



# A South African Perspective on Conservation Behaviour – A Programme Description

---

A research opportunities document compiled on behalf of  
the Working Group for Conservation Behaviour

**SOUTH AFRICAN NATIONAL SCIENTIFIC PROGRAMMES REPORT NO**

**76**

**DECEMBER 1983**

(ii)

Issued by  
Cooperative Scientific Programmes  
Council for Scientific and Industrial Research  
P O Box 395  
PRETORIA  
0001  
South Africa

from whom copies of reports in this series are available on request

*Printed in 1983 in the Republic of South Africa  
by the Graphic Arts Division of the CSIR*

ISBN 0 7988 2954 0

Compiler's address

Mr A A Ferrar  
Coordinator: Working Group for  
Conservation Behaviour  
Cooperative Scientific Programmes  
CSIR  
P O Box 395  
PRETORIA  
0001

## **ABSTRACT**

In South Africa there is a serious lack of understanding of the relationship between human behaviour and environmental conservation. A multidisciplinary field of study is described dealing with the causes and effects of people's attitudes and behaviour, relative to their use of the natural environment.

A conceptual framework is proposed for determining research priorities in this new field of study. The framework describes four components, namely the setting of goals, the accumulation of baseline data (inventory and survey), analytical research (establishing cause and effect relationships) and a re-evaluation or monitoring component. Responses are invited from researchers in a wide variety of scientific and social disciplines in order to develop the programme and define research priorities.

## **SAMEVATTING**

In Suid-Afrika is daar 'n ernstige gebrek aan begrip oor die verhouding tussen menslike gedrag en omgewingsbewaring. 'n Multidissiplinêre studieveld word beskryf wat handel oor die oorsake en effek van die mens se houdings en gedrag relatief tot hul gebruik van die natuurlike omgewing.

'n Konseptuele raamwerk word voorgestel om navorsingsprioriteite in dié nuwe studieveld te bepaal. Die raamwerk beskryf vier dele, naamlik die daarstelling van doelwitte, versameling van basiese data (oorsig en opname), analitiese navorsing (vasstelling van verhoudings tussen oorsaak en effek) asook 'n komponent vir re-evaluasie of monitering. 'n Groot verskeidenheid van wetenskaplike en sosiale dissiplines word genader vir kommentaar sodat 'n program saamgestel, en navorsingsprioriteite bepaal kan word.

**TABLE OF CONTENTS**

	Page
ABSTRACT/SAMEVATTING	(iii)
BACKGROUND	1
THE PROBLEM	3
THE PURPOSE	7
A CONCEPTUAL FRAMEWORK	9
1. Goals for society	10
2. Descriptive component of the framework	10
3. Analytical component of the framework	12
4. Re-evaluation component of the framework	16
ACTION PLAN	18
REFERENCES	20
DRAFT BIBLIOGRAPHY OF SOUTH AFRICAN PUBLICATIONS AND RESEARCH PERTAINING TO CONSERVATION BEHAVIOUR	21
TITLES IN THIS SERIES	30

## **BACKGROUND**

The National Committee for Nature Conservation (NAKOR) is a central coordinating body of government agencies set up to liaise on all matters relating to the conservation of nature. On several occasions between 1976 and 1980 NAKOR approached the CSIR's National Committee for Environmental Sciences for assistance in the coordination of nature conservation research in South Africa. In 1979 funds for the establishment of the Committee for Nature Conservation Research were obtained and in 1981 a full-time coordinator was appointed.

The activities of this Committee are divided into five separate but overlapping components, each with an appointed Working Group to advise on research priorities and funding:

1. Habitat Conservation
2. Species Conservation
3. Invasive Biota
4. Management and Utilization
5. Conservation Behaviour

Each Working Group has drafted its own terms of reference which describe and delimit its field of activity. In general their emphasis includes a specifically national or sub-continental perspective of research needs in conservation, and a mandate to fill gaps left by the established programmes of existing environmental research agencies. The areas of interest for Working Groups one to four are reasonably well defined and understood, but those for conservation behaviour are not.

The term *conservation behaviour* is, by necessity, all-encompassing. It is unfortunately also somewhat ambiguous. In the context of this document it specifically includes the terms *environmental education* and *conservation awareness*. It also incorporates related conservation agency activities, variously referred to as *information or interpretive services* and *public relations*. It goes further than all of this. The subject includes the study of human motivation and conservation ethics and the formation and understanding of human attitudes and values. It specifically includes investigation of the cause and effect relationships between the attitudes and behaviour of people and the related condition and sustainability of the natural environment.

## THE PROBLEM

*Nature conservation is a human activity for human purposes with the natural environment as its stage. Why are conservation researchers so reluctant to focus on people?*

South Africa is the most physically and commercially developed country in Africa and as a result has the largest and most densely populated urban complexes. There are also large densely populated rural areas where subsistence land-use practices persist. As a result, man-induced environmental degradation in South Africa is evident at both ends of the development spectrum (National Veld Trust 1972; Clarke 1974; Hall et al 1980; DWAFFEC 1980). There are types of degradation typical of industrial consumer nations (eg overcrowding, pollution, extinction of species) together with those typical of the rural poor in underdeveloped countries (eg impoverished soils, energy shortages, high incidence of disease). It is accepted that environmental change is inevitable, much of it directly benefiting mankind. However, in natural ecosystems these changes are often detrimental, both to the ecosystem and to its dependant human population.

Most South Africans are unaware of or misinformed about their dependence on the natural environment (Hurry 1978; Adler and Ackerman 1981). If they are aware of this relationship, it is probable that they are not able or willing to do anything about it in practice. This may be due to a variety of reasons; some straightforward, like poverty, inadequate resources or poor education, and others more complex, such as current aspirations for the future and differing standards for quality of life and basic human needs.

Regardless of the reason, it is a fact, disputed only by economists and developers, *that the sustainability of South Africa's natural environment is steadily declining* (Acocks 1953; Noble and Hemens 1974; Begg 1978; Huntley 1978). Much of this is due to the inevitable consumption of resources and competition for space associated with economic development and human population growth. However, much serious environmental degradation could be avoided (WLSSA 1981). There are gross ecological

changes, such as the severe loss of topsoil and reduction of the stock raising productivity of natural veld. There are threats to the future, such as the over-use and pollution of freshwater resources, extinction of species and loss of natural plant communities. Many of these detrimental effects are produced or at least enhanced by socio-economic forces in the human environment and are strongly influenced by human attitudes and behaviour.

In spite of there being adequate technological progress and scientific knowledge to remedy many of these negative effects, no remedy is in sight. *The problem appears to be one of human behaviour and the remedy probably lies in the fields of sociology, economics and education.*

What is being done about this apparent lack of awareness, and the sometimes lemming-like behaviour that seems to result from it? The short answer is, quite a lot unintentionally, most of it in a haphazard way with little feedback as to its effectiveness. Not nearly enough is being done deliberately and systematically. The international news media give us insights into the problems of developed countries in the western world together with the plight of third world peasants, providing ample opportunity to learn from others' experience. Nature study, and an increasing content of environmental issues such as pollution, are taught in schools. "Schools in the Wild" operate widely if inadequately around the country but are probably least effective where they are most needed - among decision making white adults and the rapidly expanding black populations (Hurry 1978; Irwin 1982).

Although there appears to be widespread appreciation of some issues (eg coal from the Kruger National Park), there is little understanding of some of the subtle but much more important ones (eg the significance of the degraded condition of South Africa's estuaries). *What is most clearly evident is the lack of active research in the field of public awareness and understanding of environmental issues.* There are probably less than a dozen people in South Africa currently involved in research in this field, both in the sphere of formal education and in the informal learning context.



*We do not have an information base from which to develop a national environmental awareness programme.* We do not know what the attitudes of people or communities are towards their environment. We do not know what the best or most practical way to influence these attitudes is. We do know that certain legislation has been poorly effective (eg the Soil Conservation Act and the Stock Reduction Scheme) but the analyses of these failures have so far failed to enhance their effectiveness on the ground (Rabie 1976).

Society has developed three basic ways of motivating people to counteract the negative environmental changes that result from human attitudes and behaviour:

1. *Enforcement* - by Government imposed controls (laws and regulations) on the type of development or land-use and the style of land management.
2. *Inducement* - primarily financial through tax concessions, also social through promotion of conservation ethics - prestige value.
3. *Education* - by voluntary, scientific or moral controls, achieved through man's understanding of his dependence on the sustained productivity and health of his environment.

In reality, these means are used simultaneously. It is reasonable to assume that any national administration would have the long-term aim of using a minimum of the first and a maximum of the second and third.

*Of all the facets of environmental conservation these human behavioural components are the least understood and least researched.* Academically they often fall uncomfortably between the stools of environmental science and the social arts. Potential research topics range from; psychological studies such as the sub-conscious motivations affecting the "throw away mentality" in society, to testing the acceptability of alternative energy sources for the treeless environments of the rural poor. For instance a full programme could be launched solely on the adequacy of environmental education in schools, or on the effects of legislative and financial incentives for conservation.

In short, how does a nation like South Africa prepare and organize itself for the excessive demands that are going to be made on its natural resources in the future? *With a population crisis ahead, complicated by the diversity of our cultures, how are we to develop a national ethic for land? What is the morality behind, "Die boer is baas op sy plaas", when farmers have not inherited the land from their forefathers, but have it in trust for generations of the future?*

## THE PURPOSE

*The purpose of this document is to stimulate interest in research into problems associated with the interaction between human behaviour and the natural environment.*

This document serves to define the scope and emphasis of research priorities in conservation behaviour, namely the study of the human behaviour/natural environment relationship. It is also a research promotional document intended to stimulate an awareness of research needs in this area among a wide variety of research leaders, educators and administrators. In order to do this, the subject matter is set out in a framework that is intended to show potential and possibly unaware researchers how their particular field of expertise can contribute. The description does not set out to be definitive or comprehensive, merely to create interest in and awareness of the subject. Within its financial capabilities the National Programme is prepared to fund suitable research projects in this field.

At this point it is useful to set out the purposes for which the Working Group for Conservation Behaviour was convened. To quote from its terms of reference, it is the aim of the Working Group,

*"to initiate, coordinate and interpret research into human behaviour relative to environmental conservation, in order to:*

- improve our understanding of the causes and effects of conservation behaviour;*
- understand the development of values and attitudes that might lead to positive conservation behaviour by individuals;*
- facilitate ecologically sound management and use of the natural environment.*

In this context "conservation behaviour" is defined as those aspects of human behaviour which affect or arise from man's interaction with the "natural environment". ("Natural" is used to distinguish from man's developed, built or socio-cultural environment). Of particular relevance are those aspects which most positively or negatively influence the life-support systems and processes upon which the long-term welfare of man himself depends.

In order to achieve relevance to local needs there are some additional guidelines or areas of emphasis, appropriate to a specifically South African research programme:

- Since the field of research is vast and undeveloped, research priorities need to be carefully selected. In this respect the need to promote positive conservation behaviour among key decision makers is recognised as of prime importance, eg politicians, senior administrators and policy makers in fields such as education, journalism and physical planning.
- Within selected population or interest groups, research should be related specifically to the values, attitudes and motives of individuals and communities within the group.
- To guide research towards achieving positive changes in people's attitudes and behaviour, relative to conservation and human interdependence with living natural resources".

Recipients of this document who are able to contribute suggestions or general comment, are encouraged to do so. *Government and administrative agencies who are in a position to indicate research needs, and university researchers who wish to suggest academic involvement or to submit research proposals, are requested to respond to the address on the title page.* Once adequate responses have been received a national workshop will be convened in order to improve and complete the framework and to identify specific research priorities. An ultimate objective is to develop self-sustaining centres of research expertise in this field at education and academic institutions and conservation agencies around the country.

## A CONCEPTUAL FRAMEWORK

There are many ways of looking at the human behaviour/natural environment interaction. This framework is presented as a convenient means of arranging the topic conceptually for the purpose of highlighting potential components of a research programme. Such a programme will of necessity be multidisciplinary, catering as it does to normally unrelated research disciplines such as, ecology, biology, sociology, psychology, education, law, agricultural extension, public administration and mass media communication.

The framework contains four basic components which are described below, three of which provide real opportunities for research. Within reason, research work could be carried out in any component, either simultaneously or in any logical sequence. Examples of potential topics or approaches are listed under each heading.

- *The first component* is that of describing, in normative terms, what the state of the human behaviour/natural environment system should be; some collective goals for society.
  
- *The second component* is that of gathering the information to provide a description and inventory of the constituent parts of the human/environment interaction. In this description it will be necessary to establish, by analytical research if necessary, the cause and effect relationships between human behaviour and environmental response.
  
- *The third component* is that of in-depth analysis of the influencing factors and change mechanisms involved in these aspects of behaviour. Here, research will aim to measure the potential for creating public attitudes with a positive influence on environmental conservation.
  
- *The fourth component* is that of re-evaluation or monitoring. This is carried out to provide a measure of the dynamics and trends in the elements and processes that comprise the man/environment

interaction. This may include repeated assessment of the effectiveness of the factors and social mechanisms which influence behaviour. It will also measure general, non-specific shifts in attitudes over time. It will include regular assessment of the environmental problems associated with human behaviour. It is only through this research component that the success or failure of environmental awareness programmes may be judged.

1. Goals for society

*This may be seen as a description of "what should be", or as a formalization of society's environmental responsibility to future generations.* It involves the setting up of a behavioural target for society to aim at. It involves the concept of a set of norms and codes of conduct, as determined by ecological and sociological limiting factors, which by various change mechanisms will seek to establish a caring environmental ethic for society (Leopold 1949; Tilden 1977).

These goals or guidelines will be written initially for policy makers and opinion formers and will not have much requirement for research. However researchers will be needed to help compile them and test their practicality and acceptability. They could well form part of a National Conservation Strategy, drawn up for public administrators. They should set goals for environmental awareness not only at the national level but at the community and individual levels as well. Research, if there is any in this component, might be limited to looking for alternatives to this "goals for society" approach, as a means of achieving overall objectives.

2. Descriptive component of the framework

*This is basically a description of "what is".* It comprises a qualitative and quantitative description of the identifiable components of the problem and the evaluation of their causative factors. It will consist largely of descriptive analysis by means of surveys and inventory-type information

gathering. There may be a need for a more analytical research component only in respect of establishing some of the cause and effect relationships. There are several possible subdivisions of this component:

a. Survey and description of the attitudes and behaviour of people towards conservation and the environment

Some examples:

- Identification of key population groups, organizations or individuals and description of their conservation behaviour characteristics.
- Attitudinal and behavioural surveys of specific (key) segments of society - characterize - classify - compare. (eg leaders, teachers, farmers, journalists, students, parks staff, the poor etc).

b. Description and inventory of conservation and environmental problems manifestly related to human behaviour

An approach :

- List environmental problems and describe their probable causes.
- Establish in each case a link with human behaviour, attitudes, beliefs and traditions etc.
- Investigate suitable indicator components in the environment, use them in monitoring trends and possible future responses to changing behaviour (eg soil erosion, pollution, species extinctions etc).

c. Description and assessment of influencing factors and change mechanisms that operate in society and have an impact on conservation

- Inventory, survey, description and evaluation of these influencing factors and change mechanisms, - characterize - classify - compare (eg assessments of the role of education, legislation or poverty in rural behaviour and land-use).
- Establish a priority order for research into these factors and mechanisms. (They may be subdivided into institutional and other change mechanisms for practical convenience.)

3. Analytical component of the framework

*This section seeks to understand causes and effects in the patterns of human behaviour.* The intention here is to provide future societies with the option of changing their behaviour from "the way the world is" (2) towards "the way the world should be" (1). This component should focus on research and analysis of the change mechanisms, educational methods and other influencing factors involved. The psychological basis for attitudes and behavioural responses to these factors will provide one important emphasis. Another will be evaluation of the effectiveness of institutionalized change mechanisms, such as education, legislation and economic incentives. Results of this research will hopefully indicate new change mechanisms or teaching methods for testing in the field.

a. Analysis of the effects of institutional change mechanisms and factors affecting behaviour relative to conservation

- i. *Formal education and training.* This includes research to assess the effectiveness of both current and proposed conservation education. It should include investigations into teaching methods and perspectives as well as the syllabus content at all levels. It includes primary to tertiary schooling, teacher and university graduate training and adult



education courses. Public education facilities might also be included, eg interpretive displays, information literature and public relations activities of nature conservation agencies, museums, zoological and botanical gardens. Some examples of potential projects:

- What is the effectiveness of teaching conservation ethics in different ways relative to specific objectives?
  - What is the best means of integrating conservation education into existing curricula within existing time schedules?
  - Development of an intensive conservation awareness course for headmasters, geography and biology teachers.
  - Analysis of the syllabus review processes for teacher and graduate training programmes with a view to introducing an ecological component.
  - What is the variety of student receptiveness to conservation awareness ideas?
  - Publication of a handbook on "school-yard" teaching methods and teaching resources.
- ii. *Legislation.* This may include a broad look at legislation in general to investigate ways in which it indirectly affects conservation, as well as more penetrating studies on the costs and benefits of existing environmental law. Here proposals for new legislation could be tested for feasibility. Some examples :
- A broad theoretical review of different styles of legislation in South Africa and other countries, eg positively motivating legislation vs negatively motivating legislation.
  - Analysis of tax laws and other relevant economic legislation.

- Analysis of the laws of land ownership and freehold title.
- Analysis of laws controlling agricultural land-use and management practices, eg Soil Conservation Act.
- Analysis of laws controlling pollution and how they are circumvented - including cost-benefit analysis.
- Assessment of the differences in the nature conservation legislation of each of the four provinces with a view to future compatibility.

iii. *Public administration.* The way in which public administrations are organized and routinely function is vital knowledge to those involved with the definition and attainment of goals for society. An investigation is needed to illustrate the bottlenecks and opportunities likely to exist within the administrative machinery that may have an impact on conservation. Some examples:

- To what extent does the administrative system encourage or discourage the coordination of ideas between developers, engineers, administrators and conservationists?
- How can legislation with a potential for positive environmental impact be more positively administered? (eg administrative factors in the enforcement of the Soil Conservation Act.)
- Is the planning of future administrative activities short of an ecological perspective and, if so, how best is such a perspective implanted? (eg would it be more effective to provide the ecological perspective to the planners or to the top administrators to whom the plans are submitted?)

b. Analysis of factors and mechanisms of behavioural change that are imposed on society and have unintended environmental consequences

Studies in this section are intended to include all the sociological structures and conventions that societies impose upon themselves, and have imposed on them, which result unintentionally in behaviour that has environmental consequences. A list of subjects that could be investigated for their impact on environmental conservation might include :

- Religion or belief systems
- Traditions and customs
- Politics
- Poverty
- Lack of resources
- Affluence
- Competing interests and ethics (eg the economic growth ethic, the rise in living standards)

c. Analysis of the effects of factors that subconsciously influence behaviour by psychological means

There are many factors associated with peoples' everyday surroundings and life style that have the potential to affect attitudes and behaviour. Some may be more or less obvious, while others may be unanticipated and subtle in their effects. These psychological factors need to be recognized and understood in order to describe accurately some of man's more obscure responses to his environment. A list of topics that would provide interesting research themes could include:

- The personal environment - especially that of young people, parents, home-culture; the adult environment, impact of socio-economic status, the physical and social work environment - are there common factors?
- Experiential events - the value of that single enlightening experience that germinates a seed of future interest and understanding - how does it work?

- Urban crowding syndrome and the value of open space - it drives some people away from nature and others to become more concerned - why the dichotomy?
- The effects of media and advertizing influence - as education will never be adequate to the task of informing the public as a whole, how can the power and the pitfalls of the public media be used to best effect?

4. Re-evaluation component of the framework

*This component is intended to include all measurement of trends and changes over time.* It may include the initial evaluation as well as the ongoing re-evaluations that follow. In ecological parlance it is referred to as monitoring. Whatever the words used to describe it, it provides the "feedback control" for the entire research system. Whereas some projects may be concerned entirely with a monitoring or re-evaluation exercise, in general this measurement of change, its rate and extent, is integral to all phases of research in this field.

Monitoring or re-evaluation should set out to measure changes, not only in response to deliberately imposed programmes, but also changes in human behaviour and in their associated environmental conditions that result from the non-specific effects of the passing of time. This provides the background or control sample in any experiment or field trial. One aspect of evaluation that is of particular importance is cost-benefit analysis. With monetary and social values changing rapidly, repeated assessments of the real costs and benefits of all programmes and proposals should be a regular feature. Some of the more obvious and generalized research topics are :

- Regular and repeated evaluation of the effectiveness of environmental education.
- Evaluation of the effectiveness of legislation and the incentives it provides (eg tax write-offs).

- Monitoring for ecological changes in the environment (having first established the behavioural link).
- Identifying cause and effect relationships that are not readily perceived or anticipated.
- Monitoring changes in attitudes as a result of non-specific socio-economic changes.
- Monitoring the effectiveness of interpretive and public relations efforts of nature conservation agencies.

## **ACTION PLAN**

This document is intended to initiate widespread interest in these multidimensional topics which contribute to the study of conservation behaviour. It is intended that this interest should develop into active coordinated involvement. This applies not only to researchers but also to public administrators, teachers, trainers, economists, extension officers, planners and many others. For this purpose the preceeding background, rationale and framework will need to be refined and improved to describe the programme more comprehensively.

*The first activity* should therefore comprise responses by interested or involved people and institutions, with comment, criticism and suggestions for the development of this programme. After evaluation of the dialogue generated in this way, the Working Group will review the programme by means of a system of workshops or meetings.

This would comprise *a second level of activity* where participants with potential for involvement in the programme could be identified and critical nuclei of research activity created. This phase would also serve to align research priorities with available manpower and academic resources.

*A third level of activity*, simultaneous with the review process, would be the acquisition of funds and their allocation to priority components in the research programme. In addition to funding research the Working Group would consider holding further meetings to generate new perspectives and ideas and to expose key, but hitherto uninvolved people to these viewpoints. From there onwards it is anticipated that the programme should determine its own course, as dictated by its participants and their achievements.

Although Cooperative Scientific Programmes (CSP) of the CSIR is specifically set up to coordinate and, to a limited extent, fund multidisciplinary research projects, it is hoped that independent support for the substance of these proposals will be forthcoming from administrative and research agencies throughout South Africa. A list of agencies that would have an interest in these activities should include:

i. University Institutes and Departments for:

- Education
- Biology and Ecology
- Environmental and Resource Studies
- Agricultural Extension
- Nature Conservation
- Forestry
- Law
- Economics
- Social Studies
- Town and Regional Planning

ii. Nature Conservation, National Parks and Forestry Agencies

iii. Government Departments for:

- Education
- Agriculture
- Environment Affairs
- Constitutional Development and Planning

iv. South African Technikons and Teaching Colleges

*The Working Group for Conservation Behaviour specifically requests that you respond with proposals, criticisms or general comment to,*

The Coordinator  
Nature Conservation Research  
Cooperative Scientific Programmes  
CSIR  
P O Box 395  
PRETORIA  
0001  
telephone (012) 869211 (ext 3364 or 2705)

## REFERENCES

- ACOCKS J P H 1953. Veld types of South Africa. Botanical Survey of South Africa, Memoir 28. Government Printer, Pretoria.
- ADLER E and ACKERMAN P 1981. Public opinion regarding environmental degradation. Ekos (Veldtrust), Vol 2, 4.
- BEGG G 1978. The estuaries of Natal. Natal Town and Regional Planning Commission, Report No 41, Pietermaritzburg.
- CLARKE J 1974. Our fragile land : South Africa's environmental crisis. MacMillan & Co (SA), Johannesburg.
- DWAFEC (Department of Water Affairs, Forestry and Environmental Conservation) 1980. White paper on a national policy regarding environmental conservation. Government Printer, Pretoria.
- HALL A V, DE WINTER M, DE WINTER B and VAN OOSTERHOUT S A M 1980. Threatened plants of southern Africa. South African National Scientific Programmes Report No 45, CSIR, Pretoria.
- HUNTLEY B J 1978. Ecosystem conservation in southern Africa. In: Werger M J A (ed). Biogeography and ecology of southern Africa. W Junk, The Hague, Netherlands.
- HURRY L B 1978. Is conservation awareness one of the aims of formal education in South Africa? An assessment with special regard to biology and geography teaching. Wildlife Society of Southern Africa, Johannesburg.
- IRWIN P R 1982. Conservation awareness amongst white adolescents in South Africa : A study of senior secondary pupils in Natal. MSc Thesis, University of Natal, Pietermaritzburg.
- LEOPOLD A 1949. Sand County Almanac. Oxford University Press, New York.
- NATIONAL VELD TRUST 1972. Habitat RSA : The proceedings of a conference on man and his environment, October 1971. National Veld Trust, Pretoria.
- NOBLE R G and HEMENS J 1978. Inland water ecosystems in South Africa: a review of research needs. South African National Scientific Programmes Report No 34, CSIR, Pretoria.
- RABIE M A 1976. South African environmental legislation. Institute of Foreign and Comparative Law, University of South Africa. Pretoria.
- TILDEN F 1977. Interpreting our heritage. University of North Carolina Press, Chapel Hill.
- WLSSA (Wildlife Society of Southern Africa) 1981. A conservation strategy for South Africa. African Wildlife, Vol 35, 5.



**DRAFT BIBLIOGRAPHY OF SOUTH AFRICAN PUBLICATIONS  
AND RESEARCH PERTAINING TO CONSERVATION BEHAVIOUR**

This bibliography is incomplete and likely to contain inaccuracies, as few of the references could be checked against actual publications. Readers are requested to inform the editor of all errors or omissions that come to their notice so that a more comprehensive bibliography may be compiled in due course.

A'BEAR D R 1979. Cognitive aspects of pollution in the geographical environment. MA Thesis, University of Natal, Durban.

ADLER E and ACKERMAN P 1981. Public opinion regarding environmental degradation. Ekos (Veldtrust) Vol 2 No 4.

ALBERTS L J (undated). Buitelugopvoeding - 'n didaktiese ondersoek na enkele tendense in die Republiek van Suid-Afrika. MEd Thesis, University of the Orange Free State, Bloemfontein.

BARKHUIZEN G F 1981. Die administrasie van omgewingsbewing in die Republiek van Suid-Afrika. DAdmin Thesis, University of the Orange Free State, Bloemfontein.

BARKHUIZEN G F 1979. Koördinasie van openbare natuurbewaring in Suid-Afrika. MPA Thesis, University of the Orange Free State, Bloemfontein.

BENKENSTEIN H 1982. Human impact on the Cape of Good Hope Nature Reserve. MSc Thesis, University of Cape Town.

BEZUIDENHOUT F J and BOTHA P M C (undated). 'n Ondersoek na kurrikulêre en nie-kurrikulêre onderrig in leierskap en buitelugopvoeding aan die Universiteit van Port Elizabeth.

BIGALKE E H 1966. Notes on the place of domestic and indigenous animals in the Cape Nguni Life. Ann Cape Prov Mus 6 (1), 1-16.

BODDINGTON G 1980. Hiking trail corridors in the Cape Peninsula Mountain Chain. MA Thesis, University of Cape Town.

BOEGMAN N 1981. The development of a national policy for the control of air pollution in South Africa. PhD Thesis, University of the Witwatersrand, Johannesburg.

BOTHA H J 1975. Samewerking vir die bewaring en benutting van die bodem in suidelike-Afrika. MAdmin Thesis, University of Pretoria.

BROCKMAN C F 1961. Outdoor recreation in relation to nature conservation in South Africa. Cyclostyled report to the South African Nature Union. Council for the Habitat, Pretoria. 27 pp.

BUTLER-ADAM J F L and HEATH R A (undated). A recreation demand and preference survey in Natal. University of Durban-Westville.

- CADIEUX J J 1979. Determining the attitude of different groups to nature recreation. Paper presented at the University of Stellenbosch, July 1979.
- CADLE K 1983. The response of two (one rural, one urban) coloured fishing communities to their marine resource base. MA Thesis, University of Cape Town.
- CHISHOLM J P (undated). Recreation - its role and function in human relationships with the environment. MA Thesis, University of Natal.
- CLARKE J 1974. Our fragile land: South Africa's Environmental Crisis. MacMillan SA, Johannesburg.
- CLAYTON J F 1980. Outdoor education in the United States of America, Canada and Britain. MEd Thesis, University of South Africa, Pretoria.
- CLAYTON J F 1982. Outdoor education for South African schools. DED Thesis, University of South Africa, Pretoria.
- COETZEE J A (undated). Port Elizabeth and its hinterland - environmental challenge and human response. A synopsis and guide for progressive regional analysis and comprehensive planning. University of Port Elizabeth.
- COLVIN I S 1983. Problems of wildlife utilization in the Cape Province. MSc Thesis, University of Cape Town.
- COTTRELL M J 1978. An assessment of the value of a small nature reserve, with particular reference to the Palmiet Nature Reserve, Westville, Natal. MA Thesis, University of Cape Town.
- COUNCIL FOR THE HABITAT 1977. Proceedings of the conference on creating environmental awareness, Stellenbosch. Council for the Habitat, Pretoria.
- COURTENAY-LATIMER M E D 1961. Africans as protectionists. Bokmakierie 13 (1), 16-17.
- DE CLERCQ J L W (undated). Leisure time and organized recreation activities at Hambanathi Township. University of Zululand.
- DIEPEVEEN W M 1977. In-service training of teachers: outdoor education. Cape Education Department.
- DIXIE P O S 1973. Critical issues in human ecology. MSocSc Thesis, University of Cape Town.
- DOWNING H R and DE VILLIERS J H G (undated). A preliminary study towards the development of a matriculation syllabus in environmental studies with particular reference to the present and future problems of rural Africa. University of Fort Hare.
- DU PLOOY G J G 1980. Evaluasie van kommunikasie tegnieke in geprogrammeerde voorligting. M Inst Agrar, University of Pretoria.

- FOURIE J H 1974. Ekologie in sosiologiese perspektief. MA Thesis, University of Pretoria.
- FUGGLE R F 1975. Legal aspects of Environmental Studies. In: SA Law Conference, Cape Town, Papers 229.
- FUGGLE R F 1979. Methods for preliminary environmental analysis in South Africa. School of Environmental Studies, University of Cape Town, 53 pp.
- FUGGLE R F 1980. Regulating environmental change in South Africa. The Civil Engineer in South Africa 22 (4), 77-83.
- FUGGLE R F AND RABIE M A (Eds) 1983. Environmental concerns in South Africa. Technical and Legal Perspectives. Jutas, Cape Town.
- GELDENHUIS D J (undated). Die plek van buiteligopvoeding in die opvoeding van die kind, met spesiale verwysing na die stedelike sekondêre skoolleerling. MEd Thesis, University of Stellenbosch.
- GRANGER S 1982. The interaction between informal land tenure and environmental conditions at Wupperthal. MSc Thesis, University of Cape Town.
- HART T 1974. The factorial ecology of Johannesburg. MA Thesis, University of the Witwatersrand, Johannesburg.
- HATTINGH D J 1965. Die verwantskap tussen finansiële sukses in boerdery en bepaalde sosiaal-kulturele faktore in die S2 en C5 agro-ekonomiese streke in die opvanggebied van die Bo-Oranjeriviergebied. MSc Agric, University of Pretoria.
- HATTINGH P S (undated). Hiking - an investigation into the perception and experience of the environment by Blacks. University of the North, Pietersburg.
- HEATH R A and BUTLER-ADAM J F L 1980. Recreation needs and attitude study at Albert Falls. University of Durban-Westville.
- HEY D 1977. The history and status of nature conservation in South Africa. In: A History of Scientific Endeavour in South Africa. A C Brown (Ed). The Royal Society of South Africa.
- HEYNS M L 1979. Die rol van strewe as gedragsbepalende faktor by oortreders van die grondbewaringswet. M Inst Agrar, University of Pretoria.
- HUDSON-REED D (undated). Outdoor education. Unpublished Drakensberg Administration Board report, 151 pp.
- HUGO M L 1974. Die behoefte van die Bantoebevolking aan buiteligontspanning tot die jaar 2000 en die potensiaal van die tuislande om daaraan te voldoen. DPhil Thesis, Potchefstroom University for CHE.

- HURRY L B 1977. Is conservation awareness one of the aims of formal education in South Africa? An assessment with special regard to biology and geography teaching. Wildlife Society of Southern Africa report.
- HURRY L B 1977. Conservation awareness and geography teaching in South Africa. The South African Geographer. Vol 7 No 1, pp 80-87.
- HURRY L B 1981. Environmental education in Transvaal secondary schools and its relation to the teaching of biology and geography. MEd Thesis, University of South Africa, Pretoria.
- HURRY L B 1982. Directions in environmental education and their implication for the training of primary school teachers in the Transvaal - towards a synthesis. DEd Thesis, University of South Africa, Pretoria.
- IRWIN P R 1982. Conservation awareness amongst white adolescents in South Africa: A study of senior secondary pupils in Natal. MEd Thesis, University of Natal, Pietermaritzburg.
- JOOSTE M E 1974. A socio-agogical reflection on outdoor recreation with reference to a specific spatial survey. MEd Thesis, University of Pretoria.
- JORDAAN P F 1982. Die aard en omvang van stap as buiteligontspannings-aktiwiteit en die voorsiening daarvoor in die stedelike en natuurlike omgewings. ML Thesis, University of Pretoria.
- JOUBERT L 1980. Die aanwending van toerisme, opelugontspanning en natuurbewaring as stimulus van 'n agtergeblewe gebied met spesiale toepassing op Maputaland. MA Thesis, Potchefstroom University for CHE.
- KEOGH M I 1981. Measurement of conservation awareness in school children. MSc Thesis, University of Natal, Durban.
- KOK F J 1964. 'n Onderzoek na die opleiding en opleidingsbehoefte van Suid-Afrikaanse voorligtingsbeamptes. DSc Agric, University of Pretoria.
- KRUGER A (undated). 'n Analise van die huidige en toekomstige behoefte aan buiteligontspanningsoorde by die Kleurlinge en Indiers van Transvaal. MA Thesis, Potchefstroom University for CHE.
- KRUGER M L (undated). 'n Terreingeskiktheidsanalise vir buiteligontspanning - 'n gevallestudie vir die Knysna-, Wildernis-, Plettenbergbaai-gebied. ML Thesis, University of Pretoria.
- KUSHLICK S 1977. Man-environment studies - a review with an analysis of some techniques for the assessment of environmental perception. National Institute for Personnel Research, CSIR, Pretoria.

- LAMBRECHTS A von W 1976. 'n Ontleding van die natuurbewaringsopvattinge van wildreservaateienaars in die Oos-Transvaalse laeveld. MSc Thesis, University of Pretoria.
- LAMPAERT L (undated). Grondgebruik en natuurbewaring. LLM Thesis, University of Port Elizabeth.
- LE GRANGE J J (undated). Vooruitbepaling van invloede op die omgewing in gevalle van beplannings- en ontwikkelingsvoorstelle. DPhil Thesis, Potchefstroom University for CHE.
- LE ROUX S D 1971. Indian agriculture on the north coast of Natal: social aspects.
- LIEBENBERG C R AND SPIES P G van Z 1979. Open air education in the RSA. Human Sciences Research Council, Pretoria.
- MALAN J G S 1982. The formulation of an administrative structure for the management of False Bay. MA Thesis, University of Cape Town.
- MANLEY J H 1972. An ecological/environmental approach to the planning of the Knysna Lakes region. MURP Thesis, University of Cape Town.
- MARAIS C H 1977. Nywerheidsontwikkeling, natuurbewaring en toerisme in Kavango. MSc Thesis, University of Stellenbosch.
- MCCARTHY R T 1971. An inquiry into the use of the ecological approach for environmental and land-use planning in the Howick sub-region, Natal. MURP Thesis, University of Cape Town.
- MCPHERSON E A (undated). Die ruimtelike patrone van rekreasie as 'n probleemfunksie binne die kleurlinggemeenskap van die Kaapse metropolitaanse gebied. MA Thesis, University of the Western Cape, Cape Town.
- MILLAR J C G 1980. The objectives of outdoor education. Workshop Report, University of South Africa.
- NATAL PARKS BOARD 1982. A teachers guide to the environmental education resources of Natal. Unpublished NPB report. 46 pp.
- NATIONAL VELD TRUST 1972. Habitat RSA. Proceedings of the conference "Man and his environment". National Veld Trust, Johannesburg.
- NEITZ M H 1965. 'n Studie van die gedragpatroon van landboukundig-opgeleide boere. MSc Agric, University of Pretoria.
- NIGHTINGALE C S 1977. An analysis of the educational potential of sites on the Cape peninsula for secondary school field-work in environmental studies. MA Thesis, University of Cape Town.
- OPIE F W J 1979. The promotion of effective educational objectives by means of an environmental approach to biology teaching. MEd Thesis, University of Cape Town.

- PARKER S F 1976. Studies in school ecology. Science Education Centre, University of Rhodesia, Salisbury.
- PICKLES J 1978. Images of landscape in South Africa with particular reference to landscape appreciation and preferences in the Natal Drakensberg. PhD Thesis, Department of Geography, University of Natal.
- PICKLES J 1982. Landscape preferences and behaviour. Natal Town and Regional Planning Committee.
- POHORILLE R L (in prep). An assessment of indices for assessing environmental awareness. MA Thesis, University of Cape Town.
- PRESTON G 1983. An evaluation of the enhancement of an awareness of conservation issues in visitors to Hluhluwe Game Reserve, Giant's Castle Game Reserve and Londolozi Private Nature Reserve. MA Thesis, University of Cape Town.
- QUICKELBERGE C D 1969. The role played by birds in the lives of southern Nguni tribesmen. Proceedings of the 3rd Pan-African Ornithological Congress. Ostrich Supplement 8, 487-495.
- RABIE M A 1972. Legal remedies for environmental protection. Comparative and International Law Journal of Southern Africa. pp 247-280.
- RABIE M A 1974. Appèl deur Yskor ingevolge die wet op die voorkoming van lugbesoedeling: Uitspraak van die Appèlraad op Lugbesoedeling. Tydskrif vir die Hedendaagse Romeins-Hollandse Reg. pp 180-193.
- RABIE M A 1976. Disclosure and evaluation of potential environmental impact of proposed governmental administrative action. Tydskrif vir Hedendaagse Romeins-Hollandse Reg. pp 40-65.
- RABIE M A 1976. South African Environmental Legislation.
- RABIE M A 1979. Environmental Conservation. In: Joubert (Ed). The Law of South Africa. Volume 9.
- RABIE M A 1981. Administrative law reform and environmental law. Tydskrif vir Hedendaagse Romeins-Hollandse Reg. pp 46-53.
- RABIE M A 1981. South African legislation with respect to the control of pollution of the sea. South African National Scientific Programmes Report No 46, 1-73.
- RABIE M A 1982. You and your environment. Readers Digest Family Guide to the law in South Africa. pp 689-701.
- RABIE M A AND ECKHARD C F 1976. Locus Standi: The administration's shield and the environmentalist's shackle. Comparative and International Law Journal of Southern Africa. pp 141-160.

- RAJAH D S 1974. An analysis of the family status dimension among the Indian population in Durban, South Africa - an experiment in urban factorial ecology. PhD Thesis, Clark University.
- RAWICZ M M 1980. Environmental factors in relation to the location and planning of industrial areas in South Africa. ML Thesis, University of Pretoria.
- ROBBERTSE N J 1972. Die doeltreffendheid van landbouvoorligting:- Suidoos-Transvaal. D Inst Agrar, University of Pretoria.
- ROBINSON T G 1983. An investigation of the environmental informants in peri-urban low cost housing in Southern Africa. MA Thesis, University of Cape Town.
- SARCCUS 1967. Proceedings of the symposium on conservation and education, Johannesburg. Southern African Regional Commission for the Conservation and Utilization of the Soil, Pretoria.
- SCHLEMMER L and THAW D (undated). Conceptualization of the environment - cognitive models and educational levels among rural and urban Africans. University of Natal, Durban.
- SCHREUDER D R 1978. Omgewingskultivering en die omgewingsvraagstuk, met besondere verwysing na die rol van biologie-onderrig in die opleiding van primêre skoolonderwysers. MEd Thesis, University of South Africa, Pretoria.
- SHOPLEY J B 1981. Environmental impact analysis: the identification of secondary impacts. MSc Thesis, University of Cape Town.
- SINCLAIR S A 1983. Environmental and social impact assessments. PhD Thesis, University of Cape Town.
- SNYMAN P J N 1972. Konservasie van natuurbronne. 'n Uitdaging aan onderwys en opvoeding. DEd Thesis, Potchefstroom University for CHE.
- SOUTHWOOD A J 1982. Land-use practices of the Outeniqua mountain range. MSc Thesis, University of Cape Town.
- STANDER E H H 1977. Die ekologiese krisis en die opvoedkundige implikasies daarvan - 'n empiriese studie. MEd Thesis, University of South Africa, Pretoria.
- STAUTH R B (in prep). A methodology for evaluating socio-economic implications of environmental resource usage, with application to selected South African resource allocation proposals. PhD Thesis, University of Cape Town.
- STAUTH R B 1980. A rationale for maintaining natural and near natural areas in developing countries. MA Thesis, University of Cape Town.
- STRELITZ J S 1979. Environmental perception - an approach to urban planning. MSc Thesis, University of the Witwatersrand, Johannesburg.

- SUBSIDIARY COMMITTEE OF THE PRIME MINISTER'S ADVISORY COUNCIL (undated).  
A guide plan for the optimum utilization of the natural resources for  
the Drakensberg Catchment Reserve. Department of Planning and the  
Environment, Pretoria.
- SUTCLIFFE M O 1980. A behavioural study of recreation in the Natal  
Drakensberg. MSc Thesis, University of Natal.
- TALJAARD E P S (undated). 'n Onderzoek na die vraag vir parke- en  
ontspanningspersoneel op plaaslike owerheidsvlak in Suid-Afrika.  
University of Stellenbosch.
- TALJAARD E P S (undated). Die behoefte en daarstelling van parke- en  
ontspanningsfasiliteite vir kleurlinge in wes-Kaapland. University of  
Stellenbosch.
- TALJAARD E P S (undated). Die administrasie en organisasie van  
ontspanning vir die Bantoe in die stedelike gebiede van Suid-Afrika.  
University of Stellenbosch.
- TAYLOR V (undated). Opelugontspanningsruimtes in suidwes-Kaapland -  
hulpbronbasis, hulpbronpersepsie en hulpbronbenutting. DPhil Thesis,  
University of Stellenbosch.
- THERON C H B 1978. Interne dinamika van grondbewaringskomitees in Natal.  
M Inst Agrar, University of Pretoria
- VAKALISA C G (undated). Aspects of teaching ecology in KwaZulu senior  
black schools. MEd Thesis, University of South Africa, Pretoria.
- VAN DER PAS J B 1974. A visitor survey in the Jonkershoek State Forest.  
Forestry in South Africa, 15, 35-42.
- VAN DER WALT T J 1976. 'n Sosiologiese ondersoek na voetslaanvoorkeure,  
motiewe en gebruike van voetslaners. Unpublished report to the  
National Hiking Way Board, Pretoria.
- VAN DER WESTHUIZEN J M 1978. Bergklim as ontspanningsaktiwiteit in 'n  
gedeelte van die Natalse Drakensberge: 'n Studie in ontspannings-  
geografie. MSc Thesis, Potchefstroom University for CHE.
- VAN LOGGERENBERG E (undated). Ekologies-demografiese ondersoek van die  
blanke bevolking aan die Witwatersrand. Rand Afrikaans University,  
Johannesburg.
- VAN MEURS 1977. South African laws relating to rights of private citizens  
in environmental issues. Southwestern University Law Review. pp 157.
- VAN NIEKERK B v D 1975. Ecological Norm in Law or the Jurisprudence of  
the Fight against Pollution. South African Law Journal. pp 78.
- VAN NIEKERK B v D 1976. Environmental Pollution - The New International  
Crime. South African Law Journal. pp 68.



- VAN NIEKERK R J 1982. Bewaring as sedelike prinsipe in die Suid-Afrikaanse bodembenuttingsituasie - 'n kultuur-filosofiese studie. DPhil Thesis, University of Pretoria.
- VAN SCHALKWYK 1982. Die menings van onderwysers en 'n groep deskundiges oor die Biologiesillabusse op sekondêre skoolvlak. Raad vir Geesteswetenskaplike Navorsing verslag.
- VAN WYK A 1978. Conservation education programme for black teachers. Environment RSA Vol 5 No 5.
- VAN WYK A 1979. 'n Klaskamer in die natuur. Environment RSA Vol 6 No 5.
- VON BROEMBSSEN M H 1977. A survey of public attitudes towards nature conservation. Wildlife Society of Southern Africa report.
- WEBSTER A S 1979. Field studies in the teaching of geography with particular reference to Natal. MEd Thesis, University of Natal, Pietermaritzburg.
- WHITE T R 1974. Samelewing en omgewingsbeskadiging. 'n Verkennde sosio-ekologiese studie. MA Thesis, University of Pretoria.
- WLSSA 1976. Proceedings of the conservation education symposium, Skukuza, Kruger National Park. Wildlife Society of Southern Africa.
- WLSSA 1978. Proceedings of a symposium on agriculture and environmental conservation in Natal and KwaZulu, Durban. Wildlife Society of Southern Africa and Royal Society of South Africa, Johannesburg.
- WLSSA 1981. A conservation strategy for South Africa. African Wildlife Vol 35 No 5.
- ZABOROWSKI R M 1977. Planning for water based recreation on Lake Mzingasi, Richards Bay. MSc Thesis, University of Natal.

**TITLES IN THIS SERIES**

1. A description of the Savanna Ecosystem Project, Nylsvley, South Africa. December 1975. 24 pp.
2. Sensitivity analysis of a simple linear model of a savanna ecosystem at Nylsvley. W M Getz and A M Starfield. December 1975. 18 pp.
3. Savanna Ecosystem Project - Progress report 1974/1975. S M Hirst. December 1975. 27 pp.
4. Solid wastes research in South Africa. R G Noble. June 1976. 13 pp.
5. \*Bibliography on marine pollution in South Africa. D A Darracott and C E Cloete. June 1976. 131 pp.
6. \*Recycling and disposal of plastics waste in South Africa. R H Nurse, N C Symington, G R de V Brooks and L J Heyl. June 1976. 35 pp.
7. \*South African Red Data Book - Aves. W R Siegfried, P G H Frost, J Cooper and A C Kemp. June 1976. 108 pp.
8. \*South African marine pollution survey report 1974-1975. C E Cloete and W D Oliff (editors). September 1976. 60 pp.
9. Modelling of the flow of stable air over a complex region. M T Scholtz and C J Brouckaert. September 1976. 42 pp.
10. Methods and machinery for pulverising solid wastes. M J Simpkins. October 1976. 29 pp.
11. \*South African Red Data Book - Small mammals. J A J Meester. November 1976. 59 pp.
12. Savanna Ecosystem Project - Progress report 1975/1976. B J Huntley. March 1977. 41 pp.
13. Disposal and recovery of waste paper in South Africa. G R de V Brooks. April 1977. 35 pp.
14. South African Red Data Book - Fishes. P H Skelton. July 1977. 39 pp.
15. A checklist of the birds of the Nylsvley Nature Reserve. W R Tarboton. September 1977. 14 pp.
16. \*Grondsoorte van die Nylsvley-natuurreservaat. H J von M Harmse. September 1977. 64 pp.
17. \*Description and manual for the use of DRIVER - an interactive modelling aid. P R Furniss. September 1977. 23 pp.

18. \*South African Red Data Book - Large mammals. J D Skinner, N Fairall and J du P Bothma. November 1977. 29 pp.
19. Introducing you to satellite operated Data Collection Platforms (DCP's). C C Stavropoulos. September 1977. 9 pp.
20. A phytosociological classification of the Nylsvley Nature Reserve. B J Coetzee, F van der Meulen, S Zwanziger, P Gonsalves and P J Weisser. December 1977. 31 pp.
21. \*An annotated checklist of the amphibians, reptiles and mammals of the Nylsvley Nature Reserve. N H G Jacobsen. December 1977. 65 pp.
22. \*Cooperative National Oceanographic Programme. SANCOR. January 1978. 19 pp.
23. South African Red Data Book - Reptiles and amphibians. G R McLachlan. February 1978. 53 pp.
24. \*Guidelines for the disposal of dangerous and toxic wastes so as to minimize or prevent environmental and water pollution. R T Rudd. January 1978. 12 pp.
25. \*Richards Bay mesometeorological data. Vertical profiles of air temperature and wind velocity and surface wind statistics. M T Scholtz, E T Woodburn, C J Brouckaert and M Mulholland. March 1978. 104 pp.
26. \*Studies of mineralization in South African rivers. G C Hall and A H M Gorgens (editors). March 1978. 24 pp.
27. Nylsvley - A South African Savanna Ecosystem Project: objectives, organization and research programme. March 1978. 37 pp.
28. \*A description of the Fynbos Biome Project. June 1978. 25 pp.
29. Savanna Ecosystem Project - Phase I summary and Phase II progress. B J Huntley and J W Morris. July 1978. 52 pp.
30. \*Review of Coastal Currents in Southern African Waters. T F W Harris. August 1978. 106 pp.
31. \*Report of the Task Group on Fermentation Technology. R J Andrews, J A de Villiers, P M Lategan, F G Neytzell-de Wilde, J P van der Walt and Professor D R Woods. September 1978. 16 pp.
32. \*South African programme for the SCOPE mid-term project on the ecological effects of fire. September 1978. 36 pp.
33. Fire in South African ecosystems: an annotated bibliography. G U Schirge and A H Penderis. October 1978. 114 pp.
34. Inland water ecosystems in South Africa : a review of research needs. R G Noble and J Hemens. November 1978. 150 pp.

35. \*South African Antarctic Research Programme, 1978-1982. SASCAR. December 1978. 39 pp. Out of print but partially replaced by No 50.
36. \*Aboveground biomass subdivisions in woody species of the Savanna Ecosystem Project Study Area, Nylsvley. M C Rutherford. January 1979. 33 pp.
37. \*Marine Line Fish Research Programme. SANCOR. April 1979. 17 pp.
38. \*The Southern Ocean - South African Cooperative Research Programme. SANCOR. May 1979. 26 pp.
39. The Transfer of Pollutants in Two Southern Hemispheric Oceanic Systems. Proceedings of a workshop held at Plettenberg Bay, South Africa, 23-26 April 1979. October 1979. 188 pp.
40. Fynbos ecology : a preliminary synthesis. J Day, W R Siegfried, G N Louw and M L Jarman. December 1979. 166 pp.
41. \*Bibliography of Marine Biology in South Africa. D A Darracott and A C Brown. February 1980. 250 pp.
42. Advances in understanding phosphorus cycling in inland waters - their significance for South African limnology. A J Twinch and C M Breen. March 1980. 22 pp.
43. Terrestrial ecology in South Africa - project abstracts for 1978. February 1980. 92 pp.
44. A manual of methods for use in the South African Marine Pollution Monitoring Programme. R J Watling. July 1981. 82 pp.
45. Threatened plants of Southern Africa. A V Hall, M de Winter, B de Winter and S A M van Oosterhout. May 1980. 244 pp.
46. South African legislation with respect to the control of pollution of the sea. André Rabie. January 1981. 73 pp.
47. Terrestrial ecology in South Africa and South West Africa - project abstracts for 1979. May 1981. 107 pp.
48. A bibliography of seabirds in the waters of southern Africa, the Prince Edward and Tristan Groups. J Cooper and R K Brooke. December 1981. 297 pp.
49. National Geoscience Programme. The Evolution of Earth Resource Systems. SACUGS. June 1981. 42 pp.
50. South African Antarctic Biological Research Programme. SASCAR. July 1981. 54 pp.
51. South African Marine Pollution Monitoring Programme 1979-1982. R J Watling and C E Cloete (editors). July 1981. 52 pp.

52. Structural characterization of vegetation in the Fynbos Biome. B M Campbell, R M Cowling, W J Bond and F J Kruger in collaboration with D P Bands, C Boucher, E J Moll, H C Taylor and B W van Wilgen. August 1981. 19 pp.
53. A bibliography of fynbos ecology. M L Jarman, R M Cowling, R Haynes, F J Kruger, S M Price and G Moll. August 1981. 73 pp.
54. A description of the Benguela Ecology Programme 1982-1986. SANCOR: (W R Siegfried and J G Field editors). March 1982. 39 pp.
55. Trophic Ecology of Lepidoptera Larvae associated with woody vegetation in a Savanna Ecosystem. C H Scholtz. June 1982. 29 pp.
56. Man and the Pongolo floodplain. J Heeg and C M Breen. June 1982. 117 pp.
57. An inventory of plant communities recorded in the western, southern and eastern Cape Province, South Africa up to the end of 1980. C Boucher and A E McDonald. September 1982. 58 pp.
58. A bibliography of African inland water invertebrates (to 1980). B R Davies, T Davies, J Frazer and F M Chutter. September 1982. 418 pp.
59. An annotated checklist of dung-associated beetles of the Savanna Ecosystem Project study area, Nylsvley. S Endrödy-Younga. September 1982. 34 pp.
60. The termites of the Savanna Ecosystem Project study area, Nylsvley. P Ferrar. September 1982. 42 pp.
61. Conservation of Ecosystems: Theory and Practice. A report on a workshop meeting held at Tsitsikama, South Africa, September 1980. Edited by W R Siegfried and B R Davies. September 1982. 97 pp.
62. \*A description of the Grassland Biome Project. Edited by M T Mentis and B J Huntley. October 1982. 29 pp.
63. Description of a fire and its effects in the Nylsvley Nature Reserve: A Synthesis Report. M V Gandar. October 1982. 39 pp.
64. Terrestrial ecology in South Africa - project abstracts for 1980-1981. December 1982. 148 pp.
65. \*Alien invasive vascular plants in South African natural and semi-natural environments: bibliography from 1830. V C Moran and P M Moran. December 1982. 42 pp.
66. Environmental Research Perspectives in South Africa. December 1982. 39 pp.
67. The Sancor Estuaries Programme 1982-1986. February 1983. 43 pp.

68. The SANCOR Programme on Coastal Processes. April 1982 - March 1988. Edited by D H Swart. February 1983. 29 pp.
69. Guidelines for the management of large mammals in African conservation areas. The proceedings of an international workshop held at Olifants Camp, Kruger National Park, South Africa. Edited by A A Ferrar. May 1983. 95 pp.
70. Marine Linefish Programme Priority Species List. SANCOR. Edited by J H Wallace and R P van der Elst. May 1983. 113 pp.
71. Mineral nutrients in mediterranean ecosystems. Edited by J A Day. June 1983. 165 pp.
72. South African programme for the SCOPE project on the ecology of biological invasions. A description and research framework produced by The Task Group for Invasive Biota of the National Programme for Environmental Sciences. July 1983. 25 pp.
73. South African Marine Pollution Survey Report 1976-1979. B D Gardner, A D Connell, G A Eagle, A G S Moldan, W D Oliff, M J Orren and R J Watling. September 1983. 105 pp.
74. Ecological notes and annotated checklist of the grasshoppers (Orthoptera: Acridoidea) of the Savanna Ecosystem Project Study Area, Nylsvley. M V Gandar. November 1983. 42 pp.
75. Fynbos palaeoecology: a preliminary synthesis. H J Deacon, Q B Hendey, J J Lambrechts (Eds). December 1983. 200 pp.
76. A South African Perspective on Conservation Behaviour - A Programme Description. Compiled by A A Ferrar. December 1983. 34 pp.

\*Out of print.