	0,52
2.2.8 Visit lavatory	0,10
2.3 BUS-TERMINI AND BETWEEN	
2.3.1 Rest/walk/run	2,01
2.3.2 Sit in bus	0,42
	9,89

LOCALITY 3 BUFFELSBAY	
3.1 BRAAI/PICNIC AREAS	
3.1.1 At braai/picnic spot	7,20
3.1.2 Between braai/picnic spots	1,94
3.1.3 On sand/rocks	0,79
3.1.4 Visit lavatory	0,11
3.2 TIDAL POOL	
3.2.1 In water	0,23
3.2.2 At edge of tidal pool	0,69
3.2.3 Sunbathe	0,11
3.2.4 Drink/eat	+
3.3 BEACH	
3.3.1 In water	0,29
3.3.2 Stand/walk/run	0,55
3.3.3 Sunbathe	+

LOCALITY 3 CONTINUED	% VIS-h
3.3.4 Drink/eat	+
3.4 SLIPWAY AND TRAILERPARK	
3.4.1 Ski-boat fishing excursion	3,52
3.5 SEA	
3.5.1 Snorkeling/diving	0,18
	15,61

LOCALITY 4 BORDJIESRIF	
4.1 BRAAI/PICNIC AREAS	
4.1.1 At braai/picnic spot	22,00
4.1.2 Between braai/picnic spots	3,81
4.1.3 On rocks	4,88
4.1.4 Visit lavatory	0,12
4.1.5 At kiosk	+
4.1.6 In car-park	4,40
4,1.7 In car	0,12
4.2 TIDAL POOL	
4.2.1 In water	2,04
4.2.2 At edge of tidal pool	2,48
4.2.3 Sunbathe	+
4.2.4 Drink/eat	+
4.3 SEA	
4.3.1 Snorkeling/diving	0,01
	39,86

LOCALITY 5 BLACK ROCKS BOOISESKERM VENUS POOL	
5.1 BLACK ROCKS	
5.1.1 At braai/picnic spot	1,80
5.1.2 Between braai/picnic spots	0,63
5.1.3 On rocks/sand	1,26
5.1.4 Visit lavatory	+
5.2 BOOISESKERM	
5.2.1 At braai/picnic spot	+
5.2.2 Between braai/picnic spots	+
5.2.3 On rocks	+
5.2.4 Visit lavatory	+
	2,12

LOCALITY 5 CONTINUED	% VIS-h
5.3 VENUS POOL	
5.3.1 On rocks	0,08
5.3.2 In car-park	0,04
	5,93

LOCALITY 6 PLATBOOM	
6.1 BRAAI/PICNIC AREAS	
6.1.1 At braai/picnic spot	2,26
6.1.2 Between braai/picnic spots	3,21
6.1.3 In car	1,59
6.1.4 Visit lavatory	+
6.2 BEACH	
6.2.1 Sit/stand/walk/run	0,88
6.2.2 Sunbathe	+
6.2.3 Drink/eat	+
	7,93

LOCALITY 7 OLIPHANTSBOSCH	
7.1 BRAAI/PICNIC AREAS	
7.1.1 General picnicking activities	1,87

LOCALITY 8 HOMESTEAD RESTAURANT	
8.1 AT RESTAURANT	
8.1.1 Sit/drink/eat	+

LOCALITY 9 KOOIKRANS	
9.1 FISHING LEDGES	
9.1.1 Fish/watching fish	+

LOCALITY 10 COASTLINE PEGRAM'S POINT TO CAPE MACLEAR	
10.1 Scenic drive/watch sea	+

LOCALITY 11 COASTLINE PLATBOOM TO GIFKOMMETJIE	% VIS-h
11.1 SEASHORE	
11.1.1 Walk	+
11.1.2 Angling/netting	+
11.1.3 Sit on rocks	+
11.2 SEA	
11.2.1 Snorkeling/diving	+

LOCALITY 12 COASTLINE OLIPHANTS-BOSCH TO MAST BAY	
12.1 SEASHORE	
12.1.1 Walk	+
12.1.2 Angling/netting	+
12.1.3 Sit on sand	+
12.2 SEA	
12.2.1 Snorkeling/diving	+

LOCALITY 13 REMAINDER OF RESERVE	
13.1 COASTLINE	
13.1.1 Walk/angling	+
13.1.2 Skin-diving	+
13.2 ROAD NETWORK	
13.2.1 Scenic drive/ look at animals	+
13.2.2 Look at flowers	+
13.3 INLAND AREA	
13.3.1 Hiking	+
13.4 RIVERSIDE/LAKESIDE ZONE	
13.4.1 Riverside/lakeside activities	+
13.5 FRESHWATER AQUATIC ZONE	
13.5.1 Freshwater zone activities	+

STUDY LOCALITIES 8-13	18,91
TOTAL	100,00

APPENDIX 22 COMPUTATION OF IMPORTANCE VALUES (%VIS-h) OF PRINCIPAL BEHAVIOUR-PATTERNS FROM THE IMPORTANCE-VALUES OF THEIR COMPOSITE ACTIVITY-TYPES (+ = ACTIVITIES OBSERVED BUT NOT QUANTIFIED)

ACTIVITY NO. \ STUDY LOCALITY	2		3		4		5		6		7		8		9		10		11		12		13		CATEGORY TOTAL (% VIS-h)
	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	TYPE	VIS-h	
SKIN-DIVING			3.5.1	0,18	4.3.1	0,01													11.2.1	+	12.2.1	+	13.1.2	+	0,19
SEASHORE RECREATION			3.1.3	0,79	4.1.3	4,88	5.1.3	1,26	6.2.1	0,88					9.1.1	+			11.1.1	+	12.1.1	+	13.1.1	+	8,61
							5.2.3	0,72											11.1.2	+	12.1.2	+			
							5.3.1	0,08											11.1.3	+					
				0,79		4,88		2,06		0,88															
RELAXING/SWIMMING AT BEACH			3.3.1	0,29					6.2.2	+											12.1.3	+			0,84
			3.3.2	0,55					6.2.3	+															
			3.3.3	+																					
			3.3.4	+																					
				0,84																					
TIDAL POOL RECREATION			3.2.1	0,23	4.2.1	2,04																			5,55
			3.2.2	0,69	4.2.2	2,48																			
			3.2.3	0,11	4.2.3	+																			
			3.2.4	+	4.2.4	+																			
				1,03		4,52																			
SKI-BOAT FISHING EXCURSION			3.4.1	3,52																					3,52
RECREATION AT BRAAI/ PICNIC SPOTS			3.1.1	7,20	4.1.1	22,00	5.1.1	1,80	6.1.1	2,26	7.1.1	1,87													36,19
							5.2.1	1,04																	
				7,20		22,00		2,84		2,26		1,87													
RECREATION BETWEEN BRAAI/PICNIC SPOTS			3.1.2	1,94	4.1.2	3,81	5.1.2	0,63	6.1.2	3,21															16,11
					4.1.5	+	5.2.2	0,36	6.1.3	1,60															
					4.1.6	4,40	5.3.2	0,04																	
					4.1.7	0,12																			
				1,94		8,33		1,03		4,81															
SCENIC DRIVING/LOOKING AT ANIMALS																	10.1.1	+					13.2.1	+	+
VISITING RESTAURANT													8.1.1	+											+
HIKING/LOOKING AT FLOWERS																							13.2.2	+	+
																							13.3.1	+	
RIVERSIDE/LAKESIDE ACTIVITIES																							13.4.1	+	+
FRESHWATER AQUATIC ACTIVITIES																							13.5.1	+	+
MOVING BETWEEN VEHICLE AND VIEWPOINT	2.1.1	1,72																							5,52
	2.2.1	0,85																							
	2.2.7	0,52																							
	2.3.1	2,01																							
	2.3.2	0,42																							
		5,52																							
APPRECIATION OF VISTA	2.1.2	1,64																							4,19
	2.1.3	0,12																							
	2.2.3	0,10																							
	2.1.4	0,15																							
	2.1.5	0,22																							
	2.2.4	0,05																							
	2.2.2	1,07																							
	2.2.5	0,10																							
	2.2.6	0,74																							
		4,19																							
VISIT LAVATORY	2.1.6	0,06	3.1.4	0,11	4.1.4	0,12	5.1.4	+	6.1.4	+															0,39
	2.2.8	0,10					5.2.4	+																	
		0,16		0,11		0,12																			
STUDY LOCALITY TOTAL		9,89		15,61		39,86		5,93		7,93		1,87		+		+		+		+		+		+	81,09

APPENDIX 23 ANALYSIS OF THE ACTIVITIES OF VISITORS EXPRESSED BOTH AS PERCENTAGES WITHIN PARTICULAR STUDY LOCALITIES AND WITHIN THE RESERVE AS A WHOLE (+ = ACTIVITIES OBSERVED BUT NOT QUANTIFIED)

ACTIVITY	% VISITOR-HOURS																							
LOCALITY NO.	2		3		4		5		6		7		8		9		10		11		12		13		WHOLE RESERVE
RECREATION AT BRAAI/PICNIC SPOTS			46	7,21	55	22,00	48	2,84	29	2,26	100	1,87													36,19
RECREATION BETWEEN BRAAI/PICNIC SPOTS			12	1,94	21	8,33	17	1,03	60	4,81															16,11
SEASHORE RECREATION			5	0,79	12	4,89	35	2,06	11	0,88					+	+			+	+	+	+	+	+	8,62
TIDAL POOL RECREATION			7	1,03	11	4,52																			5,55
MOVING BETWEEN VEHICLE AND VIEWPOINT	56	5,52																							5,52
APPRECIATION OF VISTA	42	4,19																							4,19
SKI-BOAT FISHING-EXCURSION			23	3,52																					3,52
VISITING RESTAURANT													+	+											+
SCENIC DRIVING/LOOKING AT ANIMALS																	+	+					+	+	+
SKIN-DIVING			1	0,18	<0,5	0,01													+	+	+	+	+	+	0,19
RELAXING/SWIMMING AT BEACH			5	0,84					+	+											+	+			0,84
VISIT LAVATORY	2	0,16	1	0,11	<0,5	0,12	+	+	+	+															0,39
HIKING/LOOKING AT FLOWERS																							+	+	+
RIVERSIDE/LAKESHORE ACTIVITIES																							+	+	+
FRESHWATER AQUATIC ACTIVITIES																							+	+	+
	100	9,89	100	15,61	99	39,95	100	5,93	100	7,98	100	1,87	+	+	+	+	+	+	+	+	+	+	+	+	81,09

APPENDIX 24 TABULATION OF DATA RELATING VISITOR-ACTIVITY (%VIS-h) TO THE USE OF THE ENVIRONMENT (+ = ACTIVITIES OBSERVED BUT NOT QUANTIFIED)

ENVIRONMENTAL ZONE	ACTIVITIES	% VISITOR-HOURS												
	STUDY LOCALITY NO.	2	3	4	5	6	7	8	9	10	11	12	13	WHOLE RESERVE
MARINE ZONE	SKIN-DIVING		0,18	0,01							+	+	+	0,19
SEASHORE ECOTONE	SEASHORE RECREATION		0,79	4,89	2,06	0,88			+		+	+	+	15,01
	RELAXING/SWIMMING AT BEACH		0,84			+								
	TIDAL POOL RECREATION		1,03	4,52										
			2,66	9,41	2,06	0,88								
COASTAL MARGIN	SKI-BOAT FISHING EXCURSION		3,52											56,04
	RECREATION AT BRAAI/PICNIC SPOTS		7,21	22,00	2,84	2,26	1,87							
	RECREATION BETWEEN BRAAI/PICNIC SPOTS		1,94	8,33	1,03	4,81								
	VISIT LAVATORY		0,11	0,12	+	+								
			12,78	30,45	3,87	7,07	1,87							
INLAND TERRESTRIAL ZONE	SCENIC DRIVING/LOOKING AT ANIMALS									+			+	+
	VISITING RESTAURANT							+						+
	HIKING/LOOKING AT FLOWERS												+	+
FRESHWATER ECOTONE	RIVERSIDE/LAKESIDE ACTIVITIES												+	+
FRESHWATER AQUATIC ZONE	FRESHWATER AQUATIC ACTIVITIES												+	+
CLIFF/HILLTOP ZONE	MOVING BETWEEN MOTOR VEHICLE AND VIEWPOINT	5,52												9,87
	APPRECIATION OF VISTA	4,19												
	VISIT LAVATORY	0,16												
		9,87												
	TOTAL	9,89	15,61	39,95	5,93	7,98	1,87	+	+	+	+	+	+	81,09

APPENDIX 25 MATRIX RELATING VISITOR-ACTIVITY (% VIS- h) TO THE USE OF THE ENVIRONMENT IN THE CAPE OF GOOD HOPE NATURE RESERVE
(+ = ACTIVITIES OBSERVED BUT NOT QUANTIFIED)

STUDY LOCALITY NO. / ENVIRON-MENTAL ZONE	2	3	4	5	6	7	8	9	10	11	12	13	WHOLE RESERVE
COASTAL MARGIN		12,78	30,45	3,87	7,07	1,87							56,04
SEASHORE ECOTONE		2,84	9,42	2,06	0,88			+					15,20
CLIFF/HILLTOP ZONE	9,89												9,89
INLAND TERRESTRIAL ZONE							+		+			+	+
MARINE ZONE		0,18	0,01							+	+	+	0,19
FRESHWATER ECOTONE												+	+
FRESHWATER AQUATIC ZONE												+	+
TOTAL	9,89	15,61	39,95	5,93	7,98	1,87	+	+	+	+	+	+	81,09

APPENDIX 26 a) DESIGN OF THE VISITOR SURVEY QUESTIONNAIRE FORM (AFRIKAANS SIDE)

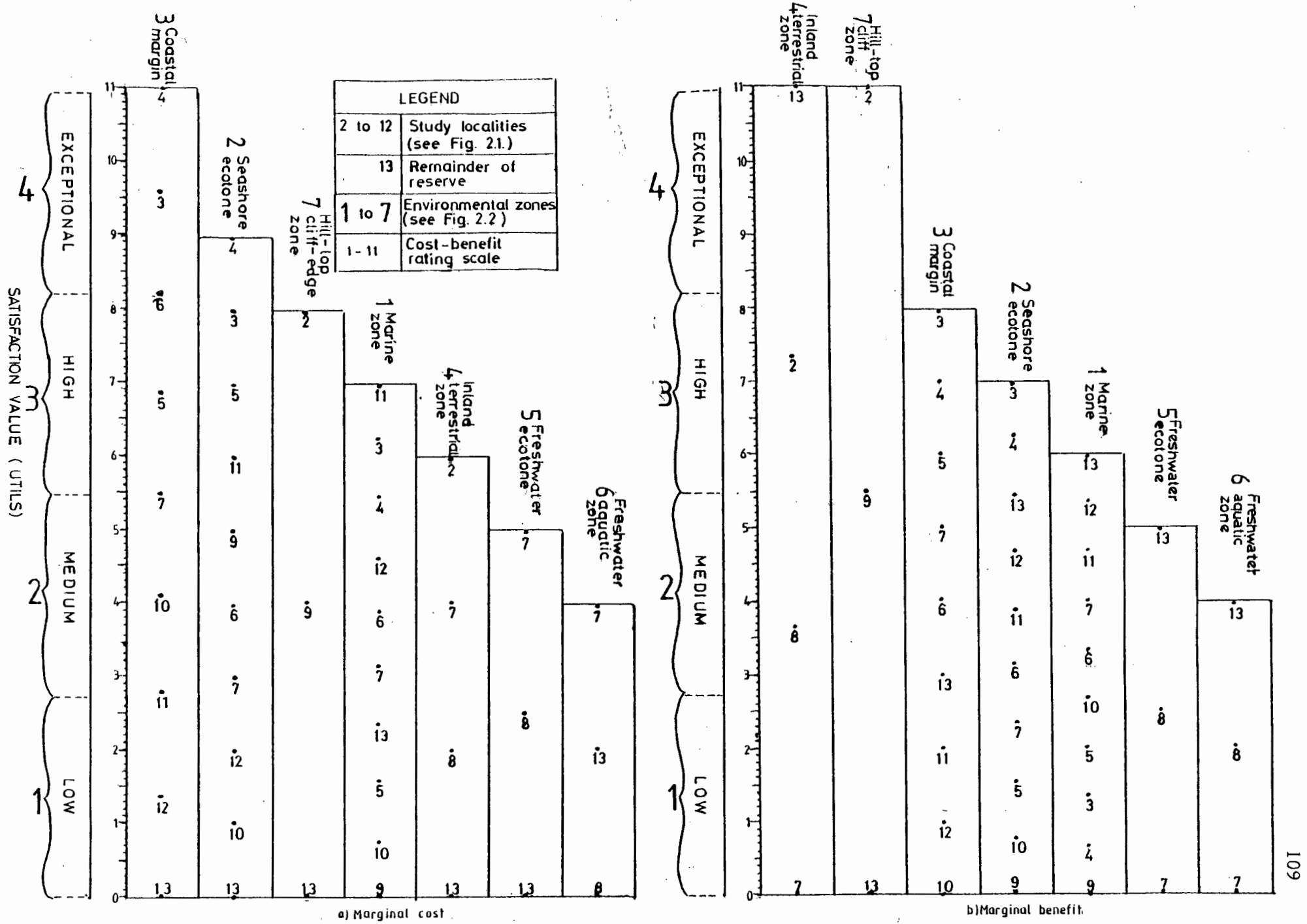
			ANTWOORD KODE	
1	OUDERDOM	18-25 25-45 45-65 65+	1	
2	GESLAG	M/V	2	
3	BESOEKER VAN	Inwoner / S.A. Besoeker / van Afrika behalwe S.A. / Buitelandse Besoeker	3	
4	REDE VIR BESOEK	PIEKNIEK	4	
		VIS	5	
		DIERE	6	
		STAP/BLOMME	7	
		UITSIGPAD	8	
		SWEM	9	
5	VERWAGTE GERIEWE	TOILETTE	10	
		BRAAIPLEKKE	11	
		GETYPOEL	12	
		SWAAIE/GLYPLANKE ENS.	13	
		TAFELS/BANKE	14	
		MEER SPEELRUIMTE	15	
6	BEHOORT DIE NATUURTUIN MEER PIEKNIEKPLEKKE TE HÊ	ja/nee/weet nie	16	
	REDES (ja)		17	
	(as nee)		18	
7	BEHOORT DIE NATUURTUIN 'n GROTER RESTOURANT TE HÊ	ja/nee / nog nie daar nie / geen komment / oop restourant	19	
8	IS DIE GERIEWE	GOED/SWAK/MIDDELMATIG/geen komment/ oormatig	20	
	REDES (as Goed)		21	
	(as Swak)		22	
	(as Middelmatig)		23	
9	IS DAAR GENOEG PAAIE	ja/nee/weet nie	24	
10	IS DAAR GENOEG DIERE	ja/nee	25	
11	BEHOORT DIE AANTAL BESOEKERS AAN DIE NATUURTUIN BEPERK TE WORD	ja/nee/weet nie	26	
	REDES (as Ja)		27	
	(as Nee)		28	
12	BEHOORT DIE BOBBEJANE DEUR BESOEKERS GEVOER TE WORD	ja/nee	29	
	REDES (as Ja)		30	
	(as Nee)		31	
13	IS DIE NATUURTUIN NA U MENING	SKOON/VUIL	32	
14	WAT SOU U DOEN OM DIE ROMMEL PROBLEEM TE BEKAMP		33	
15	ENIGE VERDERE VOORSTELLE IN VERBAND MET DIE NATUURTUIN		34	
			35	

APPENDIX 26 b) DESIGN OF THE VISITOR SURVEY QUESTIONNAIRE (ENGLISH SIDE)

			RESPONSE CODE
1	AGE	18-25 25-45 46-65 65+	1 ___
2	SEX	M/F	2 ___
3	VISITOR FROM: Local / S.A. visitor / from Africa excl. S.A. / Overseas visitor		3 ___
4	REASON FOR VISIT	PICNIC	4 ___
		FISH	5 ___
		ANIMALS	6 ___
		WALK/FLOWERS	7 ___
		SCENIC DRIVE	8 ___
		SWIM	9 ___
5	FACILITIES EXPECTED	TOILETS	10 ___
		BRAAI PLACES	11 ___
		TIDAL POOL	12 ___
		SWINGS, SLIDES, ETC.	13 ___
		TABLES/BENCHES	14 ___
		MORE PLAYING AREAS	15 ___
6	SHOULD THE RESERVE HAVE MORE PICNIC SPOTS	yes/no/don't know	16 ___
	REASONS (if yes)_____		17 ___
	(if no)_____		18 ___
7	SHOULD RESERVE HAVE A LARGER RESTAURANT	yes/no haven't been there / no comment / should have non-racial	19 ___
8	ARE AMENITIES	GOOD/POOR/INDIFFERENT/no comment/excessive	20 ___
	REASONS (if good)_____		21 ___
	(if poor)_____		22 ___
	(if indifferent)_____		23 ___
9	ARE THERE ENOUGH ROADS	yes/no/don't know	24 ___
10	ARE THERE ENOUGH ANIMALS	yes/no	25 ___
11	SHOULD NUMBER OF VISITORS TO RESERVE BE LIMITED	yes/no/don't know	26 ___
	REASONS (if yes)_____		27 ___
	(if no)_____		28 ___
12	SHOULD BABOONS BE FED BY VISITORS	yes/no	29 ___
	REASONS (if yes)_____		30 ___
	(if no)_____		31 ___
13	IN YOUR OPINION IS RESERVE	CLEAN/DIRTY	32 ___
14	WHAT WOULD YOU DO TO COMBAT THE LITTER PROBLEM_____		33 ___
15	ANY FURTHER SUGGESTIONS REGARDING THE RESERVE_____		34 ___
	_____		35 ___

APPENDIX 27 SUMMARY OF ALTERATIONS TO THE DESIGN OF THE VISITOR SURVEY QUESTIONNAIRE

	PERIOD	ALTERATIONS TO CONTENT OF QUESTIONNAIRE	NO. OF QUESTIONNAIRES	%
a)	NOV '77 TO JAN '78	-	424	62,0
b)	JAN '79 TO MARCH '79	-	56	8,2
c)	AUGUST '79 TO SEPT '79	"RACE" DELETED FROM WRITTEN FORMAT; "AGE" ADDED	17	2,5
d)	1 TO 24 NOV '79	"SWIM" SUBSTITUTED FOR "NOTHING ELSE TO DO"	41	6,0
e)	24 NOV '79 TO 13 JAN '80	-	146	21,3
			684	100,0



Appendix 28 Diagram illustrating a cost-benefit analysis of the "business" conducted in the Cape of Good Hope nature reserve

APPENDIX 29 a) COMPUTATION SHEET FOR CALCULATING DISTANCE OF STUDY LOCALITY NUMBER LOCATIONS FROM BASELINE ZERO ON HISTOGRAM BAR CHART, APPENDIX 28

MARGINAL COST						MARGINAL BENEFIT					
ENVIRONMENTAL ZONE NUMBER	STUDY LOCALITY NUMBER	ENVIRONMENTAL ELEMENT NO.	1	2 ÷	3 ×	4 =	ENVIRONMENTAL ZONE NUMBER	STUDY LOCALITY NUMBER	1	2 ÷	3 ×	4 =
1	11	7	9	9	7,00	1	13	6	9	9	6,00
1	3	7	9	8	6,22	1	12	6	9	8	5,33
1	4	7	9	7	5,44	1	11	6	9	7	4,67
1	12	7	9	6	4,67	1	7	6	9	6	4,00
1	6	7	9	5	3,89	1	6	6	9	5	3,33
1	7	7	9	4	3,11	1	10	6	9	4	2,67
1	13	7	9	3	2,33	1	5	6	9	3	2,00
1	5	7	9	2	1,56	1	3	6	9	2	1,33
1	10	7	9	1	0,78	1	4	6	9	1	0,67
1	9	7	9	0	0,00	1	9	6	9	0	0,00
2	4	9	9	9	9,00	2	3	7	9	9	7,00
2	3	9	9	8	8,00	2	4	7	9	8	6,22
2	5	9	9	7	7,00	2	13	7	9	7	5,44
2	11	9	9	6	6,00	2	12	7	9	6	4,67
2	9	9	9	5	5,00	2	11	7	9	5	3,89
2	6	9	9	4	4,00	2	6	7	9	4	3,11
2	7	9	9	3	3,00	2	7	7	9	3	2,33
2	12	9	9	2	2,00	2	5	7	9	2	1,56
2	10	9	9	1	1,00	2	10	7	9	1	0,78
2	13	9	9	0	0,00	2	9	7	9	0	0,00
3	4	11	8	8	11,00	3	3	8	8	8	8,00
3	3	11	8	7	9,63	3	4	8	8	7	7,00
3	6	11	8	6	8,25	3	5	8	8	6	6,00
3	5	11	8	5	6,88	3	7	8	8	5	5,00
3	7	11	8	4	5,50	3	6	8	8	4	4,00
3	10	11	8	3	4,13	3	13	8	8	3	3,00
3	11	11	8	2	2,75	3	11	8	8	2	2,00
3	12	11	8	1	1,38	3	12	8	8	1	1,00
3	13	11	8	0	0,00	3	10	8	8	0	0,00
4	2	6	3	3	6,00	4	13	11	3	3	11,00
4	7	6	3	2	4,00	4	2	11	3	2	7,33
4	8	6	3	1	2,00	4	8	11	3	1	3,67
4	13	6	3	0	0,00	4	7	11	3	0	0,00
5	7	5	2	2	5,00	5	13	5	2	2	5,00
5	8	5	2	1	2,50	5	8	5	2	1	2,50
5	13	5	2	0	0,00	5	7	5	2	0	0,00
6	7	4	2	2	4,00	6	13	4	2	2	4,00
6	13	4	2	1	2,00	6	8	4	2	1	2,00
6	8	4	2	0	0,00	6	7	4	2	0	0,00
7	2	8	2	2	8,00	7	2	11	2	2	11,00
7	9	8	2	1	4,00	7	9	11	2	1	5,50
7	13	8	2	0	0,00	7	13	11	2	0	0,00

APPENDIX 29 b) KEY TO APPENDIX 29 a)

1	2 ÷	3 ×	4 =
DISTANCE FROM BASELINE ZERO TO TOP OF HISTOGRAM BAR		SEQUENCE NUMBER FROM BASELINE ZERO UPWARDS MINUS ONE	DISTANCE FROM BASELINE ZERO (11 - POINT SCALE)
	NUMBER OF LOCALITIES INCLUDED IN HISTOGRAM BAR MINUS ONE		

ENVIRONMENTAL ZONE		MARGINAL COST (Visitor - hours used as ranking criterion)	
		ATTRIBUTES	KEY FEATURES
3		56,04% vis-h (Appendix 25). Renders exceptional service. Rated 11 points instead of 10.	Majority share of services produced
2		15,20% vis-h (Appendix 25)	People commonly seen
7		9,89% vis-h (Appendix 25)	
1		0,19% vis-h (Appendix 25)	
4		Road access	People rarely seen
5		Relatively free passage for walking	Visitor activity limited by absence of roads
6			Visitor activity limited by obstructing vegetation
3	3.4	30,45% vis-h (Appendix 25)	
	3.3	12,78% vis-h (Appendix 25)	
	3.6	7,07% vis-h (Appendix 25)	
	3.5	3,87% vis-h (Appendix 25)	
	3.7	1,87% vis-h (Appendix 25)	
	3.10	0,33% vis-h (See calculation below)	
	a)	Vehicle occupancy at locality 10 (Whites and non-whites in cars) = 1,53 visitors/axle (Appendix 8)	
	b)	Vehicle occupancy at Cape Point = 1,63 visitors/axle (Appendix 8)	
	c)	Vis-h axle at Cape Point = $(\frac{3145,3}{2483,5})$ (Appendix 10a) Columns 3 and 2)	
	d)	Residence time of visitors at Cape Point = 30 min (from timed observations of visitor behaviour)	
	e)	Residence time of visitors at locality 10 not of same order of magnitude; vehicles here were transitory, therefore accept an estimate of approx. 3 min.	
	f)	Therefore proportion, f, of vis-h/axle at locality 10 in relation to that at Cape Point is given by $f = (\frac{a}{b} \times \frac{e}{d})$ $= (\frac{1,53}{1,63} \times \frac{3}{30})$ $= 0,094$	Accessible by road
	g)	Therefore vis-h/axle at locality 10 = (c x f) = 1,27 x 0,94 = 0,12	
	h)	Vis-h spent in whole reserve on days 17 to 21 given by: h = (2403,9 + 3429,1 + 3677,6 + 3840,7 + 2928,1) vis-h (Appendix 9a) = 16279,4 vis-h	
	i)	Traffic count at locality 10, days 17 to 21 = 453 (Appendix 11)	
	j)	Therefore % vis-h spent at locality 10 = $(\frac{i \times g}{h} \times 100)$ % $= (\frac{453 \times 0,12}{16279,4} \times 100)$ % $= 0,33\%$	
	3.11	Provides pedestrian access to a concentration of seafood harvesting activities (Sect 3,2 para 7)	Visitor activity limited by absence of roads
	3.12	Commonly frequented area	Lower concentration of seafood harvesting activities than at locality 11 (Sect 3,2 para 7)
	3.13		Remote from commonly frequented areas
2	2.4	09,42% vis-h (Appendix 25)	
	2.3.	02,83% vis-h (Appendix 25)	
	2.5	02,06% vis-h (Appendix 25)	
	2.11	89 people recorded on one occasion (Sect3,2 para 7) indicates appreciable vis-h spent at this locality	Goal-oriented sea-food harvesting behaviour lends a degree of permance to visitor presence
	2.9	Fishing is goal-oriented behaviour which is associated with a degree of permanence. This would increase vis-h spent here	Smaller focus of fishing activity than at locality 11 (Sect 3,2 para 7)
	2.6	0,88% vis-h. Transitory visits associated with activity in coastal margin picnic site	Erratic numbers of visitors (Appendix 15). Less permanent presence associated with non-goal oriented behaviour tends to reduce amount of vis-h spent
	2.7	Transitory visits associated with activity in coastal margin picnic site	Associated coastal margin locality 7 occupies 1/3 vis-h spent in locality 6 Appendix 25)
	2.12	Commonly frequented area	Less accessible due to loose sand. Tends to reduce vis-h spent
	2.10	Commonly frequented area	Strong winds reduce out-of-car activities
	2.13		Remote from commonly frequented areas

ENVIRONMENTAL ZONE		MARGINAL COST	
		ATTRIBUTES	KEY FEATURES
7	7.2	9,89% vis-h (Appendix 25)	
	7.9	Average traffic count 27 axles/day (Appendix 11)	Average traffic count 1/10 to 1/50 of counts obtained at locality 2 (Appendix 11)
	7.13		Visitor activity limited by absence of roads
1	1.11	18 skin-divers counted on one occasion (Sect 3,2 para 7)	
	1.13	0,18% vis-h	6 divers is maximum recorded at any one time Appendix 15)
	1.4	0,01% vis-h	
	1.12	Divers seen in this locality	Remote area. By contrast, locality 4 is associated with 39,95% vis-h. 1.12 is therefore ranked below 1.4
	1.6	Accessible by road. Adjoins locality 11 which is most heavily used by divers	Indirect evidence of divers
	1.7	Accessible by road. Adjoins locality 12 which is where divers were seen	Indirect evidence of divers. Associated with locality 12 which is a remote area not as heavily used by divers as locality 11
	1.13	Divers seen returning from vehicles parked north of locality 7 and at locality 2. This provides evidence that diving occurs in locality 13	Indirect evidence of divers. Visitor activity limited by absence of roads
	1.5	Adjacent to locality 4, the most heavily used in the reserve	No evidence of divers
	1.10	Shallow shore gradients permit access to water	Strong currents limit visitor activity to calm conditions
	1.9		Vertical cliffs and strong swells limit visitor activity to very calm conditon
4	4.2	Photography of flowers and looking at them on hill slopes in transit to hill-tops was an integral part of activity types 2.1.5, 2.2.4 and 2.3.1 (Appendix 21) which consumed 2,28% vis-h	Associated with activities that consume 2,28% vis-h
	4.7	Small part of picnicking activities take place in inland terrestrial zone which merges with coastal margin. Locality 7 occupies 1,87% vis-h	Associated with activities that consume 1.87% vis-h
	4.8	People seen enjoying the view seated on patio of Homestead restaurant although most of them cut off from environment by restaurant walls	No people seen walking in open space in front of restaurant
	4.13	Permeated by road system	People almost entirely cut off from environment by space enclosure of vehicles
5	5.7	Stream runs through picnic site which increases visitor time spent on ecotone	
	5.8	Two small ponds present near Homestead restaurant	Ponds not intimately associated with restaurant, which reduces visitor time spent on ecotones
	5.13		Remote situation limits visitor time spent on ecotones
6	6.7	Paddling in the small stream running through locality 7 is as inevitable as paddling in the sea nearby	
	6.13	Some open vleis and streams present in remainder of reserve	Remainder of reserve remotely situated which would tend to reduce visitor time spent paddling and swimming
	6.8	Two ponds present near Homestead restaurant	Obstructing vegetation around ponds would tend to reduce visitor time spent in water

MARGINAL BENEFIT
(Economic scarcity used as ranking criterion)

MARKET SIZE (Local/worldwide appeal)
NATURAL BEAUTY (Space non-uniformity)
SPORTING VALUE (for sea food harvesting) HIERARCHY OF FACTORS AFFECTING ECONOMIC SCARCITY

	ATTRIBUTES	KEY FEATURES
4	Provides a representative example of part of the endangered fynbos biome which is one of the six floral kingdoms of the world (Taylor 1969)	
7	Cape Point, which is an element of this zone, was ranked third in a market research survey of the tourist resources of South Africa (Ferrario 1978)	World-wide appeal means exceptional economic scarcity. Zones 4 and 7 were therefore both rated 11 points instead of 10
3	Coastal margin picnicking next in demand after inland terrestrial zone scenic driving (Fig. 3.16.5)	Demand for coastal margin picnicking restricted to local market (Fig 3.16.5)
2	Seashore ecotone fishing next in demand after coastal margin picnicking (Fig. 3.36.5)	Local market appeal, demand lower than that for picnicking (Fig. 3.16.5)

Appendix 30 cont.

ENVIRONMENTAL ZONE	MARGINAL BENEFIT	
	ATTRIBUTES	KEY FEATURES
1	Compares favourably with sporting opportunities related to seafood harvesting elsewhere along the peninsula/False Bay coastline	Market appeal narrowed to those people who can swim
5	Walking along freshwater ecotones has relatively wide market appeal because the activity is physically undemanding	Natural beauty of vleis and streams does not compare favourably with those elsewhere in Cape Town and the Western Cape, eg. elsewhere along the peninsula mountain chain
6	Streams and vleis present	Market appeal narrowed to those people who can swim
4 4.13	Provides a representative example of part of the endangered fynbosbiome which has a high degree of economic scarcity	Economic scarcity of fynbos biome
4.2	Wild flowers relatively abundant on hill slopes of locality 2	Partial representation of fynbos biome
4.8	Contains a significant proportion of natural vegetation	Alien vegetation present
4.7	Has a potential for regrowth of fynbosvegetation	Overgrown by alien vegetation
7 7.2	Ranked third in a market research survey of the tourist resources of South Africa (Ferrario 1978)	Economic scarcity of world famous landmark
7.9	Few places exist in Cape Town and the Western Cape which areas as suitable for deep-sea rock angling as Rooikrans	Economic scarcity in local context
7.13	Affords angling opportunities into rock gullies	Lacks the economic distinction of having suitable rock ledges for deep sea angling
3 3.3	Space non-uniformity by four kinds of surface (sand, lawn, dunevegetation and low thickets). Topography has variable gradients. Vista has massive backdrop of Paulsberg mountain to the north, more open aspect to the south, and land/sea contrast	Natural processes at work here produce a high degree of non-uniformity in space in accordance with the principle of increase of entropy (Frauenfelder & Heuber 1966) Natural processes do not predominate in the living environment of people in an urbanised economic region such as Cape Town and the Western Cape and consequently, space non-uniformity, otherwise known as open space, has become an economically scarce resource associated with natural beauty
3.4	Space non-uniformity produced by two kinds of surface (sand and low thicket). Topography has variable gradients. Vista has massive backdrop of Paulsberg mountain to the north which merges with the enclosure built in to the topography, forming a space contrast with the sea	Two elements of surface non-uniformity only. Further reduction in space non-uniformity due to lack of open southern aspect in vista
3.5	Space non-uniformity produced by two types of surface (dune vegetation and low thickets), moderate gradients and the contrast of the backdrop of Paulsberg mountain with the sea	Lack of gradient variability and simplified land-sea contrast reduce space non-uniformity
3.7	Space non-uniformity produced by two kinds of surface (dune vegetation and low thickets). Level topography is interrupted by space non-uniformity introduced by the channel profile of a small stream	Lack of perspective in topography and reduced land-sea contrast in vista due to its lack of a massive backdrop reduce space non-uniformity
3.6	Space non-uniformity is produced by three types of surface (sand, lawn and low thickets). Level topography contrasted with the sea forms an uniformly open vista	Lack of an watercourse simplifies topography to a single element. Marginal loss by reduction from two to one element of topographic non-uniformity is greater than the marginal gain from an increase to three from two elements of surface non-uniformity. This follows from the assumption that the demand curve for space non-uniformity is downward sloping (Sect 2,3 para 2)
3.13	Space non-uniformity produced by two kinds of surface,fynbos and stands of wild flowers. The only suitable picnicking places have a level gradient and an open vista. Elsewhere gradients are too steep.	Surface non-uniformity reduced to two elements
3.11	Surface non-uniformity produced by two types of surface, (fynbos vegetation and paths through it). Vista non-uniformity formed by the contrast of level land topography with the sea.	Reduction of surface non-uniformity due to the absence of colour contrast provided by stands of wild flowers
3.12	Space non-uniformity produced by two kinds of surface, (fynbos vegetation and sand). Uniformly open vista formed by the contrast of level sand topography with the sea	Absence of paths through fynbos vegetation and loose sand reduce the capacity of this locality to produce an open space experience
3.10	Space non-uniformity produced by the contrast of level land topography with the sea, which forms an open vista	Surface is uniform (tar mat of carpark). Site is wind swept. These two factors give it a bleak character

ENVIRONMENTAL ZONE	MARGINAL BENEFITS	
	ATTRIBUTES	KEY FEATURES
2 2.3	Space non-uniformity produced by three types of surface (sand, rocks and water). Vista comprised of the backdrop of Paulsberg mountain to the north, the more open aspect to the south and the land/sea contrast. A gently shelving beach and an artificial tidal pool provide paddling and bathing opportunities. The large number of rock pools and the absence of offshore kelp provide angling opportunities for young and old	High degree of space non-uniformity variety of bathing and angling opportunities
2.4	Space non-uniformity is produced by two types of surface (rocks and water). Vista comprised of the space enclosure formed partly by the backdrop of Paulsberg mountain and partly by the site topography An artificial tidal pool provide paddling and bathing opportunities. Rock pools are an attraction	Space non-uniformity lower due to reduction in types of surfaces and enclosed nature of this area. Lack of beach reduces bathing opportunities. Presence of offshore kelp reduces angling opportunities to rock pools only
2.13	Variety of coastlines, from beaches to rocks and craggy cliffs together with the wreck of an oil-rig provide a degree of space non-uniformity whose combined beauty is greater than that in any one study locality. Variety of rock angling opportunities available	Absence of road access reduces the capacity of these areas to provide the feeling of relaxation associated with the beauty of natural surroundings and also reduces angling opportunities
2.12	Space non-uniformity produced by three kinds of surface (sand, rocks and water). Topographic non-uniformity introduced by two ship wrecks Land/sea contrast is a uniformly open vista. Rock angling and beach angling opportunities available	Absence of road access, lack of craggy cliffs create a more uniform vista
2.11	Space non-uniformity produced by two kinds of surface (rocks and water) Land/sea contrast is an uniformly open vista. Rock angling opportunities available	Absence of beaches reduces surface non-uniformity. Absence of shipwrecks reduces topographical non-uniformity
2.6	Space non-uniformity produced by three kinds of surface (sand, rocks and water). Land/sea contrast is a uniformly open vista	Absence of rock gallies reduces opportunity for rock angling
2.7	Space non-uniformity produced by three kinds of surface, (sand, rocks and water). Land/sea contrast is an uniformly open vista.,	Kelp in Olifantsbaai reduces angling opportunities
2.5	Space non-uniformity produced by two kinds of surface (rocks and water) and vista contrast between the backdrop of Paulsberg mountain and the sea	Rock-angling opportunities reduced by the stripping of shellfish from seashore and marine zone as a result of promixity to coastal margin picnicking zones
2.10	Space non-uniformity produced by two kinds of surface (rocks and water) Land/sea contrast is an uniformly open vista	Space non-uniformity reduced by open aspect. Rock angling opportunities reduced by strong currents
2.9	Rock angling opportunities from rock ledges at waters edge	Unpredictable swells that come in from deep water reduce the market appeal for fishing at the waters edge below the ledges in the hill-top cliff-edge zone
1 1.13	Inaccessibility reduces biological impact of divers	Least human predation
1.12		
1.11		Increasing human predation
1.7	Cold waters of Atlantic reduce human predation	due to increasing quantity of vis-h
1.6		
1.10		Turbulent seas reduce human predation
1.5		
1.3	Warmer False bay waters	Increasing human predation due to
1.4		increasing quantity of vis-h
1.9	Inaccessibility reduces biological impact of divers	Vertical sides of shoreline and unpredictable swells reduce market appeal to a select few divers
5 5.13	Variety of scenery associated with rivers and vleis of reserve	
5.8	Pond at Homestead restaurant on a slope	Reduced scenic variety associated with single locality
5.7	Stream at Oliphantsbosch on a level gradient	Space non-uniformity reduced by level gradient
6 6.13	Sirkelsvlei is big enough to provide swimming and boating opportunities	Capacity to provide swimming and boating opportunities
6.8	Ponds at Homestead restaurant small but perennial	Ponds too small to provide anything but limited swimming opportunities
6.7	Water present in winter but not always in summer	Water not always present in summer dry season