FINANCIAL CONSIDERATIONS OF SOUTH AFRICAN ENVIRONMENTAL PROBLEMS

by

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ABSTRACT

No panacea exists for the resolution of environmental problems. In South Africa environmental control is effected almost exclusively by way of direct prohibition and regulation. These policies have serious limitations predominantly as a result of legal and administrative inadequacies. The remedy of these inadequacies is not feasible and alternative, complementary or replacement control policies are needed. This report reviews a number of alternative policies, most of which rely on market related mechanisms, in the context of pollution, resource destruction and land use problems. In addition, current financial legislation is replete with provisions contributing towards the exacerbation of environmental ills. These anomalous provisions must be re-evaluated in terms of material objectives, which must include the need for sound environmental resource management. A number of provisions do, however, offer some potential for conservation activities. These provisions, together with some innovative schemes, are introduced in the report and deserve further research.

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CHAPTER 1 : INTRODUCTION

1.1 Introduction to the Problem

> 'We must acknowledge the realitites of economic and political power and the strength of past habits, assumptions, and institutions. Yet there are significant sources of change ...'
>
> (Barbour, 1980, p.8)

Unanimity is easily accorded to the fact that no panacea exists for the resolution of environmental problems. A wide array of policy instruments are available to ameliorate environmental problems with the objective of approximating a social optimal. However, environmental problems are by definition extremely diverse in nature, magnitude and origination which exacerbates the difficulty of selecting an appropriate policy instrument for the regulation of the particular problem.

In South Africa environmental legislation is described almost entirely by restrictions on human activities (see Section 3.3). Alternative policy instruments have not been investigated and in many instances sub-optimal regulation has resulted (see Chapter 3).

This report will, therefore, attempt to categorise environmental problems and to comprehensively survey appropriate policy alternatives in the light of the South African legal structure and current government fiscal policy. Particular emphasis will be placed upon financial incentives as no South African study or text has previously considered these extremely promising and viable policy alternatives for the resolution of environmental problems.

It <u>is not</u> suggested that the policies reviewed and recommended for further investigation are sufficient to ensure changes in values and attitudes. This is clearly the task of education and improved information dissemination. It <u>is</u> submitted that financial incentives may encourage socially desirable interaction between man and his environ-

ment, stimulate questioning of existing interactions and, most importantly, provide channels for the expression of these values (see Section 2.1).

1.2 A Categorization and Definition of Environmental Problems

The definition to be adopted for 'environmental problems' refers to 'impaired interrelationships between man and his physical surroundings' (Fuggle and Rabie, 1983, p.2). The term 'physical surroundings' includes the natural environment, but excludes the built environment.

In order to facilitate the investigation and comprehensive review of alternative regulatory policies environmental problems have been conveniently classified into three categories:

1. Pollution Problems (reviewed in Chapter 3)

   Pollution is defined to be 'the residuals of human activity which adversely affect the next user of some environmental resources' (Fuggle and Rabie, 1983, p.85), e.g. air pollution.

2. Resource Destruction (reviewed in Chapter 4)

   Problems of resource destruction relate to '... the removal or dispersion of natural concentrations of materials that impairs some ecological process or depletes some environmental resource which is capable of yielding benefits in perpetuity' (Fuggle and Rabie, 1983, p.85), e.g. soil erosion.

3. Suboptimal Management of the Space Economy (reviewed in Chapter 5)

   The suboptimal spatial arrangement of human activities result in a loss of current and future welfare due to an exacerbation of pollution and resource destruction impacts in addition to sociological concerns, e.g. urban sprawl and leapfrog development.

1.3 Report Objectives

Research activities and the subsequent documentation in this report have been focused on the objectives below:

1.3.1 Primary objectives

1. To survey the spectrum of policy instruments appropriate to the regulation and amelioration of particular categories of environmental concern (viz., Pollution - Chapter 4; Resource destruction - Chapter 5, and Management of the Space Economy - Chapter 6).

2. To identify policy mechanisms currently employed in South African environmental legislation and to highlight the merits and inadequacies of such policies.

3. To review the relevant provisions in financial legislation, in particular The Income Act No. 58 of 1962, and to expose incentives and disincentives to environmental protection. It has been assumed that the reader is unfamiliar with financial and economic concepts. For this reason numerous examples and illustrations have been used to aid comprehension of complex financial or economic discussions.

4. To suggest complementary financial policy mechanisms, consistent with current fiscal policy, where existing provisions are inadequate.

Objectives 2. to 4. above have been addressed in Chapters 2 to 5.

1.3.2 Subsidiary Objectives

1. To establish an analytical framework by way of convenient classifications of environmental problems and associated policy instruments (see

Chapters 2 and 3).

2. To explore reasons for the occurrence of environmental concerns. The two major categories investigated are those of market failure and government failure. An attempt is made to question the assumptions that market failure must be countered by greater restrictive legislation imposed by government (see Chapter 2).

3. To compile a comprehensive bibliography, so as to aid follow-up researchers.

1.4 Research Methodology

The research methodology employed to pursue the research objectives identified in Section 1.3 included a detailed literature survey, interviews and consultations and analysis and interpretation of environmental and financial legislation.

1.4.1 Literature Search

It was considered necessary to conduct a comprehensive literature survey as no South African study or text has previously considered financial policy alternatives for ameliorating environmental degradation. It must also be noted that much relevant research is extremely recent with little having been published in the form of available texts. The following activities were undertaken to supplement a preliminary bibliography composed almost entirely of standard environmental economic texts.

1. A computer search of a database entitled 'Directory of Environmental Research Projects in the European Community' was undertaken under the auspices of the Ministry of the Environment in London. This search revealed a number of

projects recently completed or currently in progress within the EEC. Correspondence with relevant researchers, especially in England and Germany, was particularly fruitful and numerous publications, papers, seminars and lectures, all of which, to my knowledge, were unavailable in South Africa, were obtained.

2. Correspondence initiated with the IUCN in Switzerland, the Nature Conservancy in Washington, NEPA, The Institute of Fiscal Studies in London and The Taxation Institute of Australia yielded numerous relevant reports and papers.

3. A Dialogue search of three databases, viz. Enviroline, Environmental Bibliographies and Economic Abstracts International, proved extremely useful in identifying journal articles, conference papers and reports (especially those published in the USA). Extensive use was made of the Interlibrary Loan facility for literature within South Africa and in overseas libraries.

It is envisaged that this up-to-date literature, which spans almost the entire gamut of environmental concerns, will prove useful in follow-up work to the broad overview and recommendations presented in this report.

1.4.2 Interviews

The efficacious adoption of regulatory mechanisms which have desirable efficiency, equity and intertemporal impacts is dependent upon political, legal, financial and adminstrative constraints. In order to identify such constraints numerous interviews were held with prominent individuals. Interviewees selected may be classified as:

1. Senior officials with the Department of Inland Revenue,
2. Taxation authorities and consultants,
3. Prominent members of conservation organisations, and
4. Economists

A list of names of individuals consulted is presented in Appendix A.

1.4.3 Analysis and Interpretation of Environmental and Financial Legislation

Extensive use of supportative texts were used in the review of the plethora of legislation describing the research domain. In particular the following authoritative sources were consulted:

1. Taxation Legislation - Silke, Divaris and Stein (1984), Meyerowitz and Spiro (1984), and Huxham and Haupt (1984).
2. Environmental Legislation - Fuggle and Rabie 1983, and Rabie (1976).

Where necessary the relevant legislation was reviewed. This was frequently the case as commentators of financial legislation have previously afforded little or no attention to environmental concerns.

1.5 Limitations to the Report

1. The report omits the consideration of environmental concerns and related control mechanisims for the National States. This limitation is necessary in view of the different legislation and administrative bodies relevant to these areas. Furthermore, the report is inadequate in the consideration of regulatory mechanisms applicable to the underdeveloped sectors of the South African economy.

2. The scope and depth of review are limited in the sense that this report is intended to present a broad overview of environmental problems and policy control mechanisms, in particular financial policy alternatives. Many innovative policy suggestions have been drawn from the legislation of other countries. If these policy suggestions elicit a favourable response, further administrative, legal and economic research is essential prior to their implementation.

3. An already vast population exacerbated by a continued high population growth rate is viewed by many environmentalists as a driving force behind most environmental concerns. A recent paper published by the Worldwatch Institute presents an 'inventory of the many (twenty two were identified) consequences of population growth ...' (Brown, 1976, p.79). The exclusion of the population dimension from consideration in this report should not be construed as a disregard or submission to this central concern. It is intended to reflect a recognition of the enormity of the problem and the cultural, ethical and political complexities describing alternative regulatory proposals. It is recommended that in-depth investigations be initiated to investigate existing legislation and to recommend alternative policies.

4. It was not possible to survey the complete spectrum of South African financial incentives and disincentives impacting environmental concerns as many complex and extremely innovative manoeuverings with the provisions of the various Acts provide innumerable possibilities. It was considered prudent to restrict the review to those provisions of current financial legislation viewed by the author as being most relevant to this preliminary investigation.

5. The confidentiality of many documents reviewed and opinions given in the Department of Inland Revenue,

and elsewhere, has, in many instances, precluded the identification of sources and relevant parties.

1.6 Report Structure

Apart from the introduction and conclusion the report is described by three major subdivisions:

- An explanation for the occurrence of environmenal problems - Chapter 2
- A review of alternative policy options and an introduction to South African Revenue Law, and - Chapter 3
- A review of environmental problems and related policy control mechanisms - Chapters 4, 5 and 6

Chapter 2 aims to dispel the misconception that environmental ills are solely attributable to the failings of the market economy. It is argued that pervasive government failure in environmental management, attributable to administrative, political and legal inadequacies, is extremely complex and generally more difficult to correct or circumvent than market failure. A plea is made for the recognition of the necessity to utilize market mechanisms to complement and, in specific instances, even replace ineffective government admistration of environmental concerns.

Chapter 3 provides an introduction to the wide array of policy options designed to correct or circumvent the inadequacies identified in Chapter 2. Three classificatory schemes are suggested for environmental policies. This ordering of the diverse range of policy alternatives is intended to facilitate the analysis of their application to specific environmental problems in Chapters 4, 5 and 6. Chapter 3 also introduces the relevant statutes comprising South African Revenue Law. Many provisions contained in these statutes have environmental relevance and are

explored further in Chapters 4, 5 and 6.

Chapters 4, 5 and 6 broadly review the three categories of environmental concerns identified, namely Pollution (Chapter 4), Resource Destruction (Chapter 5) and Management of the Space Economy (Chapter 6). The reviews are specifically directed at:

- introducing the category of environmental concern,
- identifying and discussing appropriate policy control measures,
- reviewing current environmental and financial legislation applicable to the particular category of environmental concern, and
- identifying inadequacies or anomalies in existing financial legislation and recommending further research of alternative policies and amendments to existing financial practices.

CHAPTER 2 : AN EXPLANATION FOR THE OCCURRENCE OF ENVIRONMENTAL PROBLEMS

2.1 Introduction

The prescription of remedial or ameliorative policies for environmental problems presupposes an understanding of underlying causes. It is not intended to investigate societal value systems but rather the expression of these values is assumed in the political, legal and economic institutions describing the society. It is suggested that inadequacies in these institutions, which regulate man to man and man to environment interrelationships, need to be identified in the context of environmental concerns. Policies designed to correct or circumvent these institutional inadequacies are unlikely to result in a change in societal values but are certain to stimulate questioning and provide channels for the expression of a previously latent environmental conciousness.

A useful example is provided by the businessman who knowingly pollutes or negatively impacts the environment in the pursuance of his economic enterprise. Although he may want to reduce the magnitude of his environmental impact, financial disincentives, existing within societies institutions, may prevent him from doing so. Policies designed to help correct or circumvent these undesirable influences on rational decision making are the topic of this report.

This chapter attempts to investigate institutional inadequacies in the context of environmental concern. These are categorized as either government or market related. Chapter 3 reviews the range and classifications of policy options designed to correct or circumvent those inadequacies.

2.2 Central Concepts

The objective of economic activity is the maximization of social welfare over long time horizons. This maximum is described by:

1. Efficiency in production, distribution and the allocation of resources in accordance with societal preferences (Herfindahl and Kneese, 1974, p.42). This condition is referred to as a Pareto optimum.

2. This Pareto optimum is an optimum relative to a given distribution of income or, in the case of pure exchange with no production, a given distribution of initial endowments. We have no basis for arguing that the distribution of income resulting from private exchange will meet the ethical standards of the community and therefore the Pareto optimum cannot be assumed to be a welfare maximum. Therefore, an equitable distribution of both income and wealth, in addition to Pareto optimality, must be satisfied in order to attain a welfare maximum.

3. The incorporation of future generations into the welfare calculus has been given much attention in recent years, It is convincingly submitted that '... economic expansion has served to increase the level of uncertainty' (Lecomber, 1979, p.32). Man's capacity to do irreparable harm to the environment has increased enormously. The adoption of a socially acceptable future risk profile must, intuitively, impact the social welfare of current generations. Meade states further that:

> 'The disutility of Doom to future generations would be so great that, even if we gave it a low probability and even if we discount future utilities at a high rate ... we would be very wise to be very prudent in our present situation' (in Lecomber, 1979, p.34).

It has even been suggested that to overcome the fact that 'people distribute their resources between the present, the near future and the remote future on the basis of a wholly irrational preference' (Pigou, 1924, p.25) we should now consider the possibility of '...

political representation for future people' (Kavka and Warren, 1983, p.22).

2.3 An Introduction to the Institutional Inadequacies

Two categories of constraints are suggested for the failure of society to maximise social welfare. These two broad categories are taxonomically differentiated by distinguishing between market related and government related inadequacies.

Table 2.1 : Market and Government Related Inadequacies

Market Related	Government Related
Attenuated Property Rights (2.4.1)	Bureaucratic Ignorance and Inertia (2.5.1)
Externalities (2.4.2)	The Fallacy of an 'Omniscient Impartial Government' (2.5.1)
Market Structure (2.4.3)	Myopic Vision and Political Priorities (2.5.2.1)
Public Goods (2.4.4)	Administrative and Legal Constraints (2.5.2.2)
	Social and Economic Dichotomy (2.5.3)
Equity (2.4.5)	
Intertemporal Allocations (2.4.6)	

Both categories of constraints contribute to sub-optimal social well-being. This is evidenced by an inefficient utilization of resources, inequitable distribution of income and wealth and the inadequate incorporation of future welfare into the decision making calculus.

Efficiency in the utilization of resources is essential where scarcity describes the supply of such resources. The efficiency criterion has become more important in the management of environmental resources because of the increased rate at which such resources have become scarce e.g. wilderness, clean air, biological diversity, etc.

Efficiency is, intuitively, an extremely important concept. It is imperative that society maximise the benefits from scarce resources.

Conceptually, it is possible for a command economy in a totalitarian state to achieve Pareto-efficiency. To do so, the director of the economy would need to effectively set all the price ratios equal to the relevant rates of substitution and transformation. The enormity of the information gathering and computational task has led most economists to suspect that achievement of Pareto-efficiency in a directed economy, although conceptually possible, is unlikely.

On the other hand, it is not merely conceivable that a perfectly competitive, free enterprise economy may achieve Pareto-efficiency. The competitive economy uses the price system to provide an in-built mechanism that tends to move the economy in the direction of efficiency. The competitive economy relies upon prices as signals to direct independent producers and consumers to behave individually in such a way that the aggregate outcome of their individual endevours is efficient. It is, therefore, suggested that greater utilization of the potential benefits of the market economy should be sought by correcting for market failures. Exclusive dependence upon the market economy is not feasible and therefore government related inadequacies also deserve attention.

The causes of market imperfection are reviewed in Section 2.4 whilst government inadequacies are reviewed in Section 2.5.

2.4 Market Related Imperfections

The concept of Pareto optimality is built upon a structure of highly restrictive assumptions. Clearly, all are violated to some degree in reality and some are, at least at times, drastically violated (Herfindahl and Kneese, 1974, p.47).

This section investigates the existence and nature of what has been termed 'market failure' or more charitably 'market imperfection'. These circumstances typically involve the attenuation of property rights and, often, fundamental inefficiencies in pricing.

2.4.1 Property Rights

In an economy that is otherwise conducive to efficiency non-attenuated property rights ensure Pareto-efficiency. A set of non-attenuated property rights implies that property rights are: (Randall, 1981, p.148)

1. Completely specified, so that it can serve as a perfect system of information about the rights that accompany ownership, the restrictions upon those rights, and the penalties for their violation.

2. Exclusive, so that all the rewards and penalties resulting from an action accrue directly to the individual empowered to take the action (i.e. the owner).

3. Transferable, so that the rights are directed towards their highest value use.

4. Enforceable and completely enforced.

This definition of unattenuated property rights suggests perfection in the specification, transfer and enforcement of rights. However, these activities are costly and the persuit of perfection in these activities may incur prohibitive costs. Such costs are known as transaction costs.

2.4.2 Externalities

> '... (Are a source of) resource misallocation under the market system : one of the least obvious yet one of the most consequential imperfections in the workings of the price system.'
>
> (Baumol and Blinder, 1979, p.608)

Many economic decisions only consider internal costs and benefits, i.e. costs and benefits born by the actor. The rational individual or firm will take an action whenever the total benefits exceed the proportion of the total costs he must bear. The term externality denotes the inefficiencies that arise when some of the benefits or costs of an action are external to the decision makers calculus; that is, some of the benefits accrue to, or some of the costs are imposed upon, individuals who play no part in the decision (Randall, 1981, p.157).

Two types of externalities are envisaged:

1. an external diseconomy exists when the affected party is made worse off by the activity and has a desire to induce the acting party to reduce the level of that activity e.g. emissions and effluents from industrial processes, non point pollution, emissions from consumption activities (automobile exhaust emissions, tobacco smoke, etc.), activities that impose noise, are aesthetically displeasing or any other impact offensive to affected parties.

2. an external economy is an externality in which the affected party is made better off by the activity and therefore has a desire to induce the acting party to increase the level of that activity, e.g. the individual who beautifies his house imposes an external economy on affected parties.

Various solutions to externality problems are investigated in Chapters 4, 5 and 6.

Where economic activity imposes detrimental externalities, free markets result in a situation where marginal social benefits are less than marginal social costs. Smaller outputs than those that maximise the firm's profits will be socially desirable. Where the firm's activity generates beneficial externalities, free markets will produce too little output.

2.4.3 Market Structure

Market structures are often described as being perfectly competitive, monopolistic, competitive monopolistic or oligopolistic. It is easy to demonstrate by means of static economic models that the attainment of Pareto optimality is unlikely except in the case of perfect competition. Many economists therefore advocate government control of non perfect markets by means of direct regulation or anti-trust policy (Baumol and Blinder, 1979, p.608).

2.4.4 Public Goods

A public good is defined as any commodity or service whose benefits are not depleted by an additional user and for which it is generally difficult or impossible to exclude people from its benefits, even if they are unwilling to pay for it (Baumol and Blinder, 1979, p.612).

A public good is differentiated from a private good by virtue of two attributes associated with private goods. The first attribute is that of excludability, meaning that only those who pay can benefit from the provision of the good. The second attribute is that of depleteability, meaning that consumption depletes the supply available to other consumers.

Two problems are associated with public goods:

1. Because of the non exclusion of beneficiaries it is usually not possible to charge for the provision of public goods, and

2. The extraction of a fee from users may discourage demand, even though consumption would not deplete supply (e.g. lighthouse).

For both these reasons the supply of public goods is usually undertaken by government.

It is useful to distinguish between public goods which cannot be exhausted and those which can be depleted forever (Stanth, 1980, p.219). Baden (1977, p.144) calls this second category of goods 'common pool resources' - such goods have multiple owners and are potentially destructable.

The ability of government to satisfactorily provide public goods is surveyed further in Section 2.5 which deals with 'government imperfections'.

2.4.5 Equity

The market system has not removed gross distributional discrepancies in society. Many economists argue that the market system has, in fact, contributed to greater inequity (e.g. Lecomber and Fisher, 1978).

The maximisation of economic well-being is a condition in which society is as well-off as it can possibly be, given its resource base, its production technology and the tastes and preferences of its members. Economic efficiency or Pareto optimality is not sufficient to ensure maximum economic welfare; societies equity concerns must also be satisfied.

Few economists would argue, however, that it is the function of government, rather than markets to ensure an equitable distribution of income and wealth.

Therefore failure to achieve such equity is probably attributable to government rather than market inadequacies.

2.4.6 Intertemporal Allocations

The necessity to incorporate future generations into the welfare calculus has been discussed in Section 2.2.

Intertemporal allocations are adjudicated on the basis of efficiency and equity.

> In a world of attenuated property rights, there is always a reasonable concern that private optima for the intertemporal allocation of resources will diverge from the socially efficient allocation. In addition there is no reason to assume that a socially efficient intertemporal allocation of resources will result in intergenerational equity.
>
> (Randall, 1981, p.236)

Four specific problems associated with intertemporal allocations are discussed below.

2.4.6.1 The Socially Relevant Time Horizon

Traditional economic theory assigns a crucial role to r, the rate of interest. It is suggested that the empirical magnitude of the social discount rate is best determined through judicious observation of market interest rates and their manipulation to correct obvious sources of the failure of market interest rates to reflect the social opportunity cost of capital (Randall, 1981, p.236).

A problem exists in that market interest rates are determined in the market for capital investments where relevant time horizons seldom exceed 20 years. The implication of this practice is to reduce the present value of costs and benefits to future generations to trivial amounts. It is generally accepted that many

of the intractable problems confronting society are those in which the relevant time horizon is more than a few years or decades e.g. destruction of irreplaceable natural resources, solid waste management, etc.

> 'There is a natural intertemporal bias which favours selection of the most efficacious solution to todays problems, even if this may create greater problems for future generations.'
>
> (Stauth, 1980, p.12)

2.4.6.2 Risk and Uncertainty

A number of uncertainties exacerbate the problem of intertemporal allocations.

Technological Uncertainty

The future is inherently uncertain. Excessive optimism for technological innovation will encourage high rates of current exploitation of resources and will tend to underestimate the adverse impact of current activities. Excessive pessimism is likely to have the opposite effect.

Resource Identification and Substitutes

Resources are broadly defined as sources from which man may derive utility. The Penquin Dictionary of Economics defines utility as essentially a psychological concept which is incapable of direct measurement in absolute units (1983, p.449).

The identification of resources is, therefore, a function of technology or of tastes and preferences and is time dependent.

It is evident that man derives utility or disutility from the totality of objects and their interrelationship which surround and routinely influence the lives of man. The identification of such objects is problematical due to man's incomplete knowledge and

understanding of the physical world, biological systems and his psychological makeup. Extreme uncertainty describes attempts to predict temporal changes in the set of such objects.

Ecosystems, and rare and endangered species provide a useful illustration of the difficulties associated with the identification of objects from which man currently derives utility or is expected to derive utility.

An extremely optimistic viewpoint is the assertion that no resource problem exists as technical progress and substitutions of man-made goods for natural resources will outweigh the increasing relative physical scarcity of resources. In contrast, pessimists foresee, or at least fear, the eventual failure of technical progress, and the advent of problems for which solutions cannot be found or are not found in time (Lecomber, 1979, p.28).

The extreme optimist viewpoint, besides adopting a high risk profile and rationalising a disregard for future generations, is insensitive to the fact that species, ecosystems and many other qualities of nature do not have substitutes.

Tastes and Preferences

It is probable that tastes and preferences of future generations will differ from those of today. This uncertainty dictates an adoption of policies that do not violate Arthur Clark's rule: 'Do not commit the irrevocable' (in Goodin, 1983, p.6).

Many analysts recommend 'open end planning' in the sense that 'any choice made now must be made in such a way that .... a later generation, or the same generation at a later date, can reverse the choice and return to the original situation' (Pearce, 1979, p.26).

Many people submit that man has psychological and spiritual needs which dictate a maintenance of the natural environment, with its magnificent diversity and complex life support systems. These needs, it is argued, are not fickle tastes and preferences, but eternal components of man's psyche.

2.4.6.3 Irreversability

The orthodox rule in making public decisions, especially environmental ones, is an updated version of utilitarianism. Each alternative action is evaluated according to the ratio of the present value of expected costs and benefits.

This standard maximise-expected-utility decision paradigm has serious limitations. It is at best a partial response to the range of considerations that should be taken into account by policy makers.

It might be desirable to bias decisions:

1. against options with irreversible impacts;
2. in favour of the protection of vulnerable environmental dimensions;
3. in favour of sustainable rather than one-off benefits;
4. against causing harm, as distinct from merely foregoing benefits (Goodin, 1983, p.16).

The above prescriptions emphasize the desired low risk profile in the light of extreme uncertainty with regard to intertemporal resource allocations.

2.5 Government Failure

> 'Government is one means through which we can try to compensate for 'market failure', try to use our resources more effectively to produce the amount of clean air, water, and land that we are willing to pay for. Unfortunately, the very factors that produce the market failure also make it difficult for government to identify the specific persons who are hurt and benefited ..... Attempts to use government to correct market failure have often simply substituted government failure for market failure'
>
> (Friedman and Friedman, 1980, p.214).

2.5.1 The Role of Government

Much dissention describes the opinions with regard to the role of government in regulating and directing economic behaviour.

> The dissent comes from both the left and the right of mainstream economics. On the right are (predominantly) the libertarians, who .... (expound) .... the virtues of the capitalist market economy. To libertarians, the market rather than the state is the ultimate guarantor of freedom, and, consequently, they argue that the realm of the market should be expanded at the expense of the state.
>
> (Baumol and Blinder, 1979, p.813)

The libertarian credo is associated with a laissez faire economic philosophy, which incorporates a high regard for individual freedom and civil rights.

To Milton Friedman, the pre-eminent spokesman for libertarian economists, the role of government should be limited to four tasks.

> 'First to protect people and their property against coercion by fellow citizens - a straightforward police function. Second, to provide for the defence of the country against enemies from abroad. Third, to provide a means for deciding on the rules under which the market is going to operate. Property rights for instance are not natural - they have to be defined. And fourth to provide

> a mechanism for adjusting disputes among people over the interpretation of those rules.'
>
> (Feldberg, Jowell and Mulholland, 1975, p.47)

These functions may be conveniently classified as:

1. Legislation and enforcement of essential laws necessary to maintain the economic and social framework.

2. Control of natural monopolies.

3. Intervention to promote or protect the public welfare wherever there are beneficial or detrimental externalities.

The economics of the 'New Left' which emerged from the student 'uprisings' of the 1960's is critical of mainstream economic analysis and of comtemporary capitalism. It is submitted that:

1. Economists are guilty of disciplinary narrowness resulting in an incapacity to address the important questions, (Baumol and Blinder, 1979, p.824).

2. Modern economics is ahistorical and accepts institutions and the social system as given (Lindbeck, 1977, pp.17-21).

3. Economics takes preferences as being exogenously determined and then shifts the burden of studying their formation and change onto 'other disciplines'. The New Left rejects this compartmentalization and takes the Marxian view .... that new needs are created by the same process by which their means of satisfaction are produced (Hymer and Roosevelt, 1972, p.649).

4. That conventional economics is preoccupied with questions of efficiency instead of equality of income and wealth and the distribution of power (Lindbeck, 1977, pp.12-15 and pp.57-76).

5. Much like Galbraith the New Left is critical of mainstream economists preoccupation with policies to increase the gross national product. Baumol and Blinder term this preoccupation 'a myopic concentration on quantity rather than quality' (1979, p.827).

6. Mainstream economists are naive and sentimental with regard to the functions of the state. It is suggested that government does not translate collective choice into public policy but merely serves the interests of the controlling class in a society.

> '... Public choice analysis does not offer a high probability that representative government will reflect at all Samuelson's convenient fiction of 'the omniscient calculating machine'.

Furthermore, it is warned that

> '... (it) is essential that welfare economists are not to continue to waste their efforts in devising utopian collective choice solutions to apparent problems of market failure without reference to the deficiencies of the political market.'
>
> (Rowley, 1978, p.41)

The New Left is criticised for not offering an alternative

> 'It may be possible to make a strong case against either markets or administrative systems, but if we are against both we are in trouble; there is hardly a third method for allocating resources and co-ordinating economic decisions, if we eliminate physical force'.
>
> (Lindbeck, 1977, pp.32-33)

Summary

Economists subscribing to the libertarian viewpoint attempt to limit the role of government in the resolution of environmental problems to the correction of market failure. The New Left economists are mistrustful of market mechanisms and do not accept the concept of an omniscient impartial government. It is evident that New Left economists find themselves in a policy vacuum.

This report will adopt the viewpoint that government has a central role to play in the resolution of environmental problems. Both sources of environmental problems, market failure and government failure, need to be addressed.

The role of individuals and interested parties is vital to the initiation and adoption of corrective policies. It is suggested that public policies are the outcome of the forces of demand and supply as they impinge upon the political market place.

> Individual citizens are assumed to make known the profile of their individual preferences over alternative social states to the extent that they deem to be economic. And they attempt to influence government to satisfy those preferences by resort to the instruments available, notably by voting, by pressure group and social movement activities, by private provision, by migration or even by revolution. .....
> A further important influence in the supply of public policies is seen to stem from bureaucracy, ...'
>
> (Rowley, 1978, p.37)

In the South African context environmental concerns are not sufficiently politicised to influence voting patterns. However, pressure and interest groups have had a certain amount of success in influencing decisions e.g. the De Hoop debacle. Discussions held with members of The Standing Commission on Fiscal Matters, see Chapter 3, confirmed the importance of the role of interest and pressure groups in the drafting and enactment of Revenue Law.

It is, therefore, envisaged that South African public policy and government decisions are most likely to be influenced by means of pressure and interest groups. A number of important qualifications are necessary with regard to this strategy proposal.

Firstly, it is considered important that pressure groups should, as far as possible, be representative of the social mix characteristic of the South African society. This would obviate the possible misinterpretation of political motive and would lend credence to representations emphasizing the national character of most environmental concerns.

Secondly, it is suggested that motivations for corrective policies should be sensitive to prevailing economic philosophy and reality and the legal framework. It is submitted that representations made in the past have revealed scant recognition of their impact on government revenue, efficiency, equity or intertemporal considerations. A number of representations have even suggested policy mechanisms which conflict with government or departmental policy. Examples of these misdirected representations were found in two letters recently received by The Department for Inland Revenue requesting extended investment allowances on capital expenditure for pollution equipment. These letters were ignorant of current fiscal policy and therefore certain not to succeed. Familiarity with financial and fiscal concerns are essential if well motivated representations for financial assistance are to be forthcoming from the environmental lobby.

Thirdly, it must be recognised that most senior bureaucrats in the public service are not well informed about environmental problems. Discussion with senior government officials in The Department of Finance and The Department of Inland Revenue revealed the perceptions

of environmental problems as low priority issues. It was stated that attempts to resolve these issues are a luxury not affordable in South Africa at present. Comment to the effect that 'soil erosion is only a problem in a few black states' was not uncommon. It is imperative that interest groups should function as a catalyst for interdepartmental and interdisciplinary cross-pollination.

Fourthly, numerous administrative and legal shortcomings in environmental administration (see Fuggle and Rabie, 1983, pp.126-132) dictate a strategy that favours market orientated solutions to environmental problems where feasible. Alternative solutions to environmental ills should be actively surveyed with the objective of identifying the policy with the most favourable efficiency, equity and intertemporal consequences. These administrative shortcomings will be reviewed more fully in Section 2.5.2.2.

Fifthly, policy mechanisms must interact supportatively and should promote consistent behaviour in the man environment interrelationship. Numerous inconsistencies are apparent with regard to environmental legislation. These are explored in Chapters 4, 5 and 6. In an authoritative research paper, published by the IUCN, the importance of this requirement is well expressed:

> 'The role of government is almost always seen in the context of regulation, the establishing of some administrative mechanism to enforce, allocate and suggest further limitations - all designed to reduce the magnitude of a problem to acceptable levels ..... But regulation too narrowly conceived is also not likely to produce the degree of amelioration of environmental problems that many deem necessary ..... Indeed real progress in dealing with environmental problems is unlikely unless and until traditional regulatory processes

> and tax policies, at all levels of government and among governments are brought into a much greater degree of agreement and consistency than presently exists.'
>
> (Delogu, 1976, p.9)

2.5.2 Government Failure in Environmental Administration in South Africa

South African administration of environmental affairs is beset with numerous shortcomings that exacerbate the general concerns with government administration previously mentioned.

The following shortcomings relate specifically to South African administration of environmental problems (Fuggle and Rabie, 1983, pp.126-131).

2.5.2.1 Socio-political Problems

The South African economic and social structures are dualistic in the sense that environmental concerns associated with both development and underdevelopment need to be addressed. Administration is further complicated by the politically determined boundaries of black states and the concomitant multiplicity of authorities. The complex South African political dispensation and intercultural friction frequently result in the misinterpretation of environmental concerns in a political context. This unfortunate mistrust of motivation is a major constraint to the national consideration of environmental concerns.

The underdeveloped people of Southern Africa reveal a high population growth. The resolution of this problem, considered by many to be the driving force for most of our environmental concerns, is complex and fraught with political, economic, cultural and ethical dimensions (see Section 1.5.3).

Administration of environmental concerns is often ineffective due to attention to 'cosmetic remedies

to social ills', e.g. littering, instead of treating underlying causes.

The identification of and assessment of the magnitude and significance of environmental problems are often frustrated by ignorance and inadequate information dissemination. Furthermore, 'As in most young countries a 'pioneer mentality' which promotes the rapid exploitation of seemingly unlimited resources, prevails in South Africa' (Fuggle and Rabie, 1983, p.127).

A short time horizon is not only the prerogative of the businessman. Political time horizons seldom extend beyond the election term. In the South African context a relatively certain election outcome facilitates a longer political time horizon although this is unlikely to span more than about ten years. This myopic vision characteristic of all government leadership contributes further to a short term utilitarian ethic.

2.5.2.2 Administrative and Legal Causes

Administrative law deals with the control over the decisions and actions of Government.

> '... (It) is obvious that the success of environmental conservation is dependent to a large degree on government departments and administrative bodies. Whereas a private individual is regarded as sufficiently able to look after his own interests, these bodies are supposed to represent public concern in environmental conservation.'
>
> (Fuggle and Rabie, 1983, p.47)

Numerous shortcomings in the administration of environmental concerns are well explored by Malan, Fuggle and Rabie (in Fuggle and Rabie, 1983, pp.127-131). Briefly these are:

1. the existence of a multiplicity of authorities which, it is suggested here, will increase as a result of the new Constitutional arrangements proposed for South Africa;

2. diffusion of responsibility;

3. overlap and omission of functions;

4. the fragmented nature of environmental legislation;

5. internal difficiencies in the state machinery due to

   - dualistic assignments
   - lack of co-ordination
   - political impotency of The Department of Environmental Affairs

Rabie and Erasmus (in Fuggle and Rabie, 1983, pp.47-54) suggest a number of controls over the decisions and actions of government bodies in order to remedy these shortcomings:

1. Provision for control over the powers, especially discretionary powers, exercised by administrative bodies. This internal review is usually available but the lack of independence reduces its value so substantially as to make it almost useless.

2. External control over administrative decisions by means of judicial review. Judicial review, the most important form of control over administrative actions, is inadequate due to rigorous requirements of the applicant in establishing locus standi, high costs and the fact that courts can only adjudicate on the procedural regularity or the legality of the action and not on its merits.

3. The merits of a decision may be reviewed by the exceptional remedy of appeal.

> '... (No) provision has so far been made in South Africa in so far as environmental conservation is concerned. Our courts unlike some American courts - are in any case very reluctant to become involved in policy considerations affecting the merits of administrative actions ..... '
>
> (Fuggle and Rabie, 1983, p.49)

4. Parliamentary control over administrative actions is conceived by means of an ombudsman. Although this grievance man is only empowered to make recommendations his persuasiveness could have some limited influence in legislative and administrative reform.

5. Legislation could be enacted requiring environmental impact assessments to be incorporated into the decision matrix. It is, however, submitted that even if a document similar to that of the U.S. National Environmental Policy Act of 1970 (NEPA) were enacted: '... it would have limited value in South Africa in so far as judicial control of administrative action is concerned. This is because once the administration has given due and honest attention to the issue in question - the contrary being most difficult to prove - a court of law will not interfere with the administrative body's decision merely because it was wrong'.

6. Administrative appeal tribunals constituted of experts in the field could be provided for in the legislation. The lack of independence of tribunal members, difficulties associated with the evaluation of social, economic and other factors together with a reluctance by the

government to involve the general public in administrative decisions mitigate against the meaningful contribution of this mechanism in the control of administrative action.

7. Lawsuits against the administration may present an information dissemination forum and help rally support for environmental concerns. Lawsuits may be an important mechanism in the politicisation of environmental concerns and the sensitization of administration bodies. The control is limited by the lack of provision for judicial review in South African environmental law.

8. The public participation in administrative proceedings, facilitated by means of discussion, submissions of opinions and comments and the possible relaxation of locus standi would provide a preventative control over administrative action. This control mechanism is unlikely to be widely adopted due to a South African tradition of discouraging public participation as evidenced by the rigid locus standi requirements and the cloak of secrecy surrounding administrative decisions.

2.5.3 The Dichotomous South African Economy - Regulatory Complications

The developed sector of the South African economy is best described as a mixed economy, i.e. arrayed between the extremes of pure capitalism and the command economy. Pure, or laissez faire, capitalism is characterised by the private ownership of resources and the use of a system of markets and prices to coordinate and direct economic activity. The market system functions as a mechanism through which individual decisions and preferences are communicated and coordinated. Advocates of laissez faire capitalism

argue that government interference disturbs the efficient functioning of the market system. Government's role is, therefore, limited to the protection of private property and establishing an appropriate legal framework to facilitate the functioning of free markets. The polar alternative to pure capitalism is the command economy, characterised by public ownership of all property resources and collective determination of economic decisions through central economic planning.

Furthermore, the South African economy can simplistically be described as both socially and economically dualistic. An industrialised, predominantly white population coexists with a large rural black population. Environmental problems associated with both first and third world economies are prevalent.

These dichotomies further complicate the selection of appropriate policy control mechanisms for the regulation of environmental problems.

		Economic Decision Making	
		Centralised	Decentralised
SOCIAL SETTING	1st world	X	X
	3rd world	X	X

2.6 Conclusion

The remedies suggested above are not sufficient to overcome legal and administrative shortcomings. It is submitted that only radical administrative reform, official recognition of a right to a humane environment, the recognition of a jurisprudential norm against environmental damage and other politically unrealistic departures from the existing legal structure are likely to materially improve public administration of the environment in South Africa. Assuming such amendments to public law are feasible, it is still not guaranteed that environmental

resources would be efficiently and equitably utilized (see Section 2.3).

The prescription to emerge from this review of government administrative failure dictates that the alternative regulatory system, namely market mechanisms, should be increasingly utilized to complement and even replace government administration where possible. It is suggested that remedies for government failure are inadequate and not feasible in many spheres of environmental concern. The same is not necessarily the case with market failure. Remedies for market failure are reviewed in Chapters 4, 5 and 6.

CHAPTER 3 : A BRIEF REVIEW OF AVAILABLE POLICY OPTIONS

> 'In making recommendations or decisions, the economist simply goes beyond the relatively secure confines of his science and into the thoroughly insecure world of normative policy .... It would be ironic if the economist, being overly conscious of the limitations of his science, withdrew from the policy arena, leaving it to others who have no more, and often less, scientific and philosophical basis upon which to make policy recommendations and decisions.'
>
> (Randall, 1981, p.403)

3.1 Introduction

It has been argued in Chapter 2 that both government and market failure are the fundamental notions underlying most environmental problems. It was also submitted that, in many instances, environmental resource management by means of innovative decentralised market mechanisms has not been adequately explored as an alternative to the inadequacies of current South African environmental administration.

In this chapter the range of environmental policy options are surveyed and concepts central to the evaluation of such policies are discussed.

Some preliminary distinctions between the various policy alternatives are presented below. In broad terms, three general methods have been proposed for the control of activities that contribute to environmental degradation.

3.2 Voluntarism

> 'They tell a story of a man who asked a socially conscious friend: "If you had two houses, what would you do with them?"
> "Keep one and give the other to the State", the friend replied.
> "If you had two cows what would you do with them?", the first man asked.
> "Keep one and give the other to the State", the friend replied.

> "If you had two chickens, what would you do with them?", the first man persisted.
> "Keep them both", the friend replied.
> "Why?", the first man asked.
> "Because I *have* two chickens", the friend replied.'
>
> (Vavindra Tarzie Vittachi)

As one might surmise, the voluntary abatement of environmentally undesirable activities and the voluntary persual of desirable activities has proved a weak and unreliable regulatory mechanism. This assertion is evidenced by voluntary programs for the collection and separation of solid waste components which have only been successful in rerouting a fraction of societies solid waste disposal.

Difficulties associated with voluntary separation of waste components are revealed by Lidgren:

> 'A separation of household waste can involve costs for the individual household that are not unimportant. Thus, for example, a person living in a tower block can be compelled to go down to the cellar with his separated material, which should be compared to the situation today when the same material is thrown down the rubbish chute outside the door.'
>
> (1980, p.88)

Lidgren investigates a number of regulatory mechanisms (e.g. fines, deposits, levies, information and prohibition aimed at reduction of littering in Sweden (1980, pp.101-135). His policy prescriptions clearly indicate the need to employ policy mechanisms beyond reliance on voluntary compliance.

A number of companies exhibit activities which apparently manifest good intentions. It is submitted, however, that only token amounts can realistically be allocated towards such non-productive expenditure without impacting the firms competitive ability. Where material sums are voluntarily expended on environmentally desirable programs, corporate rationale is usually traceable to an advertising, public

relations or some other financial benefit to be derived e.g. a tax benefit. Often an innovative combination of the above benefits is required to motivate the expropriation of funds to the socially desirable activity. It is apparent that activities so rewarded cannot be termed voluntary.

Yet voluntary measures do have their place. They are appropriate where alternative policy mechanisms are not practicable. An instructive example would be that of littering in wilderness areas where policing is well nigh impossible. In such instances resort must be had to environmental mores and individual concience. In brief but serious emergencies, where recourse to existing policy mechanisms proves inadequate and insufficient time is available to plan and enact a systematic program, appeal must be made to voluntary compliance. Where public opinion is sufficiently motivated, social pressure, often translated into economic pressure, may function to regulate and enforce compliance with desirable activities.

Various authors have explored our predisposition to selfish activities and have exploded the myth of altruistic motivation. Pre-eminent amongst such writers is Garett Hardin. Hardin believes that pure altruism (the principle of living and acting for the interests of others) exists only in small, intimate, family-like groups. Hardin claims that the cardinal rule of any policy should be:

> 'Never ask a person to act against his self interest.'
>
> (1977, p.14)

He claims that we are inherently egoistic because altruistic behaviour has been selected against in the Darwinian scheme of natural selection. It is suggested that people will not act unless personal tastes and preferences, financial or personal gain or other aspects of self interest are satisfied.

This concept is supported by Professor Kantor (1984) who recommends an active campaign to influence tastes and preferences. It is submitted that conservation and environmental protection should not be sought at governmental level but should emerge from the tastes and preferences of the public.

The 'revelations' in Aldo Leopold's journals go further by asserting that a change of ethics is essential to the success of conservation.

> 'When one considers the prodigious achievements of the profit motive in wrecking land, one hesitates to reject it as a vehicle for restoring land. I incline to believe we have overestimated the scope of the profit motive. Is it profitable for the individual to build a beautiful home? To give his children a higher education? No, it is seldom profitable, yet we do both. These are, in fact, ethical and aesthetic premises which underlie the economic system.'
>
> (Leopold, 1972, p. 156)

Furthermore,

> 'What conservation education must build is an ethical underpinning for land economics and a universal curiosity to understand the land mechanism. Conservation may then follow.'
>
> (Leopold, 1972, p. 157)

Leopold recognises the enormous power of the economic system to induce behaviour but unconvincingly rejects it in the context of environmental control. It is submitted that current financial institutions and related legislations do not provide channels for the expression of changed 'ethical and aesthetic premises' (an illustration of this assertion is presented in Example 4.2). Furthermore, desirable changes in tastes, preferences and ethics might span two or more generations. Many environmental problems demand immediate attention, thus sole reliance upon ethical or value changes to promote harmonious environmental interrelationships is an inadequate short to medium term prescription. Leopold's perceptive observations regarding the

power of the 'profit motive' demand further investigation in the context of environmental policy instruments.

3.3 Direct Controls : Prohibition and Regulation

> 'The most frequent response by the average layman who perceives the seriousness of environmental problems is to urge that the legislature pass a law forbidding or regulating polluting activities, and indeed this approach has characterised all major federal environmental legislation in the United States. Such a response is in keeping with a long American tradition of attempting to solve complex social problems through prohibitory legislation.'
>
> (Senecca and Taussig, 1979, pp.214-215)

Direct controls have been the mainstay of environmental policy in the United States and Western Europe. The analysis of South African environmental legislation reveals a similar reliance on these policy mechanisms. Direct controls have been termed a 'command and control approach to regulation' (Deland, 1980, p.147) and are generally divided into prohibitory and regulatory control (Senecca and Taussig, 1979, pp.212-213).

3.3.1 Prohibitory Legislation

Prohibition means outright legislative bans on various activities and can be permanent e.g. the prohibitions relating to contrivances capable of capturing or killing wild animals (see for example Section 19 of the Transvaal Ordinance), or temporary e.g. prohibition against the exploitation of specified living marine resources during closed seasons (see Section 13(1)(f) of the Sea Fisheries Act). Prohibitory legislation is invariably buttressed by the application of the criminal penalty as a primary or independent sanction e.g. the provision in the Prevention and Combating of Pollution by Oil Act No. 6 of 1981, whereby it is an offence for the master or owner of a ship, tanker or offshore installation to

discharge oil into South African territorial waters (see Section 2(1)).

3.3.2 Regulatory Legislation

Regulatory legislation incorporates numerous mechanisms for the control of problems spanning almost the entire gamut of environmental concerns. It is predominantly within this sphere of policy alternatives that South Africa, and other Western countries, have attempted to legislate for the control and regulation of environmental problems. Legislation in this category is prescriptive in that an input, process, procedure, result, output or interrelationship is prescribed. Regulatory legislation is supported by the application of the criminal penalty as both a primary and secondary sanction. The criminal sanction is used as a secondary or subsidiary sanction in instances where reliance for compliance with legislative precepts is placed primarily upon administrative control (e.g. the licensing and permit systems and the abatements notice procedure), the criminal penalty being invoked only if and when such administrative control fails (Fuggle and Rabie, 1983, p.45). The application of this method of control is illustrated with reference to the Atmospheric Pollution Prevention Act 45 of 1965 which provides that no person may operate a scheduled process unless he is the holder of a registration certificate (see Section 9(1)(a)(i)). The operation of a scheduled process without a registration certificate is an offence (see Section 9(2)).

3.3.3 The Criminal Sanction

The effectiveness of direct regulatory mechanisms are dependent upon the efficiency of administration monitoring and apprehension, enforcement and judicial functions. Compliance with direct controls is encouraged through the application of the criminal

sanction as either a primary or secondary sanction. Failures in the above functions would therefore detract from the efficacious application of direct controls.

3.3.3.1 The criminal sanction as a primary sanction

The application of the criminal sanction as a direct sanction means that the environmentally harmful activity is outlawed directly.

Achieving compliance with direct controls by means of the criminal sanction as primary sanction is problematical. The following is a list of contributory factors (Fuggle and Rabie, 1983, p.44):

1. The apprehension of offenders is often difficult (Malan, 1984).

2. The acquisition of adequate proof is often problematical.

3. Where a causal relationship is an element of the offence in question, establishment of causation is not always possible.

4. A problem with reliance solely on the criminal sanction is that the role of the administration is reduced to the collection of information against suspected offenders and ultimate control is left to the police, the prosecution and the courts. These institutions have little expertise in the sphere of environmental concerns (Rabie, 1984).

5. The criminal process is probably the most cumbersome and inefficient coercive tool available. The accused is protected in many ways: for example, the burden of proof and evidentiary requirements are very onerous and

present formidable standards which must be met in order to obtain a conviction. Another problem is that the information gathered by the investigating officer is often inadequate because, due to his lack of legal knowledge, the evidence obtained may be inadmissible or irrelevant.

6. A serious criticism relates to the inability of the criminal sanction to effectively deter environmentally detrimental activities due to the shortcomings in policing, prosecution and inadequate punitive measures.

7. Punitive measures are not remedial in that damage is not repaired.

3.3.3.2 The Criminal Sanction as a Subsidiary Sanction

The criminal sanction is employed as a secondary sanction where compliance is primarily sought within the domain of administrative procedure. The licence, permit and abatement notice systems make use of the criminal sanction's subsidiary role where the regulated activity is pursued without the required administrative registration or where the conditions of such registration are breached.

A number of salient observations are pertinent to the subsidiary role of the criminal sanction:

1. The proof of the crime is relatively easy, requiring evidence of pursuance of a specified activity without a licence or permit or disobeying an abatement notice.

2. The criminal sanction may be applied before the environmentally detrimental conduct has actually occurred, i.e. it is a preventative control.

3. Problems are, however, associated with the policing, and prosecution of contraventions of the conditions of licences and permits, the collection of acceptable and adequate proof of contravention is problematical, insufficient numbers of investigating officers are poorly trained and punitive measures are an inadequate disincentive.

3.3.4 Pervasive Comments

1. It is widely accepted that high costs and low efficiency are associated with regulation by means of administrative procedure and legal enforcement i.e. direct controls. Sources of government failure in South African environmental administration were reviewed in Section 2.5.2.

2. Business executive attitudes in the United States of America towards direct regulations have exhibited a number of interesting tendencies with possible lessons for South African legislators. These tendencies are clearly revealed by the independent surveys of senior executive perspectives on environmental protection conducted in the United States of America in 1969 (Diamond, 1970) and in 1974 (Kefalas and Carrol, 1976/1977). Aside from some stylistic changes in phraseology, the same questions were asked. Both surveys addressed a broad spectrum of industries.

   The first survey was undertaken during a period of heightened environmental awareness; immediately prior to the passing of the National Environmental Protection Act of 1969 and the establishment of the Environmental Protection Agency. The second survey was conducted in the wake of much environmental legislation,

almost entirely constituted of prohibition and direct regulation.

The general executive viewpoint to emerge from the second survey is best summed up in the words of one executive who stated:

> 'It has been discouraging during the past several years to see the sometimes unreasoning public panic over environmental deterioration and the subsequent insistence that corrective measures be undertaken immediately at any cost! The result was that legislators at all levels hastily enacted a myriad of control legislation, often without regard for technological abatement capability or cost. .... The discouraging part from my standpoint was that industry during this period, by accusation or implication, was usually painted as the villain of the peace while the accusers always seemed to wear the white hats!'
>
> (Kefalas and Carrol, 1976/1977, p.232)

It is apparent that the dearth of prohibitory and regulatory legislation had the undesirable affect of alienating the leaders of industry. The political and economic influence wielded by this interest group necessitates greater caution in the adoption of environmental policies resulting in these undesirable attitude changes.

The table below bears evidence to the dramatic turnabout in attitude of business leaders resulting from the spate of inadequately researched environmental policies in the United States in the early 1970's.

Table 3.1 : Survey Results

In the area of environmental protection, what would you like to see the federal government do? (Kefalas and Carrol, 1976/1977, p.232)

	1974 Study %	1969 Study %
Set up regulatory activities	10	57
Maintain status quo	29	29
Cut back regulatory activities	56	8
Not sure	5	6
	100%	100%

The shift away from executive preference for direct governmental regulation is illustrated in the following words of a respondent:

> 'Five or six years ago we recognised the need for greater environmental protection effort. We realised too that the government had to play a major role in bringing it about ... but we never quite anticipated what we got!'
>
> (Kefalas and Carrol, 1976/1977, p.232)

The 1974 survey went on to canvas executive viewpoint regarding their selection of policy mechanisms most likely to facilitate effective environmental protection. These results are discussed in Section 4.3.1.

3. Economists have long argued the relative inefficiency of direct regulatory mechanisms when compared to market solutions. This simplistic claim is analysed further in the context of the particular environmental concern in later chapters.

4. Economists such as Charles Schultze, Chairman

of the President's Council of Economic Advisors, have long argued that economic incentives and disincentives are more likely to encourage business participation and innovation that are the seemingly arbitrary dictates of bureaucracy (Deland, 1980, p. 146).

This viewpoint is further explored by Wallich and McGowan who assert that financial legislation in the sphere of environmental concern would be helpful 'to the extent that management is looking not so much for guidance as to what it should be doing, but for an economic justification of what it already wants to do on compassionate or other grounds' (in Ferrar, 1974, p. 233). This assertion is intuitively appealing, assuming information pertaining to the nature and impact of environmental problems is well researched and effectively disseminated. In many spheres of environmental concern, e.g. air pollution, it is submitted that executives are only partially aware of the nature and impacts of environmental degradation. A data collection and information dissemination campaign is essential to stimulate the concern and involvement of economic decision makers and would stimulate greater demand for incentive based environmental policies.

3.4 Economic Approaches

It is apparent that environmental concerns are acute and must be addressed by government to prevent an unacceptable decline in the quality of life and, indeed, the preservation of society. A recent IUCN research paper alerts policy makers and environmentalists to consider the full range of policy alternatives:

> 'The role of government is almost always seen in the context of regulation, the establishing of some sort of adminstrative mechanism to enforce, allocate, and suggest further limitations - all designed to reduce the magnitude of a problem to acceptabel levels .... But regulation too narrowly conceived is also not likely to produce the degree of amelioration of environmental problems that many deem necessary. The literature is full of criticism of environmental control programs which it is claimed have not worked effectively.'
>
> (Delogu, 1976, p. 9)

Blackman and Baumol concisely articulate this criticism:

> 'The slow pace and occasional outright failure of the regulatory approach (along with the high cost of the traditional approaches) have led environmental authorities to investigate and to begin programs which employ pricing incentives ....'
>
> (Blackman and Baumol, 1980, p. 418)

A review of recent environmental and economic literature reveals a burgeoning interest and research into financial or economic policy alternatives for the control of environmental problems. The upsurge in the search for alternative policy mechanisms has resulted in a number of innovative programs being initiated and implemented in the United States of America, e.g. the 'Bubble' concept and Emissions Offset Policy introduced by the Environmental Protection Agency in 1979 (see Blackman and Baumol, 1980, pp. 418-430).

The economic explanation for environmental problems and the prescription of alternative policy mechanisms is not an exclusively recent phenomenon, e.g. Pigou published 'The Economics of Welfare' in 1930. It did not, however, achieve much prominence in economics prior to the mid 1960's, e.g. Coase's famous article (1960, pp. 1-14), and it is only very recently that a number of innovative market orientated policies have been suggested, e.g. various state pollution control and economic development

agencies in the U.S.A. have developed proposals for a market in pollution rights (see for example Washington Post, 1980 and Martin, 1978, pp. 1,24).

The expansion of the traditional analytical framework from pollution control to all the other spheres of environmental concern, e.g. land use planning (see Chapter 6), has resulted in numerous revelations regarding the interaction between financial legislation, and environmentally relevant attitudes and behaviour. In addition, many viable and well motivated financial policy recommendations have been forthcoming in almost every sphere of environmental concern. A number of such suggestions have been implemented. This report aims to introduce some of these promising possibilities.

Despite the exciting possibilities exhibited by financial policy alternatives

> 'It is certainly not feasible, and probably not even desirable at this point, to scrap the entire regulatory structure of environmental policy (with its nearly exclusive reliance upon direct controls) hoping to start anew with a program based entirely on market orientated policy instruments.'
>
> (Blackman and Baumol, 1980, p. 417)

A number of other authors have similarly concluded that complete dismantling of the current regulatory structure is not feasible (see for example, Rose-Ackerman, 1977, p. 403).

Blackman and Baumol recommend the gradual introduction of well researched market orientated policies.

> 'It does seem clear ... that economic incentives can gradually be grafted onto our environmental programs.'
>
> (1980, p. 417)

The urgency required for consideration of market mechanisms is powerfully stated in a recent IUCN research paper:

> 'The tax and fiscal policies of nations generally reflect the dominant political, economic and social pressures of the day. Certainly that is the case today in the industrialized countries of the West. We have pursued laissez-faire, growth orientated economic policies which require the exploitation of resources. Our industries are not above the taking of governmental subsidies, usually hidden, particularly if they can be labelled 'incentives', 'depreciation'. 'investment credits' or 'depletion allowances'. At the same time we have spurned the imposition of those penalty and pollution taxes that have real effect, that would impede not only the increase and spread of pollution and other environmentally harmful conduct, but also the processes of unrestrained growth. We bear stoically the hidden but growing costs - the social costs of polluted air and water, ravaged landscapes, and depleted, often mis-used, resources.'
>
> (Delogu, 1976, p. 26)

Delogu argues the need for immediate rectification of the anomalies in current financial legislation (e.g. incentives for resource exploitation) in order to facilitate the achievement of environmental related objectives. Thereafter, he suggests, a gradual implementation of complementary fiscal and tax measures is necessary for the efficient control of environmental problems.

Recent Reports submitted by the Planning Committee of the President's Council on Priorities between Conservation and Development (1984) and on Nature Conservation in South Africa reveal a growing awareness of the need to consider financial incentives in the control of environmental problems in South Africa. Environmentalists and conservation organisations argued in favour of tax concessions to promote specific activities, e.g.

> 'The Wildlife Society of Southern Africa pointed out that in the conservation sphere funds are needed .... The private sector should be encouraged to contribute as far as possible .... Tax concessions ought to be granted on such contributions, while companies which engage in

> environmental education and research and pollution prevention in their operations ought to be assisted financially.
>
> (In Report of the Planning Committee of the President's Council, 1984a, pp. 27-28)

A number of witnesses said that there is at present no financial incentive for a land owner to set aside land for the conservation of nature or an aesthetically pleasing landscape, nor are donations or bequests to conservation, of money or land, deductible for tax purposes.

They suggest that if donations or bequests to conservation projects were tax deductible, there would be appreciably greater support from the private sector. Other witnesses suggested direct financial assistance for nature conservation action in the form of subsidies or low interest loans for capital works such as fencing. (Report of the Planning Committee of the President's Council, 1984b, p. 107)

These submissions are ignorant of incentives and disincentives in current legislation (e.g. Section 56(1)(h) of The Income Tax Act No. 58 of 1962 provides an exemption for donations to a company, society or association whose sole or principle object is to engage in or promote nature conservation or animal protection activities - see Section 6.5.3.2. In addition existing legislation needs to be reviewed with a view to identifying anomalies in current South African financial legislation when viewed in the context of environmental objectives. A further problem with this bland recommendation is the apparent ignorance of the complexity and diversity of financial legislation and pricing policies with environmental significance. The complete range of fiscal, monetary and pricing policies need to be considered rather than merely 'tax concessions'.

Sections 3.4.1 and 3.4.3 aim to introduce the categories

of economic incentives. These incentives are reviewed in greater detail in Sections 4.2 - 4.3.

3.4.1 Monetary and Exchange Rate Measures

Various economic objectives can be pursued by way of monetary or exchange rate measures, e.g. investment levels, inflation, etc.

> 'Monetary policy refers to actions taken by ... (monetary authorities) in order to change the equilibrium of the money market, that is, to alter the money supply, move interest rates or both.'
>
> (Baumol and Blinder, 1979, p.229)

With regard to environmental concerns monetary and exchange rate measures are blunt policy instruments. Changes in monetary and exchange rate policy impact the economy broadly and is an effective measure for regulating aggregate demand, e.g. investment, consumption and saving.

3.4.2 Fiscal Policy

Fiscal policy is defined to be:

> 'That part of government policy which is concerned with raising revenue through taxation and other means and deciding on the level and pattern of expenditure.'
>
> (The Penguin Dictionary of Economics, 1983)

The circular flow of expenditure and income in Figure 3.1 illustrates, very simply, the flow of economic activity within the economy (excluding imports and exports) and the parameters of fiscal policy.

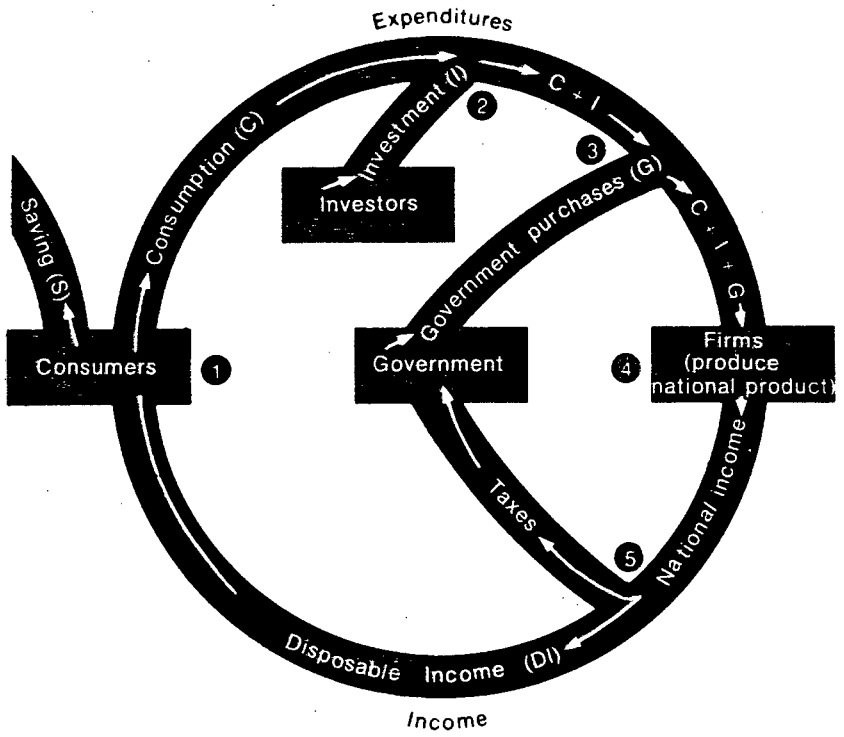


FIGURE 3.1 : The Circular Flow of Expenditure and Income

Taxes and transfer payments are the most important fiscal policy tools for environmental control. Government transfer payments are sums of money that certain individuals receive as outright grants from the government rather than as payment for services rendered to employers e.g. cash grants, subsidies, old age pensions, etc. (The Penguin Dictionary of Economics, 1983, and Baumol and Blinder, 1979, p. 182.)

These policy measures can be extremely specific, e.g. subsidies for the purchase of new air pollution control equipment in foundries. These policies are potentially cost effective. A detailed review of alternative tax and transfer payment policy mechanisms is presented in Sections 4.2 - 4.3.

James and Nobes (1978, pp. 7-8) have identified an additional revenue source for government, namely

charging for goods and services provided, obviously excluding public goods.

The South African public sector has engaged and still engages in many economic activities which can be regarded as commercial enterprise.

> 'Beginning with the establishment and growth of the Iron and Steel Industrial Corporation in the 1930's there has been an increasing number of industrial establishments wholly or partly State-owned. Much of this has come about through the Industrial Development Corporation .... The Industrial Development Corporation has built up a very substantial industrial empire .... '
>
> (Houghton, 1976, p. 205)

The public and quasi-public sections, including central government and provincial administrations, roads, railways, harbours, airways, electricity, other manufacturing enterprise, etc., add up to a considerable portion of the national economy.

> 'Moreover many of these quasi-public concerns, like Iscor, are expanding their operations by ploughing back their profits, so that there is a measure of self-generated expansion in the activities of the public sector.'
>
> (Houghton, 1976, p. 206)

The growth of the public and quasi-public sector presents a difficulty in the selection of appropriate environmental policy mechanisims as government is, in many instances, exempt from legislative provisions, e.g. Sections 10(1)(a) and (b) of the Income Tax Act No. 58 of 1962 exempts Government (including government corporations) and local authorities' revenues from taxation. The activities of these public utility corporations have enormous environmental significance. As a result

of pricing policies current government initiatives to 'privatise' (Horwood, 1984) these public corporations (e.g. SASOL) will do much to facilitate the selection and application of effective policies to control environmental impacts. Pricing policies of public utilities are briefly reviewed in Sections 6.2.2 and 6.5.1.2.

3.4.3 Market Mechanisms

> 'As social regulation has grown so has the volume of protest from regulated industry. The search for alternative regulatory schemes is the search for a way to make regulation less burdensome on business - without reducing benefits to the public (Clark, 1979, p. 1316).'

Fiscal incentives are frequently discussed in the context of market incentives. This is understandable as fiscal incentives frequently operate through the medium of the market e.g. tax allowances for investments in pollution equipment encourage greater demand for such equipment on the capital investment market. The presumption is that industry or the public make economically rational decisions. The job of the regulators is to make sure that wise economic decisions are also in the public interest.

Besides the environmental policy proposals which operate through the efficient mechanism of existing markets, suggestions and experimentation with the creation of new markets for environmental control are increasing. Blackman and Baumol (1980, p. 418) point out that an ongoing investigation of the creation of actual market systems is part of the EPA regulatory strategy agenda. In the instance of air pollution control, the current 'emissions offset' and 'offset banking' policies provide concrete evidence of these investigations and their practical implementation (see Tandle,

1978, pp. 21-29, and Blackman and Baumol, 1980, pp. 417-431).

The creation of new markets for the regulation of environmental problems demands innovation in policy drafting. It is the most radical departure from traditional regulatory approaches in that new rights need to be specified, allocated and the rules of the market defined. Experience gained in other countries with the creation of markets for environmental control should be continuously monitored and reviewed in the light of South African legal tradition and socio-economic peculiarities.

3.5 A Brief Introduction to South African Revenue Law

3.5.1 The Relevant Statutes

Income tax is levied annually. The main statute is the Income Tax Act No. 58 of 1962, with annual statutes making minor amendments but, more importantly, setting out the rates of tax for the ensuing year and stating how much money is to be spent by making allocations to departments of government. The annual budget is the mechanism utilised for these purposes. It must be noted that the railways and post office are financed separately.

A number of additional relevant statutes provide sources of revenue to government. These are:

- the Customs and Excise Act No. 91 of 1964 which provides for the imposition of levies and the control of imports;
- the Transfer Duty Act No. 40 of 1949 which provides for transfer duty on land;
- The Stamps Duty Act No. 77 of 1968 which provides for stamp duty on documents;

- the Estate Duty Act No. 45 of 1955 which provides for estate duty on the property of deceased persons;

- the Sales Tax Act No. 103 of 1979 which provides for indirect taxation in the form of sales tax.

All the above statutes relate to central government. Provincial and local governments need finance, and though they receive grants from the central treasury, they also impose taxes, notably rates on property.

3.5.2 Revenue Statistics and Current Concerns

Reference to financial legislation in this report relates primarily to the Income Tax Act No. 58 of 1962. This Act is afforded central consideration as it is of considerable importance in earning government revenue (see Table 3.2 below) and displays great specificity and flexibility in promoting various objectives. The increasing importance in the contribution of indirect taxation, in particular general sales tax, to government revenues also deserves particular mention (see Section 3.7.2 and Table 3.2 below). The General Sales Tax Act No. 103 of 1979, whilst contributing an increasing proportion of government revenues, does not reflect a promotion of the diversity of economic and social objectives characteristic of The Income Tax Act No. 58 of 1962 (see Section 3.7.2).

TABLE 3.2 : SOURCES OF GOVERNMENT REVENUE (In Statistic/Economic Review, 1984, p. 28)

(R millions)

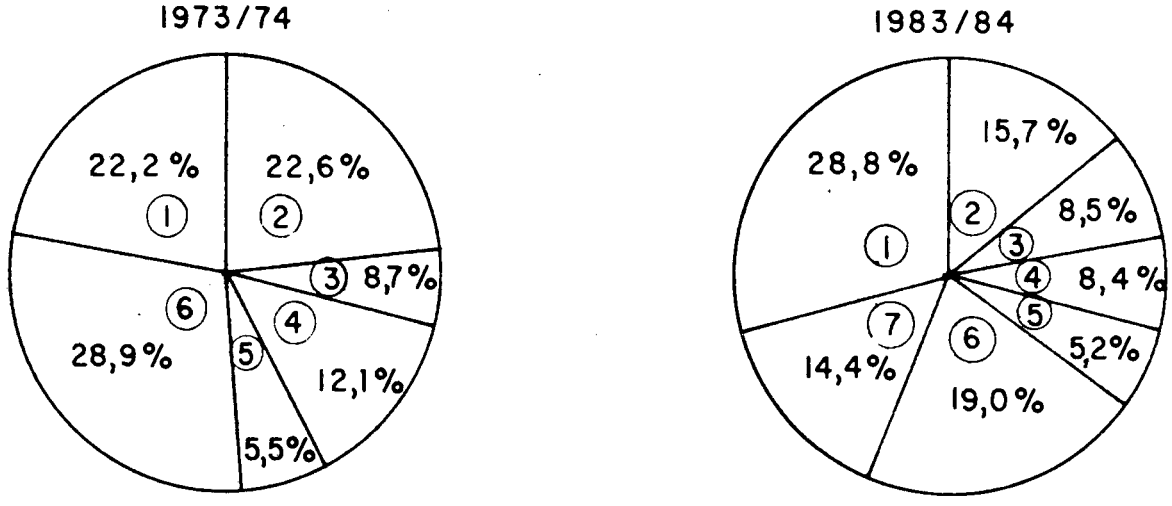
Source of Revenue	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85 Estimates
Customs and Excise:						
Customs duty	453,0	735,8	1 082,1	890,5	1 051,0	1 125,0
Surcharge	250,6	-2,8	100,4	598,3	229,0	-
Excise duty	1 013,8	1 243,2	1 503,0	1 624,9	1 695,0	1 770,0
Miscellaneous	23,0	47,4	50,9	68,3	75,0	80,0
	1 740,4	2 023,6	2 736,4	3 182,0	3 050,0	2 975,0
Less: SWA: Central Revenue Fund	44,5	41,5	257,9	250,0	250,0	250,0
Customs Union Agreement	402,5	504,9	475,4	655,9	907,0	1 089,0
Total: Customs and Excise	1 293,4	1 477,2	2 003,1	2 276,1	1 893,0	1 636,0
Inland Revenue						
Income Tax						
Companies (other than mining)	1 833,1	2 417,6	3 121,6	3 662,3	3 225,0	2 900,0[3]
Individuals	1 944,2	2 090,9	3 163,9	4 288,0	5 750,0	7 265,0[3]
Gold mines	1 167,3	2 794,8	1 542,1	1 278,2	1 725,0	1 400,0
Other mines	282,6	211,6	104,9	200,0	147,5	203,0[3]
General sales tax	1 248,7	1 653,1	2 116,2	3 183,5	3 850,0	5 010,0[3]
Gold mining leases	334,3	838,2	589,2	367,8	512,0	385,5
Non-resident shareholders' tax	161,5	296,6	323,3	245,4	260,0	260,0
Stamp duties and fees	123,6	137,5	144,1	147,8	200,0	220,0
Transfer duty	89,4	153,9	171,5	190,7	310,0	340,0
Estate duty	57,9	61,3	66,8	85,3	85,0	90,0
Interest and dividends	662,3	571,8	501,2	571,8	515,7	503,4
Other	589,2	605,8	568,4	676,1	575,1	548,1
Total: Inland Revenue[2]	8 494,1	11 833,1	12 413,2	14 896,9	17 155,3	19 125,0
Standing allocations	416,1	448,0	477,2	483,6	487,6	496,8
Total Revenue	10 203,6	13 758,3	14 893,5	17 656,6	19 535,9	21 257,8
Direct taxes	5 415,2	7 833,2	8 281,7	9 708,8	11 145,0	12 067,0
Indirect taxes	3 215,2	3 923,8	4 953,2	6 332,9	6 805,8	7 772,8
Miscellaneous	1 573,2	2 001,3	1 658,6	1 614,9	1 585,1	1 418,0

Source: Department of Finance

[1] Excluding standing allocations of revenue
[2] Excluding standing allocations of revenue and loan levy
[3] Excluding amount payable to TBVC countries and self-governing National States

The above statistics reveal the declining proportion of revenue contributed by companies. In real terms corporate tax revenues have actually declined between 1979/1980 and 1984/1985, while the individual tax burden has increased dramatically in the same period. The pie chart below illustrates these changing relative revenue sources.

FIGURE 3.2 : Pie Chart indicating Sources of Government Revenue



1) Income Tax on Individuals
2) Income Tax on Companies
3) Income Tax on Gold Mines
4) Excise Duty
5) Customs Duty
6) General Sales Tax
7) Other Income

It is also interesting to note the introduction of general sales tax, an indirect form of taxation (see Concepts, Section 3.5.1).

An investigation of the reasons for these changing revenue statistics is important for the appreciation of current government taxation concerns.

Various income tax incentives, particularly those aimed at the stimulation of economic growth in general and the promotion of export competitiveness in particular (Statistical Economic Review, 1984, p. 30), have contributed to a marked reduction in corporate taxation payments. Kingon (1984) suggests that the tax incentives have 'milked the cow dry'. Table 3.2 indicates the quantity of taxation revenue forgone as a result of specific fiscal incentives provided through the income tax system.

TABLE 3.3 : TAX FORGONE BY WAY OF INCENTIVE ALLOWANCES

(Statistical/Economic Review, 1984, p. 30)

1980/81 (R millions)

Type of incentive	Tax foregone[1]/Belasting prysgegee[1]		
	Companies Maatskappye	% Share of total company tax (excluding mining) % Bydrae van totale maatskappye-belasting (mynbou uitgesluit)	Individuals Individue
Machinery investment allowance	443,52	18,3	0,30
Machinery initial allowance	379,26	15,7	0,28
Industrial building investment allowance	18,48	0,8	0,08
2% Industrial building allowance	14,70	0,6	0,01
Decentralisation benefits	9,24	0,4	0,004
Hotel grading allowance	5,04	0,2	0,0006
Exporters allowance	73,50	3,0	0,31
Training allowance	32,34	1,3	0,006
Total	976,08	40,3	0,9906

Source: Department of Finance

[1] Excluding tax foregone as a result of LIFO adjustments or reductions relating to certain types of lease transactions.

It is submitted that the above estimates, particularly in the case of capital investment allowances are conservative (Kruger, 1984). The Report by the Standing Commission of Enquiry on the System of Initial and Investment Allowances (see Chapter 4.2.2.2) estimated considerably higher revenue losses which, even then, were considered to 'underestimate the true position because coverage of leaverage lease transactions ... (are) incomplete (1983, p. 5). The inability of government to accurately quantify revenue losses due to those allowances exemplifies the administrative difficulties associated with the monitoring and control of such incentives.

3.5.3 Implications for Environmental Policy Alternatives

Complete unanimity of opinion was obtained from senior Inland Revenue officials (Kingon; Kruger; Schweppenhauser, 1984) regarding financial incentives for the promotion of environmental control. The current fiscal concern with revenue forgone as a result of taxation allowances is certain to prejudice even well motivated applications for the creation of additional allowances or the extension of existing allowances for environmental concerns. A favourable change in taxation 'policy' is not envisaged in the near future. The proposed 'phasing out' of the investment allowance for machinery and equipment (The Income Tax Act, Section 13(5)), as recommended by The Standing Commission on Taxation Policy (1983, p. 19), together with more restrictive qualification conditions for other incentive allowances (e.g. 1984 amendments to the training allowance, Section 11 Sept of The Income Tax Act), bear evidence to the 'tightening up' of incentives allowances.

The recommended strategy to emerge from this

review is that:

1. Applications for financial concessions to environmental activities should request subsidies, which would be administered by the appropriate government department, rather than pursue the avenue of taxation allowances.

2. Existing Revenue Law, the Income Tax Act, No. 58 of 1962, in particular, should be reviewed with the objective of exposing provisions and devising schemes that help promote desirable activities. It is submitted that environmentalists have afforded insufficient attention to the possibilities that currently exist. An example of such an analysis is presented in Chapter 6.

3. The identification of disincentives in Revenue Law and undesirable pricing policies need to be identified (e.g. Sections 5.3.3.1 and 6.2.2). It may well be easier to motivate amendments to the legislation for disincentives if revenue implications are favourable for governement.

4. Innovative schemes need to be devised, in conjunction with affected parties, so as to win co-operation of participants and satisfy and address, as far as possible, the respective concerns and financial objections. Innovative environmental protection policies in the United States and Canada provide useful reference (e.g. Section 6.2.3).

3.6 Taxation and Related Concepts

The definition to be adopted for taxation is broad:

> 'A tax is a compulsory levy made by public authorities for which nothing is received directly in return .... Taxes are, therefore, transfers of money to the public sector, but they exclude loan transactions and direct payments for publicly produced goods and services.
>
> (James and Nobes, 1978, p. 11)

The term 'tax policy' to be used throughout this report is intended to suggest a wide range of possible governmental actions, e.g. an emissions tax, a throughput tax, tax deductions and exemptions.

3.6.1 General Concepts

Economists frequently divide taxes into two broad, far from clear cut, categories; direct taxes and indirect taxes. Direct taxation is a tax on individuals or companies which is paid directly by them or their employer to Inland Revenue. In general, direct taxation is levied on wealth and income whilst indirect taxes are levied on goods and services (see Musgrave, 1969, pp. 173-176). General sales tax, customs and excise taxes and property tax are the most important indirect taxes in South Africa.

3.6.1.1 Equity in Taxation

> 'The importance of fairness in taxation rests particularly in the natural desire of the governors and governed for justice .... Practical problems arise if the taxation system is perceived to be unjust. At extremes, such cataclysmic events as the French and American Revolutions were partly due to perceived inequity in taxation. Less dramatic, but nevertheless important, is the tendency for evasion and other forms of taxpayer resistance to increase under systems which are perceived to be seriously unfair.'
>
> (James and Nobes, 1978, pp. 74-75)

There are three distinct concepts of tax equity.

1. Horizontal equity is the notion that equally situated individuals should be taxed equally (Baumol and Blinder,1979, p. 631). The problem associated with this concept is the definition of 'equally situated'. It is reasonable to suggest that no two tax paying entities are equally situated.

   Property rates provide an illustration of the difficulty in applying the horizontal equity principle. It is submitted that property rates, which are computed from the rateable value, do not reflect the relative costs of providing services to the respective properties or their occupants, nor do such charges reflect the relative benefits derived from the provision of such services.

2. Vertical equity refers to the notion that differently situated individuals should be taxed in a way that society deems to be fair (Baumol and Blinder,1979, p. 632). This equity concept is often discussed as the ability-to-pay principle (James and Nobes, 1978, p. 77). The ability-to-pay principle refers to the idea that people with greater ability to pay taxes should pay higher taxes (Baumol and Blinder,1979, p. 632).

   A problem exists in that a number of alternative income tax plans, all based on the ability-to-pay concept of vertical equity, could have widely differing distributive consequences.

TABLE 3.4 : THREE ALTERNATIVE INCOME TAX PLANS

	TAX PAYMENTS (AVERAGE TAX RATE)		
INCOME (R)	PLAN 1	PLAN 2	PLAN 3
1 000	50 (5%)	100 (10%)	200 (20%)
10 000	1 000 (10%)	1 000 (10%)	1 000 (10%)
100 000	20 000 (20%)	10 000 (10%)	5 000 (5%)

Plan 1 reflects a progressive tax system which exhibits an increasing average rate of taxation for increasing incomes. South African income tax on individuals is progressive.

Plan 2 is referred to as a proportional tax system where a constant average rate of taxation is levied on all incomes. The corporate tax rate in South Africa is constant i.e. proportional to taxable income.

Plan 3 is described as regressive because of a decreasing average tax rate. Many environmental tax proposals are criticised for reflecting regressive taxation implications.

Most people would reject Plan 3 as being vertically inequitable, however, much debate surrounds the relative merits of Plans 1 and 2.

3. The benefits principle of taxation, which is often applied when the proceeds from certain taxes are earmarked for specific public services, holds that people who derive the benefits from the service should pay the taxes that finance it. (Baumol and Blinder, 1979, p. 633).

This concept often results in a violation of the vertical equity principle. A useful illustration of this principle is provided by a tax on petroleum

which is earmarked for the maintenance and construction of roads. The tax paid is clearly a function of the benefit derived from the use of the road, but the tax burden is unlikely to coincide with ability-to-pay.

A specific sales tax levied on amenities provided in natural areas or nature reserves would also reflect these concerns. The enjoyment of the amenity attracts the tax, but does not ensure vertical equity.

It is important to investigate the equity implications of environmental policy proposals. Convincing arguments demonstrating the superiority of specific policies frequently fail to address the equity consideration. The exact quantification of equity impacts are extremely difficult to research. Most researchers agree that emissions taxes, throughput taxes and indeed, the majority of 'environmental' taxes are regressive (see Dorfman and Snow, 1975, pp. 101-114).

Lecomber and Fisher (1978, pp. 27-36) feel, however, that the assumption of regressivity is unfounded as:

1. The direct distributional impact is by no means unfavourable. Although many taxes, proposed by economists and environmentalists, are regressive, the package as a whole is approximately neutral.

2. The revenue from the proposed taxes may be used to provide greater benefits for the poor or the tax structure made more progressive if this is desired.

3. If greater progressiveness is difficult to achieve, this probably reflects an aversion to

to greater equality on the part of influential sections of the electorate.

3.6.1.2 Positive and Negative Incentives

It is important at the outset to distinguish between affirmative or positive incentive tax laws and so called negative incentives (penalty or pollution taxes).

> '(Positive incentives) ... are intended to stimulate individual or corporate ... expenditures by granting some form of remission or reduction of taxes that would otherwise be due; the ... negative incentives impose a direct fee or charge on conduct or pollutant emissions or resource usage deemed harmful.'
>
> (Delogu, 1976, p. 11)

Delogu argues that positive tax incentives amount to hidden government expenditure or indirect subsidies. The label 'pollution control tax incentives' is merely a euphemism - a way in which corporate polluters ... can hide the fact that clean up costs, which they should be paying in large part, cost which they heretofore avoided, but can no longer avoid, are instead being paid in large part by public funds' (Delogu, 1976, p. 11). Although some argue that government should not subsidize (directly or indirectly) industry clean up (e.g. Lecomber, 1978, pp. 8-9), as this approach is not as economically efficient, others express the pragmatic viewpoint that:

> 'A point has been reached in history when we must shape our actions throughout the world with a more prudent care for their environmental consequences ...'
>
> To achieve this environmental goal will demand the acceptance of responsibility by citizens and communities and by enterprise and institutions at every level,

> all sharing equitably in common efforts.'
>
> (United Nations Conference on the Human Environment, 1972, p. 18)

This statement reveals a recognition of the need for a joint public-private response to environmental problems.

The joint action called for in the 1972 Stockholm conference is supported by Delogu in an important IUCN research paper:

> '... there is nothing to prevent a coupling of direct taxation ... with a program of direct subsidies. Subsidies need not be open to all.'
>
> (1976, p. 14)

This preference for direct subsidies '... undertaken directly through the process of legislative appropriation, not indirectly and in the largely hidden form of ... pollution control tax incentives' (Delogu, 1976, p. 11) is perfectly consistent with current fiscal concern, as revealed in Section 3.5.3.

The negative incentives (e.g. residuals tax, and resource depletion tax) have been strongly recommended by economists as potentially effective environmental control policies - the relative advantages of negative incentives have been well explored in the economic literature (see Sections 4.2.3.2 and 5.3.3.2). Negative incentives may be regarded as:

> '... a tax (usually) introduced with the primary purpose of discouraging, to as great a degree as possible, an environmentally undesirable course of action.
>
> (Forster, 1976, p. 133)

If the charge is set too low negative incentives may justifiably be described as 'licences to pollute' (Delogu, 1976, p. 11) and a danger exists that the environment could be regarded as 'raw materials, which can be bought at a price' (Forster, 1976, p. 134).

The viewpoint to be adopted in this report is that the present government centred approach to environmental control needs to be extended to facilitate greater private sector involvement. Furthermore, both negative and positive incentives need to be considered with a view to investigate policies that improve government administration and make greater use of the advantages offered by market mechanisms.

3.7 Introduction to Specific Taxation Legislation

This section aims to briefly introduce the reader to the two Acts specifically identified in Section 3.5.2. namely the Income Tax Act No. 58 of 1962 and the General Sales Tax Act No. 103 of 1979.

3.7.1 The Income Tax Act No. 58 of 1962

The Income Tax Act contains provisions for the levying of five different kinds of tax. These are:

1. Normal Tax

Normal Tax is a tax levied on all persons (individuals and companies) having taxable income. The logical sequence for computing taxable income is presented as follows (Huxham and Haupt, 1984, p. 4; Meyerowitz and Spiro, 1984, p. 33; Silke, Divaris and Stein, 1982, p. 9):

	Gross Income (Section 1)	XXX
LESS:	Exempt Income (Section 10)	XX
	INCOME	XXX
LESS:	Deductions (Mainly Sections 11-19 & 33)	XX
	TAXABLE INCOME	XX

Company normal tax is computed on the amount of taxable income. Individuals may deduct rebates (Section 6) from the tax, per tax tables, computed on the taxable income figure, including a 20% surcharge imposed for unmarried taxpayers.

South African Normal Taxation is the most important source of government taxation revenue. The provisions dealing with normal taxation affect every sphere of economic activity, e.g. mining, farming, land development. Many of the activities, investments or institutions encouraged or discouraged by the various provisions have profound physical and ethical implications when viewed from the perspective of environmental concern. The following chapters investigate these environmental dimensions in greater detail and in the context of the particular environmental concern.

2. Undistributed Profits Tax (UPT) : Sections 48-53

This is not a tax on income. It is a complex computation resulting in a distributable balance, (Section 48(1)) which is taxed at $33^{1}/_{3}$% (Section 48(1)(b)) to encourage companies to pay dividends (Silke, Divaris and Stein, 1982, p. 3).

Numerous companies are exempt from paying UPT (Section 50(a)-(i)) and ploughback provisions reduce the potentially broad implications of the UPT computation.

> '... It is apparent that, because of the ploughback allowance ..., companies are generally liable for UPT only on part of their dividend income to the extent that dividends are not paid out by the company.
>
> (Huxham & Haupt, 1984, p. 166)

UPT does not constitute a significant component of tax revenue and offers little potential in the sphere of environmental policy. However, observations with regard to allowable deductions reveal encouragement of resource exploitation (Section 49, prospecting allowance) and possible resource wastage (Section 49, which only allows a deduction for new plant and machinery purchased). Section 50(b) exempts certain mining companies from UPT thereby favouring the exploitation of virgin minerals.

3. Non-Resident Shareholder Tax (NRST) : Sections 41 - 47

This is a withholding tax (withheld by the company paying the tax) levied at a flat rate of 15%, on all dividends paid by a South African company to shareholders who are neither resident, nor carrying on business, in the Republic (Huxham & Haupt, 1984, p. 3).

This source of revenue, apparently innocuous from an environmental point of view, raises a number of ethical concerns. The non-resident shareholder who derives economic benefit from a distant land, with unfamiliar resources and environmental components, often represents the extreme case of man's alienation from the natural environment. The physical distancing of the proprietor and the multinational corporation is likely to predispose the non-resident decision maker to a utilitarian ethic. The credibility of this suggestion is intuitively

enhanced when the non-resident operates in third world or less developed countries where investments are frequently regarded as attaching high risk and uncertainty. The investor adopts a short time horizon in response to such uncertainty.

The growth of multinational and diversified business and the distancing of the corporate decision maker from local, regional and even national environmental issues must be appreciated in policy formulation. It is, unfortunately, unlikely that environmental ethics or individual tastes and preferences will influence highly professional corporate decision makers. It is particularly important to provide financial avenues for rational financial decision making consistent with environmental objectives for this class of entrepreneur.

4. Non-Residents Tax on Interest (NRTI) : Section 64A-64F

Similar to NRST, NRTI is a withholding tax and is levied at a flat rate of 10% on any interest paid by a South African debtor to a creditor who is not resident in the Republic. The concerns raised with NRST have relevance for NRTI.

5. Donations Tax (S 54 - S 64)

Donations Tax is payable by persons, other than public companies, who are ordinarily resident in the Republic. Private, domestic companies are liable for donations tax (Section 54), however, companies recognised as being public (Section 38) are exempt. It imposes a tax on persons who may want to donate their assets to avoid normal income tax and estate duty (Huxham and Haupt, 1984, p. 285).

Exempt Donations

Section 56 provides relief in respect of particular donations of which the following provision is of particular interest:

Section 56(1)(h) provides that:

> Donations tax shall not be payable in respect of the value of any property which is disposed of under a donation by or to any person (including any government), referred to in paragraph (a), (b), (cA), (cC), (cD), (cE), (d) or (e) of Subsection 1 of Section 10.

The person referred to would include:

a - Government, including the railway administration, the adminstration of the territory, and any provincial administration or of any other state;

b - local authorities;

cA - certain institutions, boards or bodies (other than companies or co-operative societies) that, as their sole or as one of their principal objectives, conduct scientific, technical or individual research, provide certain commodities, amenities or services to the State or general public or promote commerce, industry or agriculture; and certain South African companies all of the shares in which (i.e. a wholly owned subsidiary) are held by any such institutions, boards or bodies (Silke, Divaris and Stein, 1982, p. 1370);

cB - certain companies, societies or associations that, as their sole or principal object, conduct or promote scientific, technical or industrial research ... engage in or promote nature conservation or animal protection activities, provide social or recreational ameni-

ties or facilities for their members or promote the common interests of a particular business or occupation (Silke, Divaris and Stein, 1982, p. 1370) and

cC, cD, cE, d and e, which are not of direct relevance to the concerns of this report.

The above provisions do not constitute positive incentives but merely exempt the donee from donations tax imposed where property is gratuitously disposed. No taxation benefit accrues to the donor and he is not financially prejudiced as a result of this disposition. In situations where, as a result of the exempted donation, the donor's financial position is relatively improved the above exemptions may be termed positive incentives by default. Such a situation is envisaged where the donee reduces estate duty as levied by the Estate Duty Act No. 45 of 1955. This possibility is investigated further in Chapter 6.

The term property includes limited interests in property. The State President may make regulations prescribing the method of valuation of annuities, fiduciary, usufructuary or other limited interests in property (Section 107(1)(d)). No regulations have been promulgated, but in practice the valuation for donations tax (Section 62) is the same as that used for the valuation of limited interests for estate duty (Estate Duty Act, Section 5(1).

Full ownership in property consists of the right to ownership (bare dominium) and the right of use (usufruct).

3.7.2 The General Sales Tax Act No. 103 of 1978

General Sales Tax (GST) is an indirect form of taxation. The sales tax is essentially a tax on transactions (Juta's GST, 1984, p.1-1), although not all transactions attract the tax. Taxable transactions give rise to 'taxable values' on which the tax is payable. A system of exemptions has the effect of suspending the imposition of the tax until a transaction with an end user is concluded. The vendor, i.e. the person dealing with the end user, usually recovers the tax and pays it over to Inland Revenue. The rate at which sales tax is levied is specified in Section 5(1).

Some of the exemptions on specific goods, sold to registered vendors and used in the enterprise for the purpose for which that enterprise is registered, reveal certain comparative advantages extended to specific industries (see Section 6 and Schedules 1 - 6). The exemptions provided to mining and quarry enterprises (Schedule 2, Divisions III and IIIA) for goods and services used or performed directly for the purpose of breaking rock, explosives and explosive requisites, ore dressing/treatment, etc. further contribute to the financial advantages (see Sections 5.3.3.1 and 5.3.1) to these operations. Farming enterprises attract particularly generous exemptions, including environmentally relevant items such as insecticides, fungicides, herbicides and rodenticides (see Schedule 2, Divisions IV and IVA). Many construction acitivities, including land draining and reclamation, the excavation of stone, soil and other material, etc., are similarly exempt (see Schedule 3).

Many of the exempt activities have potential significance in the context of environmental impact.

The advantages extended to these activities frequently complement other tax advantages extended in The Income Tax Act e.g. mining (e.g. Section 5.3.1). This assertion is further evidenced by the exemption of particular repairs to machinery employed in these activities, e.g. repairs or maintenance expenditure, drilling and boring machines employed in mining operations (Schedule 2, Item No. 401).

Few indirect benefits to conservation activities are discernable in the Act with the exception of exemptions for particular donations (see Section 1(xxix) (vi) and (vii)).

3.8 Conclusion

Policy alternatives in the sphere of environmental control may be conveniently described in terms of three categories:

1. Voluntarism (Section 3.2) is a weak and unrealiable regulatory mechanism, yet voluntary measures do have their place where alternative control mechanisms are not available.

2. Direct controls (Section 3.3) are the mainstay of environmental policy in South Africa. Prohibitory (Section 3.3.1) and regulatory (Section 3.3.2) legislation is usually buttressed by the application of the criminal penalty as both a primary and secondary sanction (Section 3.3.3). Achieving compliance with direct controls by means of the criminal sanction as a primary sanction is extremely problematical (Section 3.3.3.1). The criminal sanction employed as a subsidiary sanction overcomes a few of these problems but is still not a sufficient control mechanism. It is widely accepted that high costs and low efficiency are associated with direct legislation. A survey of

business executive attitudes in the United States (Section 3.3.4) revealed that the dearth of prohibitory and regulatory legislation, in the early 1970's had the undesirable affect of alienating the businessman from environmental concerns. Environmentalists and legislators should recognise the limitations of environmental policy composed of direct controls.

3. Recent environmental and economic literature reveals a burgeoning interest in financial or economic policy alternatives for the control of environmental problems. It is generally agreed that a gradual introduction of well researched market orientated policies is needed to complement the current regulatory structure (Section 3.4). Fiscal policy (Section 3.4.2) and market mechanisms (Section 3.4.3) provide appropriate channels for the required policies. In addition, the achievement of environmental objectives demand the immediate rectification of the anomalies in current financial legislation and the lobbying for well researched financial incentives.

The Income Tax Act No. 58 of 1962, which displays great specificity and flexibility in promoting various objectives, and the Sales Tax Act No. 103 of 1979, which is increasingly being used to earn government revenue, deserve immediate attention in the context of environmental concern (Sections 3.5.1 and 3.5.2). A problem exists, however, in that current fiscal concerns (Section 3.5.2) are likely to prejudice even well motivated applications for additional tax allowances or the extension of existing allowances to environment objectives. The strategy required (Section 3.5.3) includes:

- the lobbying for subsidies;
- devising schemes and exposing provisions in the financial legislation;
- identification and rectification of disincentives

to wise environmental resource management in the financial legislation, and

- a closer look at innovative financial policies.

These recommendations must be sensitive to taxation concepts, e.g. equity (Section 3.6).

The introduction to specific taxation legislation (Section 3.7) revealed that even the apparently innocuous non-resident shareholder's tax (Section 3.7.1) raises a number of ethical concerns. The existence of possible incentives currently contained in financial legislation was demonstrated with reference to the donations tax exemption provided for donations to or by nature conservation organizations. The Sales Tax Act (Section 3.7.2) and the comparative advantages extended to various industries and activities, many of which have significance in the context of environmental impact, were introduced.

CHAPTER 4 : POLLUTION

4.1 Introduction

> 'Anyone who would like to write a thesis on the way that irrationality, emotion and prejudice dominate the discussion and implementation of economic policy could do no better than to study pollution policy.'
>
> (Beckerman, 1975, p.11)

4.1.1 The Pollution Problem

Pollution is just one example of a class of phenomena called externalities. Externalities denotes the inefficiencies that arise when an activity imposes incidental benefits or costs on others, and no corresponding compensation is provided to or by those who undertake the activity (Baumol and Blinder, 1979. p. 608). A predisposition to pollute occurs, not necessarily because the total benefits of waste disposed into the environment exceed the total costs, but because the benefits of such waste disposal exceed the costs that are borne by the polluter (Randall, 1981, pp. 156-157).

The diseconomies imposed by pollution do not enter into the calculation of the polluter because;

1. the environment polluted, such as the air or water, is not clearly anybody's 'property', so that the polluter does not have to pay the public for using it, or

2. the environment is somebody's property, but these property rights are generally difficult or expensive to protect, and payment cannot usually be extracted from polluters.

   (Beckerman, 1975, p. 27)

Pollution control measures relate to attempts to regulate the magnitude of external diseconomies resulting from residuals discharged into the environment, viz. air, water and land. The occurrence of residuals within the production and consumption cycle, together with possible locations for regulatory mechanisms are indicated in Section 4.1.2 below.

The economic explanation for the pollution problem is well understood and the necessity for some form of government intervention widely accepted. Formally, the problem is to reduce pollution not to zero, but to the point where the total costs (control plus damage) of pollution are minimised (Lecomber and Fisher, 1978, p. 4). Pollution regulation has been attempted by way of diverse policy alternatives, frequently without recognition of economic implications. These policy alternatives are reviewed in Section 4.2.

4.1.2 Residuals from Production and Consumption Activities

Boulding's 'spaceship earth' (1966, pp. 3-14) suggested that pollution, or at least material residuals from production and consumption activities, must always and increasingly be with us, because the earth is like a spaceship, a closed system with respect to materials. A related concept developed by Kneese, Ayres and d'Arge (1971) and later expanded by Herfindahl and Kneese (1974, pp. 353-380), is that of materials balance. A schematic diagram illustrating how 'the goods and production process works, is reproduced from Herfindahl and Kneese (1974, pp.354-355).

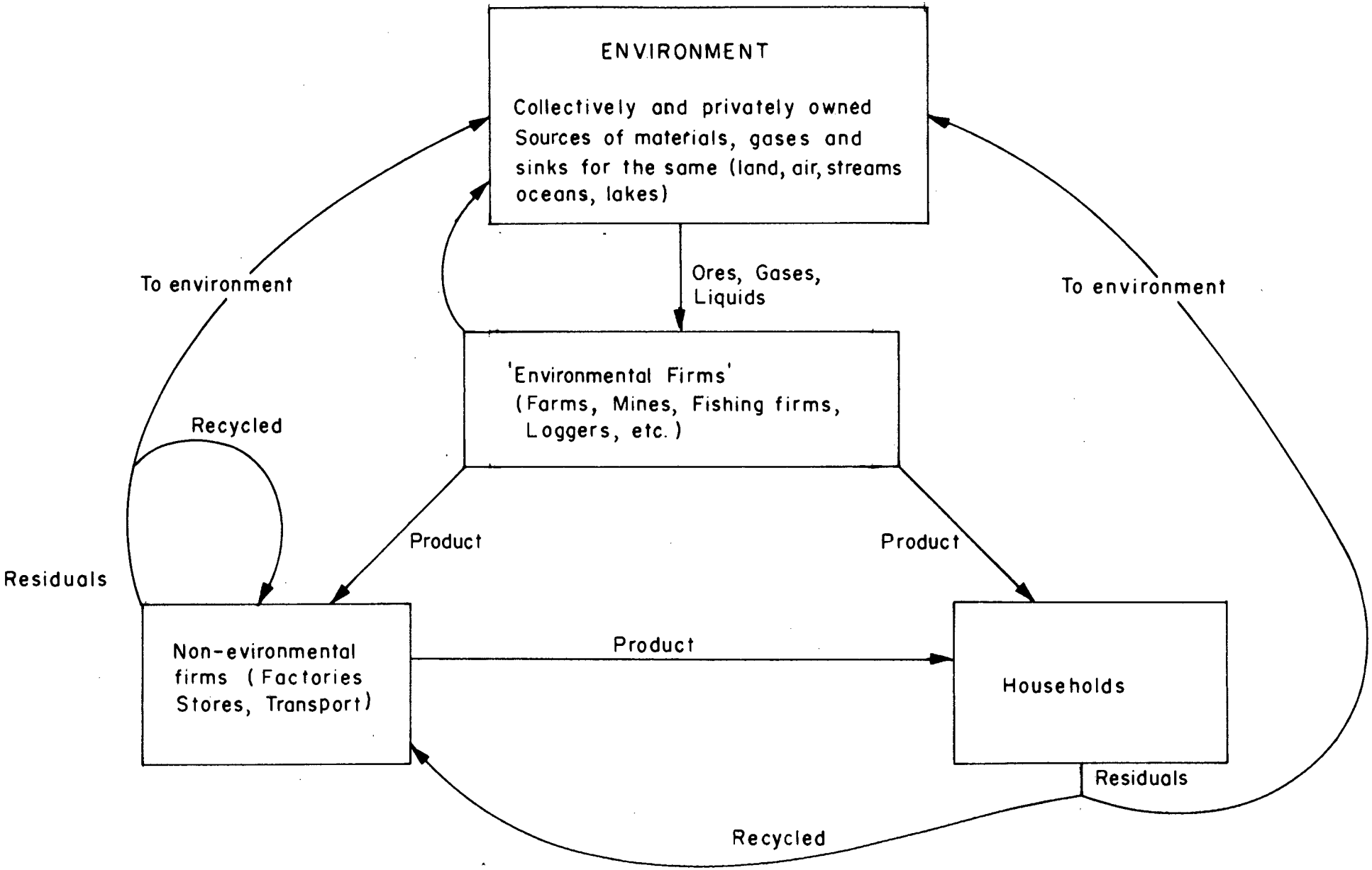


Figure 4.1: THE GENERATION OF RESIDUALS — A MATERIALS BALANCE APPROACH

Herfindahl and Kneese (1974, p.360) expand the concept of materials balance to demonstrate that:

1. ... External diseconomies resulting from the discharge of residuals to the environment are not freakish anomalies in the process of production, but an inherent and normal part of them when the environmental media are no longer free goods (i.e. no longer infinite sinks).

2. ... External diseconomies are quantitatively negligible in a low population or economically undeveloped setting ....

A high South African population growth rate (see Fuggle and Rabie, 1983, pp. 23-24) combined with rapid industrialization and technological advancement necessitate an efficient and equitable residual regulation policy to control this growing concern. The environment has ... finite capacity to absorb these ... residuals (Senecca and Taussig, 1979, p. 77) and it must be appreciated that:

> '... the form in which the residuals are discharged into the environment can be determined, to a considerable degree by society. Even with a given technology for waste disposal society can choose how it desires to allocate the total amount of waste between alternative media. ... Accordingly, it is inappropriate to analyze air, water or land pollution as separate and distinct problems.'

Furthermore,

> '... the choice of using primarily one environmental medium for waste disposal does affect the qualities of the other media in any ecosystem.'
>
> (Senecca and Taussig, 1979, pp. 77-78)

In order to maintain environmental quality and maximise social wellbeing, society must select regulatory mechanisms that most efficiently and equitably control the quantity and quality of residuals released into the environment. Pollution control legislation should be co-ordinated and planned in accordance with ecological interdependencies. Figure 4.2 below is designed to illustrate the positioning of residual generation within the production and consumption cycles and to highlight possible locations for pollution regulatory mechanisms.

Figure 4.3 futher expands on Figure 4.2 by indicating the range of policy alternatives available at each location within the cycle. Figure 4.3 also provides a reference and conceptual framework for the brief discussions presented on each of these policy alternatives.

FIGURE 4.2: ALTERNATIVE LOCATIONS FOR THE IMPOSITION OF REGULATORY MECHANISMS

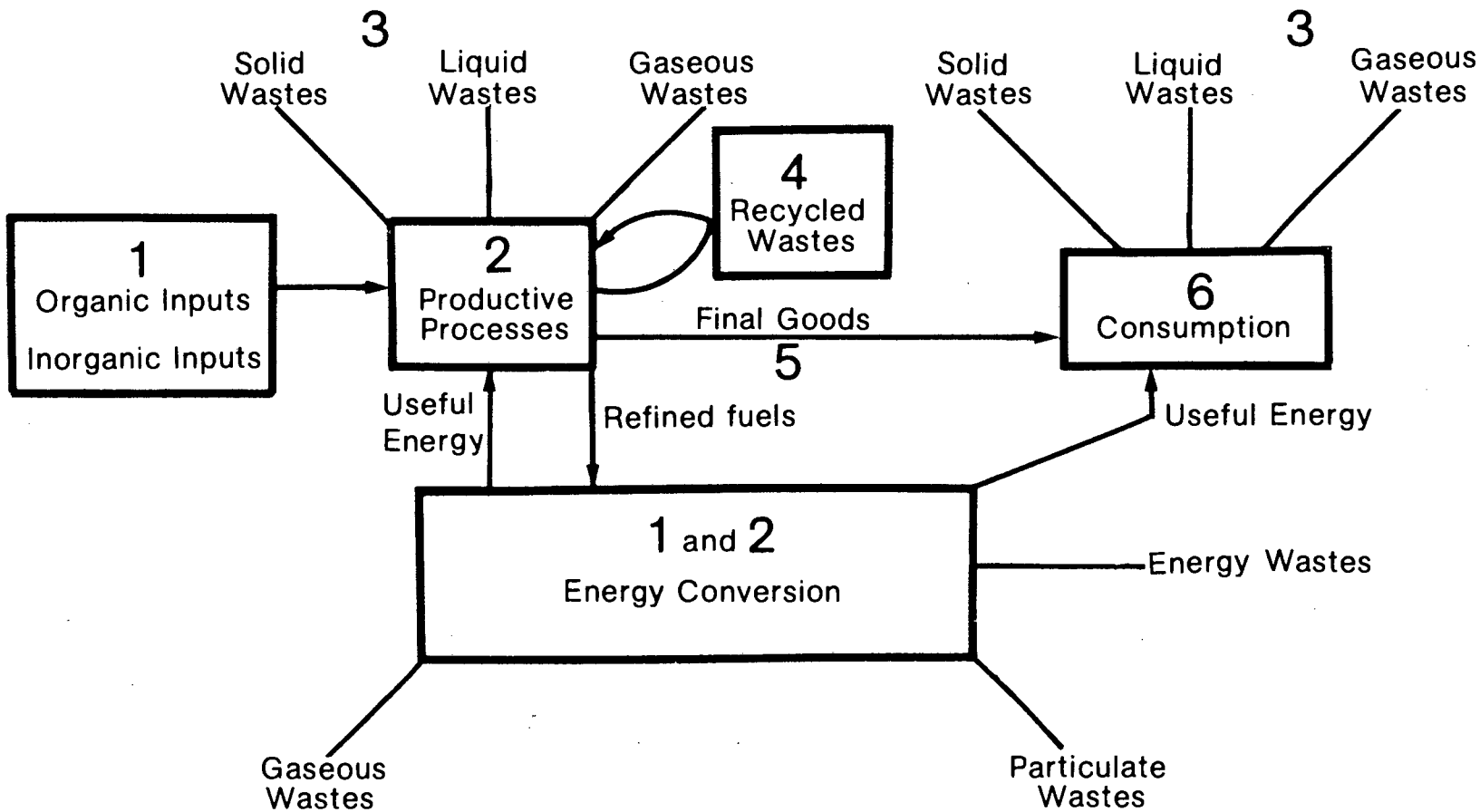
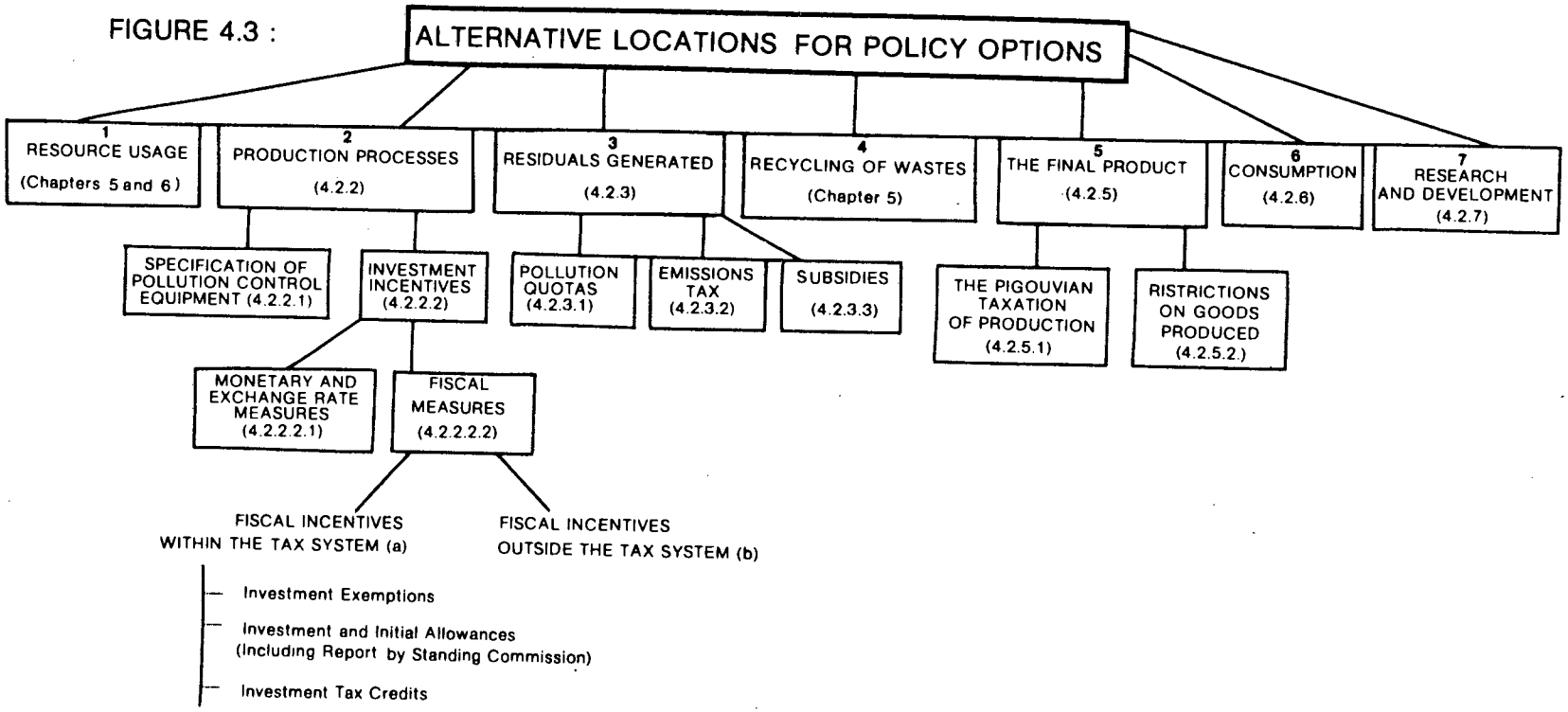


FIGURE 4.3 :


ALTERNATIVE LOCATIONS FOR POLICY OPTIONS
1 RESOURCE USAGE (Chapters 5 and 6)
2 PRODUCTION PROCESSES (4.2.2)
3 RESIDUALS GENERATED (4.2.3)
4 RECYCLING OF WASTES (Chapter 5)
5 THE FINAL PRODUCT (4.2.5)
6 CONSUMPTION (4.2.6)
7 RESEARCH AND DEVELOPMENT (4.2.7)
SPECIFICATION OF POLLUTION CONTROL EQUIPMENT (4.2.2.1)
INVESTMENT INCENTIVES (4.2.2.2)
POLLUTION QUOTAS (4.2.3.1)
EMISSIONS TAX (4.2.3.2)
SUBSIDIES (4.2.3.3)
THE PIGOUVIAN TAXATION OF PRODUCTION (4.2.5.1)
RISTRICTIONS ON GOODS PRODUCED (4.2.5.2.)
MONETARY AND EXCHANGE RATE MEASURES (4.2.2.2.1)
FISCAL MEASURES (4.2.2.2.2)
FISCAL INCENTIVES WITHIN THE TAX SYSTEM (a)
FISCAL INCENTIVES OUTSIDE THE TAX SYSTEM (b)
Investment Exemptions
Investment and Initial Allowances (Including Report by Standing Commission)
Investment Tax Credits

4.2 A Brief Review of Alternative Policy Options

The disciplines of economics and political economy ignored spillover effects of externalities from economic activity until the 1930's when Pigou published 'The Economics of Welfare'. Until then the need for government to regulate pollution generated by private individuals and companies was, with the exception of a few radical economists such as Engels, scarsely considered by economists (Tisdell, 1983, p. 364). It is only since the mid-1960's that externalities and pollution control policies have gained recognition in economic and politico-economic literature.

Economic models, which are used for discussing the social effects and control of pollution are abstractions of the variations which occur in the world. Consequently, these models may only be able to capture the essence of a particular pollution problem if they are significantly modified. Nevertheless, abstract models provide an interesting insight into the various means of pollution control.

4.2.1 Resource Usage

The policy alternatives designed to regulate and control resource usage and destruction are discussed in detail in Chapter 5.

4.2.2 Production Process

4.2.2.1 Specification of production equipment or pollution control devices

It is sometimes suggested that pollution control be effected by way of equipment specifications. This recommendation is dismissed on the grounds that:

1. It is inefficient as different enterprises could reduce pollution by installing less costly equipment or by way of innovative

reconstruction of existing plant and machinery (Goldberg, 1984).

2. The specifications would be inequitable in that the relative sizes of enterprises and plant ages would dictate their ability to purchase such equipment and their relative need to update existing equipment so as to meet socially desirable emission levels (Kantor, 1984).

3. The specification of pollution control equipment may also be inequitable from the viewpoint of competing producers of such equipment where these specifications favour particular manufacturers (eventually leading to monopolies and concomitant inefficiencies in the production of this equipment).

4. The specification of equipment does not ensure that emission levels will be better regulated as regulation is directed at plant and machinery rather than emissions directly (Tisdell, 1983, p. 366).

5. Innovation is not encouraged and it would not be feasible to regularly change equipment specifications (Kantor, 1984).

An example of this form of pollution control in South Africa is provided by the air pollution specification standard. The specification standards require that only pollution control equipment that meets certain design criteria may be used in operating certain processes that are responsible for air pollution (Fuggle and Rabie, 1983, p. 289). The Atmospheric Pollution Prevention Act 45 of 1965 provides for specification standards for scheduled processes (Second Schedule), which are

regarded as being responsible for industrial air pollution. Control is established in that no person may carry on a scheduled process in or on any premises anywhere in South Africa unless he is the holder of a registration certificate (Section 9(1)(a)). This certificate is granted by the Chief Air Pollution Control Officer of the Department of Health and Welfare if he is satisfied that the best practicable means (established on technical and economic grounds - see Section 1(1)) are being adopted for the control of air pollution caused by the scheduled process concerned (Section 10(2)). Apart from many shortcomings in this administrative arrangement (see Fuggle and Rabie, 1983, pp. 290-291), the concerns regarding pollution control by way of equipment specification are applicable.

4.2.2.2 Investment Incentives

An investment incentive is defined to be:

> '... a financial advantage given to the firm, either in the form of a direct cash grant or by some alteration in the size or timing of the firm's tax payments, in return for it making a specified type of investment.'
>
> (Downer, 1976, p. 3)

In Chapter 2 it was stated that the goal of society can be described as the maximisation of social welfare. A number of intermediate objectives and policies have been pursued in order that their fulfilment will help promote the attainment of this ultimate aim. Examples of these objectives and policies would include full production, full employment, rapid and sustained growth, relative price stability, a satisfactory balance of payments, efficient allocation of resources and equitable distribution of income and wealth (The Commission

of Enquiry,1970b, p. 15 and McConnell, 1981, pp. 11-12). It is beyond the scope of this report to discuss these objectives and policies in the context of environmental concerns. However, a policy instrument commonly employed, namely investment incentives to stimulate economic growth and, recently, to reduce pollution has been suggested as a feasible policy mechanism for the promotion of investment in pollution control equipment.

Investment Decision

It is generally assumed that firms make investment decisions on the basis of calculations of the net present value of the future income that the investment will generate (Downer, 1976, p. 37). If the firm is acting rationally the present worth of the respective net income returns that can be expected in each of the ensuing years from making the investment must exceed the cost of the investment. The timing and size of the expected net income stream is estimated at the time the investment decision is made. Uncertainty as to the timing and value of future income streams implies high risk. A correspondingly greater return will be required to justify the high risk. In the case of pollution control equipment it is unlikely that the investment outlay will result in significant income returns. Where, however, a residuals tax or a fine is imposed on specified discharge levels, the investment in pollution equipment would be financially rational if the investment in pollution control equipment plus the discounted value of maintenance and other related costs were less than the discounted value of pollution charges avoided plus the net income derived from by-products recovered by the pollution control equipment (Uliana, 1984). Examples 4.2 and 4.4 demonstrate the sensitivity of investment decisions to discount rates and the

timing and magnitude of investment incentives.

Methods of Providing Investment Incentives

Although this study is primarily concerned with fiscal incentives and disincentives, investment activity can also be regulated by way of monetary and exchange rate policy. As such a brief introduction to these mechanisms is justified.

4.2.2.2.1 Monetary and Exchange Rate Measures

Investment can be stimulated by increasing the availability of credit and by decreasing the cost of money by lowering interest rates (see Baumol and Blinder, 1979, p. 243). Monetary measures affect the level of aggregate demand in the economy, i.e. the macroeconomic effect. At the microeconomic level the individual firm's investment decisions are affected by its existing liquidity situation, expected changes in demand for its products, and the discount factor implicit or explicit in the decision process. Monetary measures are blunt policy instruments as aggregate demand is only partly composed of capital investment (Downer, 1976, pp. 4-5). Furthermore, increased demand does not necessarily promote capital investment of the desired kind.

4.2.2.2.2 Fiscal Measures

> 'A fiscal measure ... is specific. The government itself gives direct financial inducement to specific industries or firms in order to encourage them to invest .... The advantage of fiscal measures is that the government has control and can accurately aim the inducement at the particular industries, firms, transactions, products, types of equipment, geographical location or whatever it wishes to encourage.'
>
> (Downer, 1976, p. 5)

Fiscal incentives are extremely effective in terms of the investment induced per Rand of incentive granted. Fiscal incentives ... seem to constitute the most appropriate means of influencing investment patterns (Downer, 1976, p.5).

(a) Fiscal Incentives Within the Tax System

Within the tax system the most common fiscal incentives are the investment allowance, accelerated depreciation allowances, investment (income) exemptions and the investment tax credit. The positioning of these incentives in the tax computation is best illustrated by way of the following presentation (adapted from Huxham and Haupt, 1984, p. 4; Meyerowitz and Spiro, 1984, p. 33 and Silke, Divaris and Stein, 1982, p. 9).

	Gross Income (Section 1 of the Income Tax Act)	XXX	
Less:	Exempt Income (Section 10)	XX	... 1
	Income	XXX	
Less:	Deductions (Mainly Sections 11-19 and 23)	XX	2,3
	Taxable Income	XX	
	Tax per tables	XX	
Less:	Tax Credits	X	... 4
	Tax payable	XX	

Location of Investment Incentives in the Normal Tax Computation

1 Investment exemptions

2,3 Accelerated Depreciation Allowance, Investment Allowance

4 Investment tax credit

Investment exemptions

Investment exemptions omit from assessable income all or part of the income derived from an investment (Downer, 1976, p. 7). The investment in

pollution control equipment does not generally yield income and therefore investment exemptions for pollution control equipment would not be meaningful fiscal incentives.

Investment Allowance and Accelerated Depreciation Allowance (Initial Allowance)

The machinery initial allowance (Section 12(1)) is an accelerated wear and tear allowance, (the term used in the Income Tax Act for depreciation) currently granting a deduction of 25% of the cost in the year the asset is brought into use. The balance (i.e. 75%) of the cost is written off in accordingly smaller annual wear and tear allowances (Section 11(e)) over the agreed life of the asset.

> 'The initial allowance thus accelerates the write-off, and does not result in a write-off greater than the cost of the asset. The taxpayer thereby enjoys a deferral of tax liability, which is offset by the reduced wear and tear charges in later years.
>
> (The Standing Commission of Enquiry, 1983, p. 4)

The machinery investment allowance (Section 12(2) does not reduce the tax value of the machinery, i.e. it is a 30% incentive allowance above the cost of the asset. It is a bonus allowance (Huxham and Haupt, 1984, p. 72) and is not recoupable (except in specific circumstances - see Section 12(5)

> 'The essential feature of the investment allowance is that it represents a deduction from taxable income over and above the cost of the asset .... (The) value of the allowance is greater to a firm with a large profit base than to a firm that is in a start-up position and which will generate profits only in later years. Firms with no or small tax bases can, however, receive the benefit of the allowances albeit in a different form if they do

> their financing through the medium of leasing.
>
> (The Standing Commission of Enquiry, 1983, p. 5)

The example below is intended to illustrate the above descriptions and to highlight the incidence of these allowances.

EXAMPLE 4.1

A new machine is purchased on 1 July 1983 for R20 000 and brought into use immediately in a process of manufacture (pollution control equipment would qualify if part of a process of manufacture - Hassan, 1984). Assume the Commissioner allows wear and tear at the rate of 15% per annum. The allowances claimable by the taxpayer for his year of assessment ended on 29 February 1984 would be:

Investment allowance	(Section 12(2));	20 000 x 30%	R6 000
Initial allowance	(Section 12(1));	20 000 x 25%	5 000

Wear and Tear (Section 11(e)):

Cost	20 000		
Initial Allowance	5 000		
	15 000		
Wear and tear	15 000	x 15% x $\frac{8}{12}$ mnths	1 500
TOTAL DEDUCTIONS FOR 1984 TAX YEAR			R 12 500

Report by Standing Commission on the System of Initial and Investment Allowances

On 26 March 1980, in the course of delivering his budget speech, Mr Owen Horwood, then the Minister of Finance, directed the Standing Commission on Taxation Policy to investigate 'two of our principal incentive devices', namely the initial and investment allowances.

The original rationale for the introduction of the

allowances was the encouragement of investment and the stimulation of economic growth (Report of the Standing Commission, 1983, p. 7). However, the inordinate tax forgone as a result of extending these allowances (estimated to be R832m by the Department of Finance - Statistical/Economic Review 1984, p. 30) and the uncertain benefits accruing from the allowances stimulated concern, and eventually culminated in the investigation. The Commission tabled its report in 1983.

The Standing Commission of Enquiry with regard to Taxation Policy of the Republic reported the following findings and recommendations.

Findings

1. No authoratative study has emerged in South Africa which proves conclusively that the aggregate level of investment has been raised as a result of the fiscal allowances. However, the Commission submits that 'it stands to reason that the share of that aggregate investment that went into manufacturing, (the allowances are extended to 'a process of manufacture') compared to other sectors would have been lower in the absence of the allowances' (p. 8).

2. When the allowances were introduced it was stated by the then Minister of Finance, that they could be varied or withdrawn as and when cyclical considerations called for such action. Nevertheless the commission concluded that in most circumstances the value of the allowances as a countercyclical instrument is very limited (p. 8).

3. A press statement released by the Office of the Minister of Finance, dated November 1980,

stated that 'in recent years the allowance has also served as a buffer against rising replacement costs of new equipment'. The commission found that 'the allowances do provide relief to capital intensive industries ...' (p.13) and that the role of the capital allowances in facilitating capital replacements in inflationary conditions warrants further investigation.

4. Incentives based on capital expenditure tend to favour capital intensive industries, promote 'capital deepening' and that these encouragements may not be in the best interest of a '... developing country where unskilled labour is in excess supply' (p.10). The Commission called for careful judgement regarding the 'proper balance between human and physical capital' (p.11).

5. The Commission drew attention to the programme regarding regional industrial development by way of cash subsidies which have replaced, although not altogether, the previous system of decentralisation aid through the medium of tax reliefs (pp.11-12).

6. The Commission drew attention to the importance of leasing as a means of assisting commercial and industrial enterprise (the initial and investment allowances have, since 1966, been available to lessors). However, concern was expressed over the use of tax shelters by way of various leasing arrangements (pp.13-15).

Recommendations

.. (The) Commission has concluded that the investment allowance, because of its cost to the fiscus, its very limited role as an anticyclical instrument, its doubtful

> efficacy (save in marginal cases) an an incentive to investment, and its exposure to abuse, should be discontinued. In order to maintain the level of incentive for manufacturing investment relative to other sectors and to maintain the existing extent of incidental protection against inflation some extension of accelerated depreciation through initial allowances is considered desirable (p.19).

The effect of these recommendations is to reduce tax deductions on machinery investments to 100% of cost as against the current 130% (the bonus investment allowance of 30% having been abolished). These amendments will reduce the erosion of the tax base (as evidenced by the declining proportionate contribution of tax revenue by manufacturing concerns over the last decade). Discussion with senior officials in the Department of Inland Revenue revealed the following administrative concerns with tax incentives:

1. Tax incentives tend to become entrenched and continue to exist long after the problem they were designed to correct has disappeared (Kingon, 1984).

2. Tax incentives tend to continue their existence because they become mistaken for integral and necessary features of the tax system and because parliament does not consider them to be expenditures in the budgetary process, but rather a failure to collect tax. The cost of such concessions have, therefore, been very difficult to estimate. The current trend towards cash incentives, e.g. the Regional Industrial Development Program, and the frequently expressed opinion that it would be better to provide desired incentives by way of an appropriation of expenditure indicate a reluctance of the fiscus to further erode the tax base (Kruger, 1984).

Implications

The practical implications for the promotion of investment in pollution control equipment are manifold.

1. Pollution control equipment forming part of a process of manufacture will, after the phasing out of the investment allowance (30th June 1985), qualify for a 55% expanded initial allowance whereas equipment forming part of a process similar to that of manufacture will qualify for an initial allowance of 25%. Investment in pollution equipment is not economically rational unless the net present value of tax savings, subsidies received and penalties or emission-charges avoided (assuming no adverse public reaction) are equal to or greater than the investment outlay. This envisaged initial allowance, in isolation, is inadequate to effectively promote the installation of pollution control equipment. It is essential that the proposed initial allowances be complemented by way of investment subsidies, further tax benefits or the imposition of more effective penalties. The following simplified example illustrates this assertion.

   EXAMPLE 4.2

   If company Y purchases pollution control equipment for R20 000 on 1.1.19X0 for cash and pays income tax each year on 31st December, the following incentives would be necessary to rationalise this purchase in financial terms. Assume that the company has taxable income on which tax at 50% is levied and that the equipment forms part of a process of manufacture. Assume further that the machine is to be written off straight line over three years for tax purposes and that 10% is an appropriate discount rate.

EXAMPLE 4.2 Continued

DATE	AMOUNT	DISCOUNTING FACTOR	NET PRESET VALUE	
1. 1.19X0	20 000	1,00	(20 000)	Outlay - Purchase price
31.12.19X0	20 000 x 55% x 50% (1) (2)	0,91	5 005	Tax saving - Initial allowance
	(20 000 - 5 500) ÷ 3 x 2/12 x 50% (3)	0,91	367	Tax saving - Wear and Tear
31.12.19X1	(20 000 - 5 500) ÷ 3 x 12/12 x 50% (4)	0,83	2 006	Tax saving - Wear and Tear
31.12.19X2	(20 000 - 5 500) ÷ 3 x 12/12 x 50% (5)	0,75	1 813	Tax saving - Wear and Tear
31.12.19X3	(20 000 - 5 500) ÷ 3 x 10/12 x 50% (6)	0,65	1 370	Tax saving - Wear and Tear
			(9 439)	Net Present value of Excess Outlay

Where (1) = the initial allowance
(2) = the company tax rate
(3) = wear and tear for the 19X0 tax year
(4) = wear and tear for the 19X1 tax year
(5) = wear and tear for the 19X2 tax year
(6) = wear and tear for the 19X3 tax year

The example clearly illustrates the inadequacy of proposed investment incentives to promote investment in pollution control equipment. The following calculation demonstrates the magnitude of additional incentives required.

1. Cash Grant

Net present value of excess outlay		9 439
Required subsidy:		
if received at time of outlay	9 437	
if received 1 year later		
9 439 ÷ 0,91	10 373	
if received 3 years later		
9 439 ÷ 0,75	12 585	

2. Tax Allowances

Net present value of excess outlay		9 439
Required value of allowance:		
if benefit received 1 year later 9 439÷50%÷0,91	20 745	
if benefit received 3 years later 9 439÷50%÷0,75	25 171	

3. Tax Credit

A tax credit would be calculated similarly to a cash grant except that the benefit is unlikely to accrue immediately, i.e. a time lag between the date of the cash outlay and that of tax relief is to be expected.

Note: The above calculations assume that the company is in a tax paying position and that the increased capital value of the business resulting from the pollution equipment investment is not a significant factor in the investment decision.

It is easily demonstrated that infinite combinations of quantities and timings of tax allowances, subsidies, pollution penalty savings and emission charges avoided can be employed to yield a postive net present value for purchases of pollution control equipment. These policy mechanisms need to be effectively utilized as complementary financial incentives designed to stimulate purchases of pollution control equipment.

Empirical research directed at establishing methodologies employed by major Canadian corporations in capital investment decisions reveals the following (Helliwell, 1964, in Downer, 1974, pp.37-39):

Method	Number of Corporations	Percentage
Net Present Value	17	24
Gross Return, Net Return and Cash Flows	29	42
Payback		
Other Methods of Low Sophistication	24	34
	70	100%

It is submitted that these results do not imply irrationality in capital investment decision making but indicate that business acumen is frequently substituted for formal and complex financial computations. It is suggested, however, that purchases of pollution control equipment, not subject to 'gut feel' business decisions, are extremely sensitive to the figures yielded in complex financial computations and that net present value calculations are extremely important. Numerous pollution equipment investment guidelines published

in the United States of America lend credence to this assertion (e.g. Ferrar, 1974).

2. The reluctance, expressed by the fiscus, to extending the existing, costly system of tax deductions necessitates a strategy which motivates the lobbying for other forms of financial incentives e.g. emissions charges, and investment subsidies. The revenue derived from emission charges imposed could be re-directed to provide relief from the financial burden imposed on companies required to invest in pollution control equipment.

Investment Tax Credits

The investment credit is a deduction from the tax liability of a person or firm of a portion of the cost of an investment (Downer, 1976, p.6). The deduction is in addition to normal wear and tear allowances and more than 100% of the net cost of the asset may therefore be recouped. This incentive is currently employed in both the United States of America and Canada and was reviewed by the Standing Commission on Taxation Policy (1983, p.18). This investment incentive has not been employed in South African legislation in this context and would provide a further vehicle for diminishing tax revenue (Kruger, 1984). It is not envisaged that this incentive will become available in the sphere of pollution control equipment (Kruger, 1984).

(b) Fiscal Incentives Outside the Tax System

Fiscal measures provided outside the tax system that influence investment, consist of cash grants and subsidies. The cash payment and subsidy are attractive policy instruments as a great deal of control and exclusivity can be built into these policies (James and Nobes, 1978, pp.41-43, and Kingon, 1984). The qualification criterion

specified may be broad, e.g. all new equipment used in a process of manufacture, or very specific, e.g. air pollution equipment designed to reduce sulphur emissions from particular production processes. Inumerable possibilities exist for the application of these incentives.

The advantages of direct subsidies are:

1. They are open to review, debate and possible alteration at regular intervals (James and Nobes, 1978, p.42).

2. They are easily quantifiable (Kingon, 1984) and may be undertaken 'directly through the process of legislative appropriation, not indirectly through the largely hidden form of ... tax incentives' (Delogu, 1976, p.11).

3. The distributional consequence is probably less regressive than an emissions tax (Lecomber and Fisher, 1978, pp.4-9).

Concerns over subsidies to induce investment in pollution control equipment are:

1. Administrative formalities in applying for subsidies and possible delays in processing could seriously detract from their effectiveness (Goldberg, 1984).

2. A subsidy scheme implies a markedly different structure of property rights in air and water from that of an effluent charge policy. With a subsidy offer, the property rights of discharging waste into the environment implicitly accrue to the polluter (Senecca and Taussig, 1979, p.238).

As was discussed in Section 4.2.2.2.2 dealing with capital investment allowances subsidies are an

important financial incentive device for the promotion of investment in pollution control equipment. It was also mentioned that a strategy of lobbying for subsidies would be consistent with current fiscal policy (see Chapter 3.5.3).

Subsidies or cash grants have also been mooted in the context of 'bribes' to reduce pollution. These bribes would apply to the reduction in effluent or emissions discharged and are discussed in Section 4.2.3.3.

4.2.3 Control over Residuals Generated

It is intuitively obvious that the optimum amount of pollution is where the social costs of a further marginal unit of pollution abatement equal the social benefits (Beckerman, 1975, p.37). It is also perfectly reasonable to assume that polluters pollute only insofar as doing so is cost-saving to them. Thus, pollution control, the act of reducing pollutant emissions, is expensive to the polluter (Randall, 1981, p.90). It is suggested that the firm or the producer should have the same sort of incentive to economise on the use of the environment as he has to economise on other inputs into his productive process.

It is in this category of regulation that the most commonly encountered pollution control policies are to be found.

4.2.3.1 Quantitative Pollution Restrictions, Pollution Quotas or Emission Standards

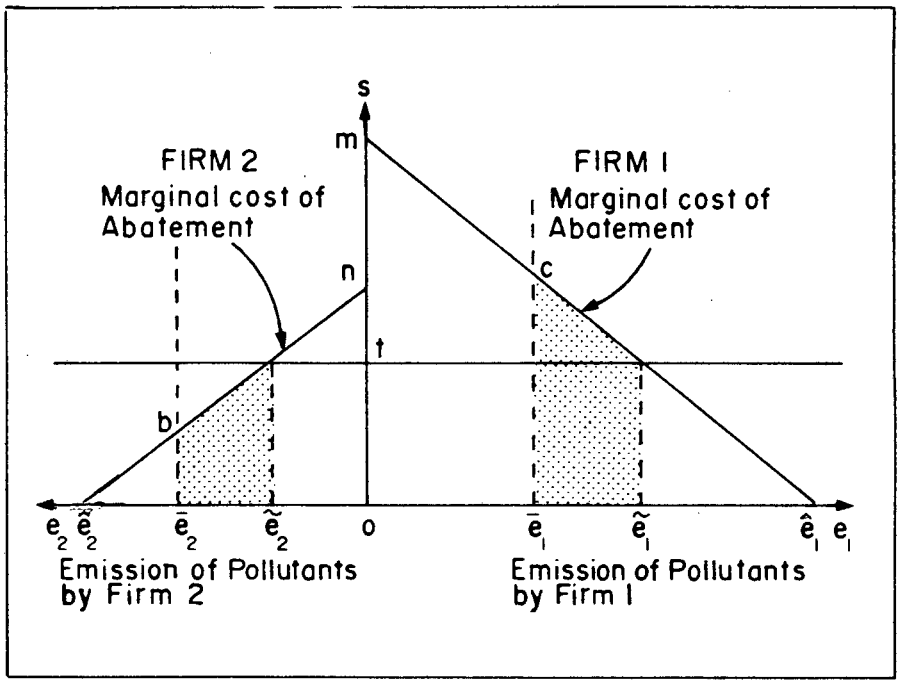
Whereas specification standards specify what must be done to reduce pollution, emission standards indicate what level of pollution must be accomplished (Fuggle and Rabie, 1983, p.291). In the case of air pollution the difficulty in obtaining proof of non-compliance with the standard has precluded the

adoption of this control mechanism (Rabie, 1984). However, control of smoke emanating from fuel burning appliances is achieved by the use of standards (The Atmospheric Pollution Prevention Act, Section 18(1)(a)) which are administered by local authorities. Failure to comply with the emission standard (or a notice of abatement issued by the local authority) may constitute an offence (Section 2(1) read together with the municipal regulations).

The control of water usage and water pollution makes greater usage of quotas and standards. Regional standards (containing a relatively strict special standard and a general standard) for industrial effluents have been promulgated and provide the basis for South African industrial water pollution control (see Fuggle and Rabie, 1983, p.313). The use of water for industrial purposes is regulated by the Water Act No. 54 of 1956. Anyone desiring to use public water (Section 1) for industrial purposes (Section 1) must obtain the permission of a water court (Section 11(a)). Where usage exceeds prescribed average volumes (Section 12(1)(b)) a permit must be obtained from the Minister of Environment Affairs (Section 11(a)). This permit states the purpose for which the water is to be used, the quantity and the mode of reporting to the Department (Fuggle and Rabie, 1983, p.328). These selected examples illustrate the practical incorporation of quotas and standards into the pollution control legislation.

This fiat approach, if it is to be efficient, requires the regulating authorities to have a great deal of information about the pollution control costs experienced by individual polluters. The basic argument can be seen from the example illustrated in Figure 4.4 below (Tisdell, 1983, p.370).

FIGURE 4.4 : POLLUTION QUOTAS VERSUS AN EMISSIONS TAX



This figure illustrates the common pollution control standard whereby each polluter is permitted to emit a maximum $\bar{e}_1 = \bar{e}_2$. The example assumes that there are two polluters, firm 1 and firm 2. The emission of the pollutant by firm 1 is measured to the right of O and that by firm 2 to the left of O. Let $\hat{e}_1$ and $\hat{e}_2$, represent the existing levels of emissions of the two firms (zero cost of abatement) and $m\hat{e}$ the marginal cost to firm 1 of reducing its emission from $\hat{e}_1$ and $n\hat{e}_2$ the marginal cost to firm 2 of reducing its emission from $\hat{e}_2$. Firm 1 experiences greater costs than firm 2 in pollution abatement. Assume that the attainment of an environmental standard required that the total level of emissions be reduced from $E = \hat{e}_1 + \hat{e}_2$ to $\bar{E} = \bar{e}_1 + \bar{e}_2$.

The total cost of achieving a reduction of emission to $\bar{E}$ is equal to the sum of the areas of triangles $\bar{e}_1\hat{e}_1c$ plus $\hat{e}_2\bar{e}_2b$. It can be demonstrated that the cost

of abating emissions, for any level of abatement is not a minimum unless the marginal cost of abatement (the rate of change of abatement cost) is the same for all polluters. In the illustration, for a reduction of emissions to $\bar{E}$, this occurs when emissions by firms 1 and 2 are $\tilde{e}_1$ and $\tilde{e}_2$ respectively. The cost saving is indicated by the difference in area between the two shaded quadralaterals (see also Baumol, 1972, pp.307-322, and Baumol and Oates, 1971, pp.42-54).

4.2.3.2 The Emissions Tax

In the above example, the optimum allocation of emissions to achieve the standard can be obtained by imposing a uniform tax of t on each unit of pollutant emitted. The common rate of tax ensures, if firms are profit maximisers that the marginal costs of abatement are equalized for all polluters. The uniform tax rate can be varied until the proposed environmental standard is observed to be satisfied. Tisdell envisages the need for regional variation in the emissions tax so as to reflect variable environmental sensitivity (Tisdell, 1983, p.371).

The above illustration clearly demonstrates the superiority of a uniform pollution tax compared to fiat regulation, however, a number of observations are required.

Arguments in favour of the Residuals Tax

The residuals tax is generally favoured because it subsitutes the flexible incentive of the pricing mechanism for the cumbersome administrative machinery of the coercion implied by regulation and enforcement. It can be so designed so as to reflect the environmental assimilative capacity while imposing relatively low transaction costs (O'Riordan, 1981, p.114).

1. It is economically efficient in that the rational decision maker would reduce pollution levels to the point where marginal social benefit derived from the pollution reductions equals the marginal social cost of reducing emissions.

> '(The emissions tax) is therefore a politically imposed extension of the price system, which prods the discharger to clean up to politically acceptable levels or pay a fee (fine) which is then deployed either to clean up the effluent for him or to compensate those who demonstrably suffer as a result of continued emissions.'
>
> (O'Riordan, 1981, p.111)

2. It can be easily varied so as to regulate the nature and level of emissions abatement in accordance with the firms production function and the assimilative capacity of the environment.

> 'Because the regulatory approach generally sets uniform emissions standards for similar classes of productive activity to cover wide regions, even nations, these can impose quite unnecessary costs on some firms and grant large subsidies to others ...'
>
> (O'Riordan, 1981, p.112)

Krier and Montgomery submit that the residuals tax achieves the same results as variable (individual tailored) emissions standards at much lower administrative costs (1973, p.103).

3. The emissions tax can be incorporated into a system of property rights. The most promising proposal is that of Campbell, et al (1972, pp.247-292) which suggests a system of transferable discharge licences which are linked in quantity and price to the assimilative capacity of the receiving medium. A number of innovative air pollution control policies currently

under investigation in the United States of America have been similarly developed (see Blackman and Baumol, 1980, pp.417-431).

Criticism of the Residuals Tax

1. The environmentalist critique asserts that a residuals tax would inevitably raise the discharge right to the margin of assimilative capacity (Pearce, 1974, pp.155-156).

2. Economic criticisms may be divided into the following subdivisions:

Equity concerns

Dorfman and Snow (1975, pp.101-114) reveal by way of empirical analysis that most environmental protection policies are regressive (i.e. impose a greater financial burden on the poor than on the rich) and that an emissions tax would impose an even greater regressive burden (1975, p.114). This assertion is supported by Baumol who shows that any crude meddling with private sector pricing mechanisms are regressive and that the residuals tax is no exception (1972, pp.67-76). For a counter viewpoint see Section 3.6.1.1.

Financial impact on different enterprises

Concerns have been expressed regarding the possibility that the residuals tax may result in the 'pricing out' of less economic enterprises. This observation was well expressed by the British Royal Commission on Environmental Pollution which concluded that:

> '... it would not be in the public interest to allow a fixed resource (i.e. the assimilative capacity of a water body) to be allocated solely according to the ability-to-pay. It

> might lead to an imbalance between industrial and public needs, or to one kind of industry being put out of business by another because their waste effluents contained the same chargeable ingredient but their financial margins were entirely different. This suggests to us that acceptable pollution control could not be secured by charges alone, without taking political and social considerations into account.'
>
> (Ashby, 1972, p.68)

The 'fine tuning' fallacy

Burrows submits that it is fallacious to suggest that pollution control can be 'fine tuned' to acceptable levels by adjusting the charge to encourage an optimal response. This is because pollution control investment is 'lumpy', i.e. is characterised by large investment increments (Burrows, 1974, pp.276-277). Dahmen further qualifies these observations by stating that the public sector is relatively insensitive to the dictates of economic efficiency and that a system of negotiated standards would probably produce a more favourable response (Dahmen, 1971, pp.67-75).

3. Political scientists have objected to the residuals tax on the grounds that economic prescriptions are an inadequate substitute for political bargaining and negotiation, or some other political process whereby personal and philosophic values are translated into policy (O'Riordan, 1981, p.118). It is submitted that these criticisms are misdirected as the residuals tax is not suggested as a substitute for the political determination (e.g. by way of the Delphi technique) of desirable standards but as an effective and efficient policy mechanism for the implementation of such standards.

> 'A serious political impediment to the adoption of the residuals tax is envisaged in the frequent concern expressed with additional costs of production (eventually born by the consumer), particularly in times of high inflation and unemployment. Tentative economic estimates made for the Council on Environmental Quality indicate that a residuals tax would not have an unacceptable impact on the United States Economy. It is speculated that the residuals tax would slow the United States economy by 0,3% annually for the first four years following implementation, but only 0,1% after that, while the consumer price index and unemployment would rise by only 0,2% annually.'
>
> (Council on Environmental Quality, 1972, pp.302-304)

4. A number of administrative reservations have been expressed. It is extremely difficult to prove the assertion that a residuals tax would be less costly than the standards and certification arrangement. O'Riordan (1981, p.119) expresses the concern that administrators do not understand the residuals tax and that implementation problems would result. Continuous monitoring of emission levels pose a technical problem that would be difficult to overcome.

5. Legal constraints could also limit the applicability of the residuals tax. Difficulties associated with monitoring and ascribing emissions or discharges to particular polluters could result in lengthy litigation. Furthermore, the compatibility of the residuals tax with other environmental legislation would require investigation.

Despite these apparently insurmountable objections to the residuals tax suggestion, the exciting advantages offered by this alternative need to be further

investigated with reference to specific South African applications and associated difficulties.

4.2.3.3 Subsidies or 'Bribes' to Reduce Emissions or Residuals

It has been suggested (e.g. Senecca and Taussig, 1979, pp.67-75) that a pollution discharge market could be created where the external affects of production and consumption could be negotiated between parties through the mechanism of private contracts.

Senecca and Taussig state that:

> 'Well defined markets for most ... goods and services aid greatly in providing information about the possibilities of mutually beneficial exchange to all potential buyers and sellers. Households and firms can readily buy or sell goods or services in markets according to clearly established procedures. In contrast externalities are not subject to private contractual arrangements within the market mechanism.'
>
> (1979, p.67)

Assuming that such a market could be effected pollution would, theoretically, be reduced to the point where the marginal costs of reducing pollution would equal the marginal social benefit of pollution reduction, i.e. the next unit of pollution reduced would cost more than the benefits derived by society. The figure below illustrates the market equilibrium:

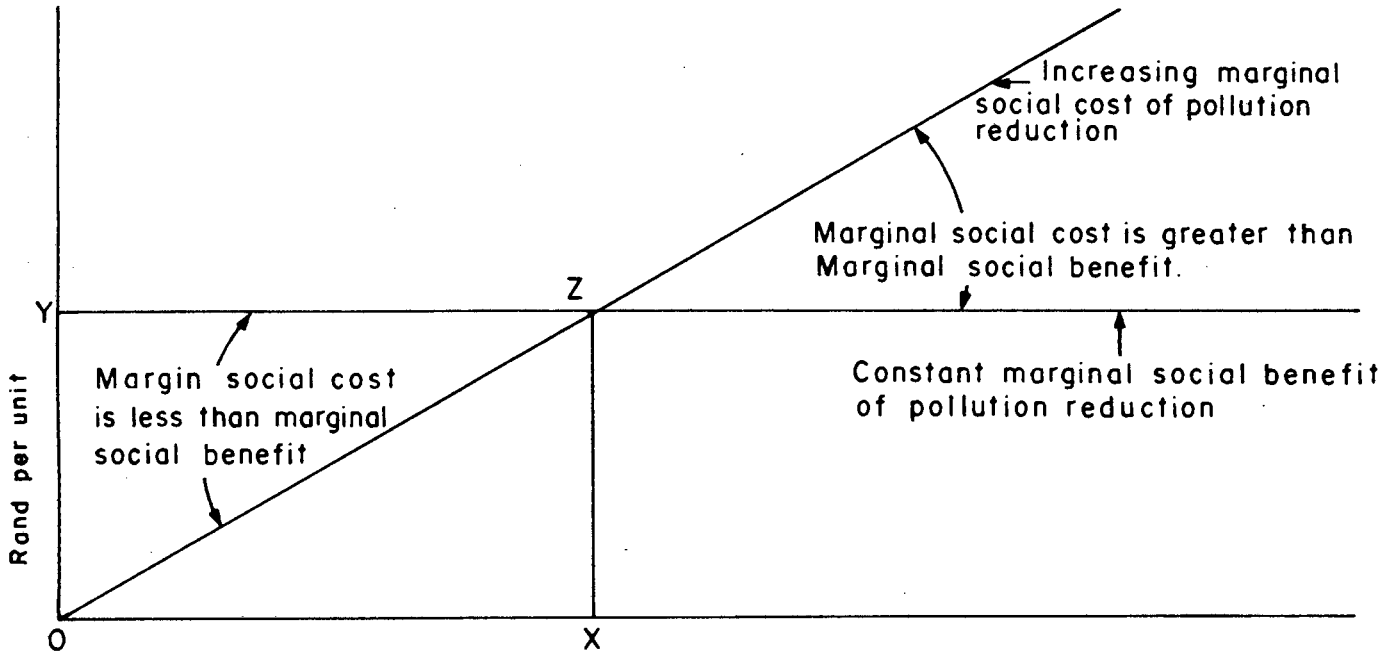


Figure 4.5 UNITS OF UNPOLLUTED ENVIRONMENT

Comments

1. The crucial assumption in this suggestion is that of well defined and enforceable property rights. The polluter must be able to prevent others from similarly polluting the particular environment and non-contributing members of the public must be excluded from the enjoyment of a cleaner environment. These assumptions are clearly unrealistic.

2. Furthermore, the subsidy system rewards polluters by offering to purchase the implicit environmental property rights. A government or public subsidy or bribe to reduce pollution implies that the property rights for discharging wastes into the environment accrue to the polluter. Therefore, the polluter treats waste reduction as another potentially marketable good and attempts to maximise profits when given the

offer. The firm will attempt to reduce pollution as efficiently as is possible and thereby maximise profits. However, it is suggested that firms may be stimulated to produce waste in situations where the costs of treating wastes are less than the subsidy (see Senecca and Taussig, 1979, pp.237-239).

3. Government subsidies to the firm to purchase the implicitly owned pollution rights of the polluter must be offset by increased taxes and/or reduced government purchases in other areas (Senecca and Taussig, 1979, p.239). This distributional effect may be contrasted with that of the effluent or emission charge where increased production costs (resulting from the internalization of the externality) are passed onto the consumer in the form of higher prices and lower quantities sold and consumed. The incidence of the costs of obtaining the same level of emissions reduction is likely to be more diffuse throughout the economy with a subsidy policy (see Section 3.6.1.1).

4. Transaction costs incurred in implementing the scheme might well be prohibitive (Stauth, 1983).

The above comments support the assertion that 'bribes' to polluters to reduce polluting activities are not feasible options in most situations.

4.2.4 Recycling of Wastes

The policy alternatives designed to stimulate the recycling of wastes and thereby reduce resource depletion and pollution are reviewed in Chapter 5.

4.2.5 The Final Product

Pollution regulation may be effected by way of policies affecting the costing or even the nature of products manufactured within the economy.

4.2.5.1 The Pigouvian Taxation of Production

Pigou observed that the marginal private cost of products to firms may diverge from the marginal costs to society of such production (Pigou, 1950). Producers of a particular product may emit pollutants into the atmosphere and cause uncompensated damage (even irreversible ecological damage) to the environment and public health. The cost of production of the commodity and the resultant pollution is therefore excessive. Pigou suggests that the marginal private costs of production by companies can be brought into line with social costs by imposing a suitable tax on the output of the product which is a source of pollution.

Pigou's approach has some shortcomings which detract from it's consideration as a viable policy alternative.

1. It may be inefficient to regulate the level of pollution by controlling the quantity of production. The emissions tax, reviewed in Section 3.2, regulates the offending pollution directly. This criticism is best illustrated by way of an example. In a particular production process pollution may result from the use of a particular input. This input may have a slightly more expensive substitute. The emissions tax would encourage the use and search for substitute inputs with better pollution characteristics whereas the Pigouvian tax will merely result in a lower quantity of the product produced and continued use of the cheaper input, i.e. the input that contributes most to the pollution problem (see Tisdell, 1983, pp.365-366).

2. A further criticism relates to the fact that reduction in production levels may be sub-optimal, especially where the producer is a

monopolist and has already created an artificial scarcity for his products (Tisdell, 1983, p.356).

A contrary view is expressed by Victor (1972, pp.42-43):

> '... this form of pollution control ... is appealing for several reasons. It could be implemented relatively quickly since only rough measures of effluents are required given that in this system of control, effluent discharge is not the tax base and therefore does not need to be measured precisely.'

This comment, whilst justifiably highlighting the difficulties associated with effluent discharge measurement, does not provide a sufficiently strong argument for further consideration of the Pigouvian product tax.

4.2.5.2 Restrictions on Goods Produced

Restrictions on goods produced are subject to similar criticisms as the Pigouvian product tax, namely that it may be inefficient to regulate the level of pollution by way of restrictions on the type and quantity of goods produced. Furthermore, concerns regarding administration, monitoring and enforcement of restrictive, prohibitive legislation seriously detract from this policy suggestion. The question as to whether consumption of specific goods is socially undesirable and whether consumption growth should be discouraged is afforded brief consideration in Section 4.2.6 below.

4.2.6 Consumption of Final Goods

The consumption of goods, demand stimulation and economic growth are closely related. Whilst pollution is directly related to these parameters, it is submitted that resource destruction and wastage are more immediate concerns. For a discussion of

these parameters see Section 5.3.4.

4.2.7 Research and Development (R and D)

The United States survey of executive viewpoints regarding environmental protection incentives, see Section 4.3.1, revealed a surprisingly high ranking for government sponsored R and D. It must be inferred that executives perceive the need for technological advancement in the engineering of environmental protection as well as improved understanding of environmental impacts and regulatory mechanisms. It is suggested that the unfortunate spate of poorly researched regulatory mechanisms hastily imposed on the business community during the early 1970's in the United States resulted in wisespread discredit of motivations for environmental protection. It is recommended that South African legislators and environmental protection agencies comprehensively research regulatory proposals prior to their implementation. It is essential that businessmen do not become alienated from environmental considerations if environmental protection and related legislation are to be successful (Rabie, 1984). These observations are of particular relevance in South Africa where environmental legislation is frequently viewed as an infringement of property rights.

Submissions to the Planning Committee of the President's Council reveal a high regard for research and development activities, e.g.:

> The Wildlife Society of Southern Africa pointed out that in the conservation sphere funds are needed mainly for ... (inter alia) research.
>
> (Report of the Planning Committee of the President's Council on Priorities Between Conservation and Development, 1984, p.27)

Discussions with prominent conservationists, e.g. Rabie (1984), Grindley (1984), Greg (1983) and Stroebel (1984) also revealed a high priority for expansion of research and development activities.

R and D Incentives in South African Income Tax Legislation

The general deduction formula (Section II(a)) in The Income Tax Act No. 58 of 1962 requires expenditure to be, amongst other things, 'in the production of income' and 'not of a capital nature' prior to qualification for a deduction in the tax computation (see Section 3.7.1 for the required computation format). Extensive case law and literature have been devoted to the definition of these terms (e.g. Silke, Divaris and Stein, 1982, pp.315-329). It is considered that expenditure on scientific research may possibly not be considered to be expenditure in the production of income (see Meyerowitz, 1984, pp.216-219). The expression 'scientific research' is defined in Section 1. It means 'any activity in the field of natural or applied science for the extension of knowledge' (see Silke, Divaris and Stein, 1982, pp.598-602).

Section 11(p) specifically provides for a deduction of expenditure on scientific research incurred by the taxpayer during the year of assessment:

(i) for the purpose of scientific research undertaken by him for the development of his business if such expenditure is not of a capital nature; or

(ii) by way of contributions to any association, institute, college or university, to be used in scientific research relating to the taxpayer's own business, if the Council for Scientic and Industrial Research certifies to

> the Commissioner that it approves the proposals of the body concerned in regard to such research and that it is satisfied that such contributions will be used in such research.

Expenditure not of a capital nature will include such things as salaries paid to staff, rentals for laboratories, materials used in experiments, but not the building of a laboratory or its equipment (Meyerowitz, 1984, p.282).

Capital expenditure incurred for the purpose of scientic research may be deducted in terms of Section 11(q). This section may be summarised as a deduction of:

- 25% per annum of such expenditure
- over 4 years
- provided that the CSIR certifies, each year, that such research was carried on and was financed by such expenditure

(Huxham and Haupt, 1984, p.63)

Section 11(2) proviso (ii) provides for a recoupment if, in any year, the research is discontinued, or a certificate is not obtained from the CSIR. The recoupment is calculated as follows:

> Total deductions less 1/10th of such expenditure for each completed period of one year (not exceeding 10) during which such research was carried on.

An excellent example illustrating these provisions is to be found in Silke, Divaris and Stein (1982, pp.601-602).

It should be noted that the deduction is allowable for the first time in the year when research

commences, which may be after all expenditure has been incurred (Silke, Divaris and Stein, 1982, p.599). This condition may significantly reduce the value of the incentive to the firm due to the time value of money. Silke et al suggest that wear and tear in terms of Section 11(e) may also be claimed on machinery, implements, utensils and articles used by the taxpayer for the purpose of his trade (1982, pp.599-600). It is submitted, however, that this suggestion cannot be assumed by the taxpayer (Hassan, 1984).

Comment

1. The allowances in Section 11(p) and Section 11(q) grant a full deduction of research and development expenditure incurred, subject to compliance with the provisions. It is submitted, however, that these deductions provide inadequate incentives for research and development expenditure on pollution control equipment by the polluter. The value of the deduction is dependent upon the tax rate and the time lag between expenditure and relief from taxation. Research and development expenditure on pollution equipment is unlikely to result in significant financial returns to the researcher or developer. As such the net present value of the incentives should exceed the net present value of expenditures incurred. Where research and development does not result in financial gains significantly larger incentives are needed.

2. The inadequacy of current research and development incentives, in the Income Tax Act, warrants urgent review in the context of pollution control. Supplementary incentives, e.g. cash subsidies, need to be investigated.

4.3 Pollution Control Policies - The Executive Viewpoint

Private enterprise and, indeed, most public corporations are profit motivated. As such an incentive designed to encourage a specific investment or to promote control over residual emissions must be adequate to induce a response from the businessman or corporate decision maker.

4.3.1 The Executive's Choice of Incentives

Both the Diamond (1970) survey and the follow-up by Kefalas and Carrol (1976/1977) revealed similar executive preferences in the United States. The constancy in these ratings are contrasted with marked variations in attitudes towards government regulation discussed in Chapter 3.3.4. The results of the later survey are presented in Table 4.1 below (Kefalas and Carrol, 1976/1977, p.237):

TABLE 4.1 : Managerial Response to the Question: Please Rank Incentives in Terms of their Effectiveness in Facilitating Environmental Protection

Incentives	Not Important	Not too Important	Fairly Important	Quite Important	Extremely Important	Rank
Tax credits for pollution control costs	5,0%	12,2%	13,7%	25,9%	43,2%	2
Government cash grants matching company expenditures	19,4	19,4	26,9	23,1	11,2	5
Government subsidies	24,8	22,6	24,1	16,5	12,0	4
Government sponsored research and development	7,5	25,4	25,4	21,6	20,1	3
Passing on costs to consumers	7,3	5,8	11,7	24,1	51,1	1

These results demonstrate that executives in the Unites States, approximately five years after the establishment of the Environmental Protection Agency and a host of environmental legislation, have the following preferences:

1. Policies designed to pass on pollution control costs to the consumer are most highly favoured. Examples of such policies include the emissions tax and the Pigouvian product tax.

2. Tax credits for pollution control costs are a close second choice. Included in this category would be investment exemptions, the investment and initial allowances and tax credits. This surprisingly low rating probably reflects an anticipation of administrative delays and inefficiencies in the processing of grants and subsidies (Goldberg, 1984).

3. Research and Development incentives are also rated highly whilst subsidies and cash grants are assigned a low preference.

4. It is notable that every incentive category was rated as fairly important to extremely important by at least 50% of the respondents. This observation indicates the relevance of the extremely diverse financial policy alternatives at the disposal of the authorities. It is necessary to integrate these various policies into an acceptable and effective armoury of environmental legislation.

A similar survey of South African executive viewpoints would be of interest although a lack of exposure, to both effective restrictive legislation and the alternative financial incentives, would detract from the results obtained.

Additional Comments

1. Fiscal incentives extended within the tax system, e.g. investment exemptions, the investment and initial allowances and tax credits, are only effective if the taxable entity has taxable income. Where the entity exhibits an assessed loss, these taxation incentives will prove much less attractive as the eventual cash flow benefit is reduced by uncertainty and the time value of money (Hassan, 1984).

2. The effectiveness of the investment exemption, investment allowance and initial allowance are also dependent upon the marginal tax rate. A higher rate of taxation will result in these incentives yielding larger cash flow savings to the entity. Investment tax credits are not sensitive to these tax rate changes. The following example illustrates the effects of changes in the corporate tax rate.

EXAMPLE 4.3

Assume Company Y has taxable income of R100 000 and has justifiably claimed investment exemptions amounting to R5 000, an investment allowance of R10 000, an initial allowance of R5 000 and an investment tax credit of R3 000. If the corporate tax rate was (a) 75% or (b) 25% the attractiveness of the incentives would be changed dramatically:

	Corporate Tax Rate	
	75%	25%
	R	R
Gross Income	100 000	100 000
Less Exempt Income	5 000	5 000
Income	95 000	95 000
Less Deductions (Investment and Initial Allowances)	15 000	15 000
Taxable Income	80 000	80 000
Taxation thereon	60 000	20 000
Less Tax Credits	3 000	3 000
Taxation Payable	57 000	17 000

Tax savings resulting from:		
Exempt Investment Income + Investment and Initial Allowances	20 000 x 75% = R15 000	20 000 x 25% = R5 000
Investment tax credits	R3 000	R3 000

3. The effectiveness of all financial incentives granted within and outside the taxation system are dependent upon the time value of money. The longer the time lag between the investment expenditure and the receipt of financial relief, the greater the dimunition in the value of the incentive. Furthermore, the higher the rate at which future income streams are discounted, the lower the present value of these financial

incentives. The following example illustrates these relationships.

EXAMPLE 4.4

Assume company Y justifiably claims taxation incentives which reduce the tax liability by R10 000. The present value to the company of this tax saving with differing discount rates and lag periods would be:

Lag Period (years)	Discount Rate (values rounded off to nearest R100)			
	5%	10%	15%	20%
1	9 500	9 100	8 700	8 300
3	8 600	7 500	6 600	6 100
5	7 800	6 200	5 000	4 000
7	7 100	5 100	3 800	2 800
10	6 100	3 900	2 500	1 500

4.4 Conclusions and Recommendations

1. Investments in pollution control equipment are different to other commercial investments in that

   - expected returns from the investment are, usually, not material;

   - the investment decision is not subject to 'gut feel' business acumen but is primarily dependent upon the net present value of financial incentives received and fines, taxes or charges avoided.

2. Existing incentives for investment in pollution control equipment and the pursuance of pollution control research and development are inadequate.

3. These investments should be encouraged by employing a number of complementary policy mechanisms.

4. The specific policies, and associated strategies, deserving further investigation are:

Pollution Equipment

- Greater utilization of the 'extended' initial allowance (see Section 4.2.2.2.2(a)).

- Lobbying for cash grants and subsidies (see Section 4.2.2.2.2(a)) and (Section 4.2.2.2.2(b)).

- Investigation of the feasibility and applicability of a residuals tax (see Section 4.2.3.2).

Research and Development

- Lobbying for larger Section 11(p) and Section 11(q) incentives for research and development into pollution control equipment (see Section 4.2.7) and

- Lobbying for cash grants and subsidies (see Section 4.2.7).

CHAPTER 5 : RESOURCE DESTRUCTION

5.1 Introduction - The Resource Concept

Economics is often defined as the science of allocating scarce resources (Lecomber, 1979, p.1). The fundamental economic problem is that the goods and services society wishes to consume are generally scarce, i.e. demand exceeds supply at zero price (Senecca and Taussig, 1979, p.6).

Randall elucidates the complex concept of resources as follows:

> '... it may be easier to define what is not a resource. First, things that are unknown or for which no uses have been found are not resources, since they have no value. Similarly things that, while useful, are available in such huge amounts relative to demands that they have no value, are not resources. 'Resource' is a dynamic concept, and the possibility always exists that changes in information, technology and relative scarcity may make a valuable resource out of that which previously had no value. Second, things that are produced under human guidance in processes that combine resources, capital, technology, and/or labor, are not themselves called resources, although resources are always among the inputs used to produce them.'
>
> (1981, p.14)

The above exposition clearly conveys the quantity, quality, time and space dimensions to the resource concept. The dynamic nature of resource recognition dictates a cautious utilization of the natural environment as it harbours many, as yet, unidentified resources. Furthermore, numerous biological resources are susceptible to irreversible destruction. A modification of the utilitarian ethic has therefore been suggested so as to:

- bias decisions against irreversible choices;
- bias decisions in favour of offering special protection

to those ... (resources) especially vulnerable to our actions and choices and to

- bias decisions in favour of sustainable rather than one-off benefits.

(Goodin, 1983, p.16)

In the context of environmental concern, resource destruction is defined by Stauth as:

> '... the removal or dispersion of natural concentrations of materials that impairs some ecological process, or depletes some environmental resource which is capable of yielding benefits in perpetuity.'
>
> (In Fuggle and Rabie, 1983, p.85)

Stauth's definition of resource destruction is useful in that it recognises the ecosystem and ecological processes as a gestalt, i.e. systems in which the whole is greater than the sum of the component resources. The destruction of component resources could well result in an impaired 'whole'.

Resources may be conveniently classified into three sub-categories:

1. Stock Resources or Exhaustible Resources
   e.g. mineral deposits

   These resources exist in given stocks in given places; their distribution and quantity varying in geological time, thus extraction could lead to exhaustion. Their quantity is measurable, usually in terms of mass or volume and their quality in terms of mineral content but many also have intangible aspects, such as aesthetic qualities (Randall, 1981, p.14).

2. Flow Resources e.g. radiation from the sun

   A flow resource must be utilized when it is available. If it is not stored or captured it is effectively lost. The quantity dimension of a flow resource is measured

in mass, volume, or energy units per unit of time. Quality attributes render it suitable or unsuitable for the intended use.

3. Renewable Resources e.g. biological resources

> 'The worst thing that can happen - will happen (in the 1980's) - is not energy depletion, economic collapse, limited nuclear war, or conquest by a totalitarian government. As terrible as these catastrophes would be for us, they can be repaired within a few generations. The one process ongoing in the 1980's that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our decendents are least likely to forgive us.'
>
> (Wilson; In Fisher, 1981, pp.75-76)

The demand for environmental resources is now growing so rapidly that even the oceans and the very atmosphere are being subjected to great impacts, and terrestrial ecosystems and biological species are being eradicated at a breathtaking rate (Fuggle and Rabie, 1983, p.85). Ecological interdependencies exacerbate the impacts of over-exploitation of natural resources. Given the flow of solar energy, the biological capacity for reproduction, and human restraint, biological resources are renewable. Not automatically self renewing, but renewable given human restraint and sound husbandry (Randall, 1981, p.16).

Man derives value from the complex system of solar, atmospheric, geological, hydrological, and biological resources by using them as inputs in production processes, by consuming them directly, and by deriving satisfaction from the amentities they provide (Randall, 1981, p.16). Even non-consumption activities, e.g. outdoor recreation, may adversely affect these resources. The challenge to man is to effectively manage the resources of the planet so

as to maximise the benefits derived from these resources. The challenge has a time dimension that is absolutely critical (Randall, 1981, p.16). Barbour claims that:

> 'Conservation and restraint in consumption are necessary for the sake of posterity as well as for the sake of developing nations today, yet current economic and political institutions are orientated almost exclusively toward short run costs and benefits.'
>
> (1980, p.5)

Resource allocation and exploitation policy problems are extremely complex as the various categories of resources are components of highly complex interactive systems. Modifications or overutilization of components of the poorly understood system may well impair the efficacious operation of the system. Furthermore, the resource utilization policies need to be solved within a complex social and institutional environment.

> '... Resource related decisions ... are made within a complex institutional structure that assigns legal rights and liabilities and thus establishes the structure of incentives.'
>
> (Randall, 1981, p.19)

This chapter aims to introduce the South African financial legislation relevant to resource exploitation and destruction as well as aspects of the control over such activities, both proposed and currently incorporated in environmental legislation.

5.2 Chapter Structure

Figure 4.3 in Section 4.1.2 illustrates the major topics for considerations in this chapter, namely resource usage, recycling of wastes and curtailment of consumption. These topics are further incorporated into the renewable resources, and exhaustible resources categorizations.

Resource Category	Policy Designed to Regulate
1. Exhaustible Resources (5.3)	Exploitation of Exhaustible Resources (5.3.2)
	Recycling of Wastes (5.3.3)
	Consumption of Final Goods (5.3.4)
2. Renewable Resources (5.4)	'Managed' and 'Unmanaged' Renewable Resources (5.4.1 and 5.4.2)

5.3 Exhaustible Resources

> 'Most academic economists now agree that the tax deductions available to firms exploiting finite reserves of natural resources should be abolished.'
>
> (O'Riordan, 1981, p.104)

In the South African context calls for the immediate withdrawl of financial advantages extended to the mining industry would be regarded as radically and politically unwise. In 1979 the (mining) industry employed an average of 719 444 workers ... consisting of 78 061 Whites, 628 487 Blacks, 13 924 Coloureds and 972 Asians (Official Yearbook of the Republic of South Africa, 1983, p.488). Income Tax revenue earned from mining operations amounted to R1 872m in the 1983/1984 tax year (Statistical/Economic Survey, 1984, p.28). Export earnings, during the period January to July 1981, amounted to R6 449m (including cut diamonds and metal product exports), 63% of the total export value (Official Yearbook of the Republic of South Africa, 1983, p.928).

The importance of the mining sector to the South African economy demands that any change in financial policy relating to this sector must be thoroughly researched. The continued provision of financial incentives to mining operations with significantly negative environmental impacts should be reconsidered.

The Income.Tax Act No. 58 of 1962 provides generous taxation benefits to activities encompassed within the broadly defined terms of 'mining operations' and 'mining' (see

Section 5.3.1). O'Riordan suggests that not only do these taxation benefits encourage very wasteful exploitation practices, but they provide a massive public subsidy to corporations and reduce the price of resource extraction to a level well below social cost.

> '... the taxpayer is subsidising unnecessary depletion and unnecessary environmental damage.'
>
> (O'Riordan, 1981, p.104)

A decreased rate of resource depletion (see Sections 5.3.2 and 5.3.4), complemented by increased reuse and recycling (see Section 5.3.3) is required to reduce the risk of resource exhaustion as well as the minimisation of environmental damage. Apart from the policies associated with these objectives, a review of existing financial incentives, relevant to resource usage patterns, is presented in Section 5.3.1 below.

Environmental legislation applicable to the mining industry is directed at regulation of some of the immediate symptoms of the environmental concerns rather than at regulation of the activity directly.

An example is provided by the Mines and Works Act 27 of 1956 which empowers the State President to make regulations as to the conservation of the environment at or near any mine or works, including the restoration of land on which activities in connection with mines or works are performed or have been performed (Section 12(1)(hA)). Fuggle and Rabie (1983, p.469) cite examples of the regulations that have been issued, e.g. rehabilitation of the surface at open cast mines. The Water Act 54 of 1956 regulates the use of water for mining purposes (see Fuggle and Rabie, 1983, p.315).

5.3.1 Provisions of The Income Tax Act No. 58 of 1962 relating to Mining

The definition of 'Mining Operations ' and 'Mining' are extremely broad. Section 1 defines the terms to include:

> '... every method or process by which any material is won from the soil or from any substance or constituent thereof.'

This definition is a very wide one and its reference to 'every method or process' makes it clear that it is not confined to underground working but also to surface excavations : it will include the winning of materials from the sea-bed by way of dredging or other process (Meyerowitz, 1984, Section B : p.513).

The Act does not define the term mineral. A number of cases have, however, provided insight. In Boksburg Brick and Fireclay Limited v CIR (1941 T.P.D. 232 (12 SATC 225)) it was held that the extraction of fireclay from an open working amounted to a mining operation. In COT v Nyasaland Quarries & Mining Co. (1961 24 SATC 1969) the court found that quarrying of gneiss constituted a mining operation. The word 'mineral' was given a wide definition by the court:

> '... any mineral that can be got from within the surface of the earth, which possesses a value in use, apart from its mere possession of the bulk and weight which makes it occupy so much of the earth's crust.'

It can be said, therefore, that 'mining operations' and 'mining' are not confined to winning precious stones or metals or base metals such as manganese, coal, tin, tungsten, salt, limestone, etc., but

embrace clay used for brick making, or granite or stone or slate used for building (Meyerowitz, 1984, Section B : p.514). Meyerowitz submits further (1984, Section B : p.514) that, on the basis of Fulcon Investments v C D of Birnham (1973 (4) SA 384 (AD)), not only rock but also ground or sand used for an industrial purpose or even for road-building falls within the term 'mineral'.

These very broad definitions incorporate many activities with potentially profound environmental impact. It is, therefore, of particular importance to review the specific provisions in The Income Tax Act relating to 'mining operations'.

Capital Expenditure

The broad definition of capital in the case of mining operations makes the capital expenditure allowance in The Income Tax Act a very significant taxation deduction (Du Toit, 1984).

Persons carrying on mining operations are allowed to deduct from income from mining each year the capital expenditure incurred by them in carrying on such mining operations (Section 15(a)). It must be noted that this deduction is granted in lieu of the Section 11 and 12 capital allowances provided to manufacturing concerns (see Section 4.2.2.2.2). The expenditure is deductible in the year in which it is incurred (Once the mine has reached the production stage - Silke, Divaris and Stein, 1982, p.1097). This deduction amounts to 100% of the cost of capital expenditure (less recoupments - para. j of the definition of 'gross income' in Section 1 read together with Section 36) as against the proposed spread of this expenditure over a specified period of time for manufacturing concerns (see Section 4.2.2.2.2).

The terms 'capital expenditure', 'capital expenditure incurred' and 'expenditure' are defined in Terms of Section 36(11). The term 'capital expenditure means':

(a) Expenditure on shaft-sinking and mine equipment, and the cost of laying pipelines from the mining block to the marine terminal or the local refinery of a natural oil mine.

Silke, Divaris and Stein elucidate this provision:

> 'As to what may be called the equipment of a mine, see Union Government v Hourse Mines Ltd 1912 TPD 924. All the apparatus necessary for carrying on mining may be called the equipment of a mine. Inland Revenue regards buildings necessary for the carrying on of mining operations as part of the equipment of a mine.'
>
> (1982, p.1097)

The deduction would be available to capital expenditures on housing, canteens, sporting facilities and administration buildings, a great deal wider than the allowances given to manufacturing concerns (Du Toit, 1984).

(b) Expenditure on development, general administation and management (including any interest and other charges payable on loans used for mining purposes) prior to the commencement of production or during any period of non production, and

(c) The special amount determined in Section 36(11)(c) for any 'new gold mine', 'new deep level gold mine', 'post-1966 gold mine', 'post-1973 gold mine' (as determined in Section 1) or natural oil mine.

(For the calculation of this 'special amount' see the commentary in Silke, Divaris and Stein, 1982, pp.1111-1113).

The following example is designed to illustrate the essence of these provisions.

EXAMPLE 5.1

Y Mines Ltd has a financial year ending 31 March. At 31 March year 2, it incurred capital expenditure of R100 000. Assume the mine commences production on 14 October year 3 and incurs the following capital transactions:

Year of Assessment	Capital expenditure incurred	Proceeds of disposal of mining equipment
	R	R
1 April year 2 to 31 March year 3	600 000	100 000
1 April year 3 to 31 March year 4	500 000	20 000

Year of assessment 1 April year 2 to 31 March year 3

Balance of capital not yet expended at 1 April year 2	100 000
Add: Capital expenditure incurred during the year (R600 000 less R100 000)	500 000
Balance of capital expenditure not yet deducted at 31 March year 3 (The mine has not yet commenced production)	R600 000

Year of assessment 1 April year 3 to 31 March year 4

Balance of capital expenditure not yet deducted at 1 April year 3	600 000
Add: Capital expenditure incurred during the year (R500 000 less R20 000)	480 000
Deductible in full as production has commenced	R1 080 000

Prospecting

Expenditure incurred by a taxpayer during the year of assessment on prospecting operations in any area within the Republic for which a mining lease has not been granted by the State, together with any other expenditure that in the opinion of the Commissioner is incidental to such prospecting operations is deductible (Section 15 (b)).

> 'Prospecting operations include surveys, boreholds, trenches, pits and other exploratory work preliminary to the establishment of a mine.'
>
> (Silke, Divaris and Stein, 1982, p.1102)

Where the prospector derives income from the sale of mining rights and claims, it is the practice of Inland Revenue to permit the taxpayer to deduct non-capital expenditure on prospecting and exploration in terms of Section 11(a) (Du Toit, 1984).

For the purposes of undistributed profits tax a prospecting allowance, 'consisting of amounts lent to or invested in a company for prospecting operations' (Huxham and Haupt, 1984, p.167), limited by a specified computation, is available (Section 49 (v)).

Additional Comments

1. Companies carrying on diamond mining operations are liable to pay normal tax as follows:

   - On their taxable income derived from mining for diamonds, a tax of 45% of taxable income plus a surcharge of 15% of the tax (for the 1984 tax year).

   This higher rate of taxation is compensated by the generous capital expenditure allowances provided in Section 15(b). Diamond mines are

exempt from the undistributed profits tax (Section 50(b)). If the sole or principal business is mining for diamonds in the Republic, the company is exempt from donations tax (Section 56(1)(n)).

2. Gold mines are similarly exempt from the undistributed profits tax and donations tax.

   The rate of taxation of gold mines is based on a sliding scale formula which differs for various categories of gold mines (see Franklin and Kaplan, 1982, pp.725-730). The formula has the effect of taxing a richer mine at a higher rate than the rate applicable to mines of lower profitability (Franklin and Kaplan, 1982, p.726).

   Wiles (1984) submits that the formula has the effect of varying the rates of taxation paid by the gold mines between 8 and 75%. This rate being dependent upon capital expenditure, ore grade and gold mining revenues. Wiles (1984) suggests further that the formula results in mines working lower grade ores when prices received are high, thereby limiting the tax liability.

3. Certain goods purchased for mining and quarrying operations enjoy exemptions from general sales tax (see The Sales Tax Act 103 of 1978, Schedule 2, Division III). These exemptions are directed primarily at explosives, chemicals, safety equipment and clothing.

4. 'Expenditure on maintenance and preservation of the environment is a necessary expense in mining operations and is accordingly deductible from income. This includes expenditure incurred in the prevention or control of atmospheric pollution,

> dust control, grassing of dumps, pollution of water from mine residues, and in carrying on reclamation work on the mine property.'
>
> (Franklin and Kaplan, 1982, p.710)

The Income Tax Act does not provide for the carry-back of expenses incurred relating to shut-down costs. Mines contribute towards a 'trust fund', the payment being deductible in the year in which it is made, thereby overcoming this potential 'disincentive' (Wiles, 1984). The sufficiency of these payments in meeting desirable rehabilitation costs needs to be investigated.

Talkenberg, 1982, observed that:

> 'No major rehabilitation efforts take place (for diamond mining activities) on the West Coast.'
>
> (p.173)

Furthermore:

> 'Such rehabilitation costs are roughly estimated to be of the order of ... 1 to 2,5% of mine revenue. This would have little effect on the economic viability of mines.'
>
> (p.175)

5.3.2 Exploitation of Exhaustible Resources

The accelerating demand for natural resources, particularly dramatic in the twentieth century, 'necessarily speeds up the use of societies depletable resources: its iron ore, its petroleum supplies, and its stocks of other mineral and fuels' (Baumol and Blinder, 1979, p.660). The result of this increased usage is that smaller stocks of these resources become available to future

generations and greater waste disposal problems are experienced.

> 'The physical laws of conservation of matter and energy tell us that no raw material can ever disappear. It can be transformed into smoke or solid waste, but unless it is recycled entirely (something that is beyond the capability of our technology and impractical for other reasons), the greater the quantity of resources used in the productive process, the greater the quantity of wastes that must ultimately result.'
>
> (Baumol and Blinder, 1979, pp.660-661)

Many economists (e.g. Baumol and Oates, 1979, p.97) claim that there is no danger of total exhaustion of our resources, the increasing costs of extraction will help resolve the problems. It is suggested that increased costs of extraction will stimulate the exploration for new reserves, the development of substitutes or the development of technology and structures to facilitate greater recycling (for a counter-argument see Section 5.3.2.1).

> 'The only certain feature of the resource situation is its inherent uncertainty.'
>
> (Lecomber, 1979, p.32)

Many economists have entered the debate surrounding the adequacy of natural resources. Little unanimity is evident. The enormous uncertainty relating to the adequacy of the stock of resources left to future generations necessitates the 'exercise of prudence' (Lecomber, 1979, p.34).

A further problem with the extreme optimist viewpoint is that resource extraction frequently imposes significant impact upon the environment (see for example; Talkenberg, 1982 and Ven et al, 1979). With regard to diamond mining on the West Coast

Talkenberg (1982, p.183) observed that:

> 'Although there is evidence of some natural revegetation occuring, this is not adequate to provide ecological stability of the land or to allow a constructive future land use.'

Ecological constraints necessitate a cautious tampering 'with the intricate interrelationships of even small ecosystems' (Stauth, 1980, p.75). Some economists talk about meeting the world's mineral needs 'from the mining of common rock and the distillation of sea-water' (e.g. Dasmann, 1975, p.62). These suggestions are extremely optimistic about 'man's innovative ability to overcome environmental constraints. It is submitted that a well considered and ecologically informed resource policy would dictate the encouragement of recycling and the gradual phasing out of the inordinate financial advantages bestowed upon the mining industry.

In Section 5.3.1 the enormous incentives available to the mining industry were introduced. Apart from the phasing out of such advantages, a number of additional resource exploitation control policies have been suggested. These are reviewed in Sections 5.3.2.1 and 5.3.2.2 below.

5.3.2.1 The Resource Depletion or Severance Tax

A resource depletion tax is a punitive tax measure which is raised or lowered according to the relative scarcity of the resource in question. Such a tax should discourage unnecessary depletion and promote more efficient extraction practices, thereby expanding the economic life of all resources (O'Riordan, 1981, p.105).

The form of the resource depletion tax is flexible, e.g. in 1973 the government of British Columbia, through its Mineral Royalties Act, imposed a

superroyalty on mineral extracting companies. This amounted to 50% on all revenues in excess of that guaranteeing a 20% return on investment. Lecomber and Fisher defend the resource depletion tax against arguments expressing the viewpoint that:

> '... if a resource becomes scarce, its price rises, thus encouraging exploration, economy in use and the development of substitutes.'
>
> (1978, p.14)

It is argued that:

1. Current policies reflect a general neglect for the future. A greater stimulus to save, a general discouragement of consumption and the encouragement of socially desirable investment is needed (Lecomber and Fisher, 1978, p.14). The current system is seen to be biased against the future.

2. Short time horizons, characteristic of private sector investment appraised techniques and government policies mitigate against resource conservation, the advantages of which are distant (see Lecomber and Fisher, 1978, p.15). Greater economic certainty, frequently characterised by low inflation and interest rates, would help promote a longer time horizon (Mark, 1984). Greater economic certainty would help promote a longer time horizon but would not be sufficient to ensure resource conservation for future generations. Additional measures are required to counter the dominant utilitarian ethic.

3. Various empirical studies indicate that real costs of resources have fallen over the last century (see for example Barnett and Morse, 1963).

Fisher claims that:

> '... evidence ...suggests a decline in the real price of exhaustible resources over a period of many decades. On the other hand, newer evidence, more sketchy, suggests that the decline may have come to an end and is, in fact, beginning to reverse. So price, at least for many exhaustible resources appears to be following a U-shaped path.'
>
> (1981, p.107)

The levelling off in prices observed by Fisher is explained by the increased difficulty in finding new sources of the resource and that costs cannot be decreased indefinitely. Proponents of the resource depletion tax argue that prices (through unavoidable government intervention) can be adjusted so as to time the rate of resource extraction to socially optimal levels (see Herfindahl and Kneese, 1974, pp.114-184). It is argued that the role of the depletion tax is to ensure that all social costs are reflected in the resource price.

It is interesting to note that Franklin and Kaplan consider that 'there is something to be said for a depletion allowance' granted for mining operations although, they submit, 'it would be difficult to grant such an allowance where it could not be based on actual cost of acquisition' (1982, p.717). This allowance is, in effect, a residuals tax in reverse and would further extend the already generous provisions at the disposal of 'mining operations'.

Arguments in Favour of the Resource Depletion Tax

1. The resource depletion tax employs flexible pricing mechanisms as against cumbersome administrative machinery.

2. It is efficient as the resource extractor would reduce extraction to the point where marginal social benefit of reduced extraction equalled the marginal social cost of achieving that reduction (see Randall, 1981, pp.219-221).

3. The tax can easily be varied temporally, spatially and between different resources.

4. The tax would yield much needed revenue to the government. This revenue could be earmarked for specific environmental objectives.

Criticism of the Resource Depletion Tax

1. Environmentalists would probably assert that the tax would result in the maximum acceptable level of resource extraction.

2. This policy may be regressive and thereby impose a higher cost on the poor (see Lecomber and Fisher, 1978, pp.27-36). The extent of this regressivity would be negligable in the case of export minerals, e.g. gold and diamonds, but high in the case of coal and other minerals affecting the prices of consumer products.

3. Each mining operation reflects different cost structures, ore yields and financial margins. The resource depletion tax could result in the 'pricing out' of less economic enterprises (Ashby, 1972, p.68).

Some governmental jurisdictions have instituted depletion allowances, which are, in effect, negative severance taxes (Randall, 1981, p.221). The effect of a depletion allowance is to increase extraction rates. South African Revenue Law does not contain a depletion allowance but the extensive fiscal advantages extended to 'mining operations' are similar in effect (see Section 5.3.1).

5.3.2.2 Quotas

Daly (1973, pp.160-163) recommends a system of extraction quotas. The quotas could be auctioned by government, thus providing a source of revenue, and would represent tradeable rights for investors. Rates of resource extraction could be varied by government purchasing or selling quotas. The idea is to regulate depletion to predetermined levels so as to slowdown the rate of resource throughput. The revenue from the depletion quota auctions would be used to encourage appropriate technologies.

Although this suggestion is interesting and deserves further investigation, it is hard to envisage how such a scheme could be implemented given present day political, economic and legal realities (Goldberg, 1984).

5.3.3 Repair, Re-use, Recycle

Denis Hayes, a senior researcher at the Worldwatch Institute submits that:

> '... it is technically possible to recover at least two-thirds of the resources that most people waste. With some thrifty life-style changes, using products designed for durability and ease of recycling, the waste streams of the industrial world could be reduced to a small fraction of their current size. And with an intelligent materials policy, the proportion of our resources that are irretrievably dissipated could eventually be reduced almost to zero.'
>
> (1979, p.76)

The need to expand recycling activities is almost unanimously agreed upon:

> 'Certainly recycling has a useful role to play in conserving resources and avoiding pollution.'
>
> (Lecomber and Fisher, 1978, p.16)

But it may be more efficient to encourage re-use of products as:

> 'Recycling can itself be a prodigous user of energy and other resources besides giving rise to pollution.'
>
> (Pearce, In: Lecomber and Fisher, 1978, p.16)

Randall (1981, pp.221-222), whilst recognising the potential of resource recycling, points out that:

> 'Resource recycling is often regarded, by its enthusiasts, as mankind's best hope for extending the availability of natural resources into distant time periods. It must be recognised, however, that recycling is not a costless process. The Second Law of Thermodynamics indicates that, in a closed system, infinite recycling is impossible ... Given that recycling is a costly process, the resource user will choose between newly extracted resources ..., recycled resources (and reuseable products).

The South African legislation clearly favours the purchase of new or unused products, particularly plant and machinery. Hayes suggests that: 'Underlying this (the stimulation of increased production and consumption) is an implicit policy to encourage the use of virgin materials' (1979, p.76). The relative importance of the mining and extractive industries in the South African economy together with their favourable tax treatment lend 'credence to Hayes' suggestion.

Although South Africa is well endowed with most minerals, these resources are not finite and their extraction, processing and eventual disposal frequently result in significant environmental impact. Prudence and environmental sensitivity suggest the need to investigate the extent of comparative disincentives to re-use, recycle and repair in current financial legislation.

5.3.3.1 Current Legislation
Capital Allowances - Normal Taxation

The capital allowances currently provided for in The Income Tax Act favour the purchase of new equipment as against used equipment and erected buildings as against purchased buildings. Furthermore, many recycling and repair activities, which are classified as 'processes similar to manufacture' are not eligible for the bonus investment allowance. These observations are reviewed in greater detail in Tables 5.1 and 5.2 below.

Table 5.1 illustrates the current qualification criterion for income tax allowances on investments in machinery. The investment allowance, a bonus 30% allowance, is only extended to investment in new equipment used directly by the purchaser or lessee in a process of manufacture.

Table 5.2 illustrates the comparative incentive advantages given to the erection of buildings to house a process of manufacture as against the purchase of existing structures or even the erection of such structures if they house a process similar to that of manufacture.

TABLE 5.1 : A Simplified Summary of Existing Machinery Allowances

		Purchase or lease (greater than 5 years (Section 12(5)(a))	
		New Machinery	Used Machinery
MACHINERY EMPLOYED	Directly in a process of Manufacture	Investment Allowance - 30% of cost (Section 12(2)) Initial Allowance - 25% of cost (Section 12(1)) Wear and Tear Allowance - 75% of cost* (Section 11(e))	Initial Allowance - 25% of cost (Section 12(1)) Wear and Tear Allowance - 75% of cost* (Section 11(e))
	In a Similar Process	Initial Allowance - 25% of cost (Section 12(1)) Wear and Tear Allowance - 75% of cost* (Section 11(e))	Initial Allowance - 25% of cost (Section 12(1)) Wear and Tear Allowance - 75% of cost* (Section 11(e))

* Over such period considered reasonable by the Commissioner

TABLE 5.2 : A Simplified Summary of Existing Building Allowances

BUILDING EMPLOYED		Purchase or lease (greater than 10 years)	
		Erected	Purchased
	In a Process of Manufacture	Building Investment Allowance - 30% of cost (Section 13(5)) Building Annual Allowance - 2% of cost deductable p.a. (Section 13(1))	Building Annual Allowance - 2% of cost deductable p.a. (Section 13(1)) (for buildings constructed 25.3.1959 to 14.3.1961)
	In a Similar Process	Building Annual Allowance - 2% of cost deductable p.a. (for buildings constructed after 14.3.1961)	

The Process of Manufacture

The Act does not define this term but various court cases have laid down guidelines:

1. For there to be a process of manufacture the article produced must be essentially different from the article as it existed before it had undergone the process, bearing in mind that there is an element of degree in determining the sufficiency of the change that must be affected. The change may be in the nature, form, shape, or utility, etc. of the material or substance subjected to the process (Meyerowitz, 1984, Section B : p.301).

2. It must be a complete process in the sense that, it must be continuous without a break which would indicate the end of the process. All machinery used in that process will then qualify for the allowance if it is to be regarded as a process of manufacture (Huxham and Haupt, 1984, p.75).

A list of activities considered by the Commissioner as processes of production is presented in Table 5.3.

Processes Similar to Manufacture

A process similar to a process of manufacture must be described as such by the Commissioner (see Section 12(1)(c) and Section 12(2)(a)).

The table below indicates the great diversity of activities falling into both categories. Various processes considered useful from a resource conservation viewpoint are to be found in both categories. Although the legal classifications of the processes may be consistent, the classifications, which are essential to the qualification for the bonus investment allowance, do not consistently

promote recycling, refurbishing or reconstruction.

TABLE 5.3 : Processes of Manufacture and Similar Processes

Process of Manufacture,e.g.:

- the reconditioning of motor vehicle engines if carried out by automotive engineering establishments registered with the National Industrial Council for the Motor Industry

  : crankshaft grinding equipment;

  : reboring and honing equipment, etc.

- the compression and cutting of scrap metal.

Processes Similar to Manufacture, e.g.:

- shoe repairing
- reconditioning of oil and other drums
- repair of grain and other bags
- collecting and bailing of wastepaper for industrial use
- reconditioning, repair and repainting of containers
- reconditioning of injector pumps and turbo-chargers for diesel engines
- sorting and compacting paper waste

The proposed amendments to the capital allowances will similarly offer greater incentives to the purchase of new or unused machinery and to newly erected buildings used in a process of manufacture. The Report by the Standing Commission of Enquiry regarding capital allowances recommended that (1983, pp.19-21):

1. The machinery investment allowance should be abolished, effective from 30 June 1975, and the initial allowance extended for machinery used directly in a process of manufacture (pp.19-20). This extended initial allowance will probably only be available to new or unused machinery (Huxham, 1984; Van Blerk, 1984).

2. The building investment allowance should not be extended to buildings whose erection commenced later than 30 June 1985. An extended initial allowance is envisaged for these newly erected buildings, in which a process of manufacture is carried on (pp.20-21).

It is evident that The Income Tax Act, by way of generous capital allowances, has the effect offering financial advantages to manufacturers and, to a less pervasive degree, recycling whereas reuse and repair are at a comparative disadvantage.

Capital Allowance - Undistributed Profits Tax (UPT)

Section 49 (para iii of the definition of 'distributable income'), provides an allowance in the UPT computation for new or unused machinery to be used directly in a process of manufacture (see Huxham and Haupt, 1984, p.176 : Silke, Divaris and Stein, 1982, pp.913-916).

Repairs

A deduction is allowed for 'expenditure actually incurred during the year of assessment on repairs of property occupied for the purpose of trade or in respect of which income is receivable ...' (The Income Tax Act, Section 11(d)).

The Income Tax Act does not contain a definition of the word 'repairs', but the courts have (e.g.

ITC 617 (1946) 14 SATC 474) decided that a repair is:

1. restoration by renewal or replacement of a subsidiary part of the whole;

2. the materials used need not be the same as the original material, and

3. it must not be an improvement, i.e. a reconstruction of the entirety, and creation of a better asset.

(Huxham and Haupt, 1984, p.69)

The requirement that the expenditure be in respect of property occupied for the purpose of trade or in respect of which income is receivable reduces the potentially wide ambit of the deduction, e.g. the deduction would not be allowed for repairs to private motor vehicles or repairs to personnal clothing.

Certain repairs and maintenance expenditures are exempt in terms of the Sales Tax Act. The Sales Tax Act regards repair, maintenance, delivery, installation, restoration, alterations and embellishment activities as taxable services (see Schedule 1 to the Act). Certain exemptions are applicable, e.g. repair or maintenance services

- in respect of machinery or plant used directly in manufacture (Schedule 2, Division 1, para.3);

- in respect of certain mining capital equipment (see Schedule 2, Division 111, Items 400-402;

- in respect of certain farming equipment (see Schedule 2, Division iv, para.8).

The Sales Tax Act selectively encourages repairs and maintenance for particular industries.

Additional Comments

1. Certain rail tariffs may prejudice recycling industries (Raimondo, 1984). These tariffs sometimes reflect the relative bargaining strengths of the respective parties (Raimondo, 1984) and not the relative handling and transport costs to the authorities.

2. Certain items exempted from general sales tax, e.g. the sale of returnable containers to be let by a registered vendor (The Sale Tax Act, Section 6(1)(f)(iii)), encourage the use of re-usable goods.

3. Environmental legislation does not contain provisions requiring recycling or re-use of resources and products.

Section 5.3.3.2 introduces some additional financial policies designed to reduce resource wastage.

5.3.3.2 The Throughput Tax

> 'The throughput tax should provide a useful incentive to encourage recycling ... Part of the problem here is the legacy of outdated, growth-orientated legislation which actively encourages practices wasteful of resources.'
>
> (O'Riordan, 1981, p.108)

Mills (in Heller, 1972, p.24) suggested that original producers or importers of resource commodities should be charged a materials usage fee, the level of which would be adjusted to reflect the social costs of the most environmentally harmful manner of disposal. A refund of the fee is linked to the reduction in environmental impact as a result of disposal, the delay in such disposal or recycling. Mills submits that this materials usage fee would help reduce obsolescence.

> 'Thus the tax, in part, would reflect the rate at which a product passes from usefulness to disuse and would provide an incentive to promote product durability. In the absence of such a tax, consumer advocates, like Ralph Nader in the United States and Michael Young in the United Kingdom, have long urged strict regulations against planned obsolescence through performance guarantees.'
>
> (O'Riordan, 1981, p.108)

Toffler (1971, p.69) asserts that some businessmen are undoubtedly guilty of planned obsolescence 'in order to guarantee replacement sales'. Toffler suggests that:

> '... the fear of obsolescence drives the businessman to innovation at the same time that it impels the consumer toward rented, disposable or temporary products.'
>
> (1971, p.69)

Undesirable advertising (reviewed in Section 5.3.4.1) is suggested by Toffler as a significant contributory factor in the growth of product obsolescence (1971, pp.69-74). Lecomer and Fisher are critical of 'the myth ... of exogenously given preferences' (1978, p.21). They suggest that wastefulness is encouraged through advertising (Lecomber and Fisher, 1978, pp.21-23).

Three distinct approaches to help reduce product obsolescence have been suggested, namely:

1. a materials usage fee;

2. advertising controls, see Section 5.3.4.1, and

3. performance guarantees.

Each of these possibilities deserves further investigation.

A variant of the throughput tax is the deposit on bottles to encourage return and re-use. At present the deposit system has limited application in the South African context, primarily in the case of glass beverage containers. Zalop (1979, pp.613-616) suggests that convenience packaging may be combatted by anti-returnables legislation. It is envisaged that a deposit system on certain types of packaging could be employed to help reduce the solid waste management problem. Extensive experimentation with such legislation in the United States provides useful insight into the problems and possibilities (see Zalop, 1979, pp.611-628 : O'Riordan, 1981, p.109). The Oregon experience is well explored by O'Riordan:

> 'In an attempt to reduce litter and encourage recycling the Oregon legislature outlawed the 'pull-tab' beverage can and slapped a 5c deposit on containers ... The Council on Environmental Quality (1973) reports that, although beverage sales are unchanged, litter has decreased by 81%, the manufacture of containers has fallen sharply, and beverage prices have actually dropped.'
>
> (1981, p.109)

5.3.4 Consumption of Final Goods

The concepts of consumption and growth are closely related, with an ideological discussion of one necessitating recourse to the other. Many nongrowth or 'steady-state' protagonists view consumption growth and demand stimulation to be significant sources of pollution and resource wastage and are sceptical of justifications in terms of increased social wellbeing.

Nongrowth advocates criticise continued growth in consumption by asserting that additional consumption reveals diminishing marginal returns, i.e. that consumption of an additional unit of goods yields

less utility than the previous unit. Mishan suggests that, the architecture of social compassion should attend primarily to a 'floor' of minimal material comfort below which nobody in the community should be allowed to sink' (1977, p.127). He also disdainfully dismisses the 'social worth of an additional transistor or some other inane gadget' because 'most kinds of consumer hardwear and many hedonistic leisure-time activities' create, both for current and, particularly, future generations, more social distress than they bestow social benefits (Mishan, 1973, p.74). Finally, Mishan launches his sardonic dictum on the consumer society, 'a goodly proportion of per capita GNP can be classified under such broad categories as expendibles, usuries, regrettables, near garbage, and positively inimicables, the 'enjoyment' of which can only lead to more tension and widespread social distress (1971, p.61). O'Riordan summarises these viewpoints by stating that 'consumption vainly tries to ease the frustration that economic growth induces' (1981, p.89).

These emotive calls for the curtailment of consumption have elicited equally impassioned counter-arguments. O'Riordan punches back by asserting that: 'Implied in all this rhetoric is a certain intellectual arrogance which, no matter how well intentioned, reflects the values of a confortable social minority (1981, p.89). Beckerman deals harshly with non-growth protagonists. He claims that economists are interested in improving total social welfare and this means changing the status quo. Growth and development are needed for 'the average American secretary or Lancashire textile worker', not just in safeguarding the ephemeral values and jealously protected values of 'the middle class, the middle aged with enough time and money to go a little way off the

beaten track but not quite rich enough to be protected from the masses on their yachts or private islands?' (Beckerman, 1974, pp.87-96). Johnson is equally scornful when he says that, 'A good many alarmists tend to reflect a conservative and aristocratic hankering after an earlier and simpler period of social organisation in which people knew and kept to their place, and upstarts could not become as affluent as oneself ... by making intelligent use of new resources and new technologies' (1975, p.327).

An indepth review of the relative merits of the non-growth or steady state argument as against that of continued growth are beyond the scope of this report. The spirited rhetoric emerging from advocates of the 'extremist' viewpoints indicates widely divergent philosophies and world views underlying these arguments. When viewed from an ecological perspective economic growth must be planned and executed within a conservationist ideology. The conservationist approach to development and growth is designed to maintain environmental quality and ecological integrity. Policies should reflect a commitment to achieving a balanced, harmonious and sustainable use of resources.

5.3.4.1 An Advertising Tax

One method designed to curb consumption and thereby constrain economic growth and the concomitant expansion in resource utilization is an advertising tax.

Lecomber and Fisher suggest that 'much of economic reasoning is based on what is now widely accepted to be a myth, namely that of exogenously given preferences' (1978, p.21). The conditioning of wants are viewed by many as a function of society and a variety of complex interacting processes. Many of

the factors involved (e.g. emulation of neighbours) cannot readily be controlled, but one of them, the deliberate stimulation of wants by advertising, can (Lecomber and Fisher, 1978, p.21).

Packard refers to overwhelming evidence which suggests the malleability of wants and their sensitivity to seemingly irrelevant influences, particularly commercial advertising. He submits that:

> '... many of us are being influenced and manipulated - far more than we realise in the patterns of everyday lives. Large scale efforts are being made, often with impressive success, to channel our unthinking habits, our purchasing decisions, and our thought processes by the use of insights gleaned from psychiatry and the social sciences.'
>
> (1977, p.3)

The morality of commercial advertising is sarcastically summarized by Packard:

> 'While some of the persuaders brood occasionally about the implications of their endeavours, others feel that what is progress for them is progress for the nation. Some ... seem to assume that anything that results in raising the gross national product is automatically good ...'
>
> (1977, p.255)

A few counter arguments to the assertion that preferences are exogenously determined have been put forward. Hayek suggests that wants are latent and that advertising simply stimulates them (in Lecomber and Fisher, pp.37-42). Lecomber and Fisher reject this justification for unrestrained commerical advertising by arguing that: 'To a limited extent (Hayek's suggestions) ... are true but not very relevant - it is only when latent wants are brought

out that they are sensed as deprivation' (Lecomber and Fisher, 1978, p.21).

5.3.4.2 Resources, Savings and the Future

> 'There is widespread concern that inadequate provision is being made for future generations : not only excessive resource depletion and cumulative environmental degradation but also inadequate (and misdirected) ... investment (and) research and development ...'
>
> (Lecomber and Fisher, 1978, p.11)

Many economists, including advocates of economic growth, agree with this supposition (e.g. Tobin, 1964). The dissention is, essentially, concerned with the ability of technology and human ingenuity to find sustitute goods, substitute materials and substitute methods of manufacture. Lecomber refers to the respective viewpoints as characterising a pessimistic or optimistic world view (1979, pp.4, 7-13). The 'pessimistic' position is well explored by Meadows et al:

> 'Present reserves of all but a few metals will be exhausted within fifty years if consumption rates continue to grow as they are ... If current trends are allowed to persist ... the breakdown of society and the irreversible disruption of the life support systems on this planet are inevitable.'
>
> (In: Lecomber, 1979, p.7)

Lecomber and Fisher recommend the adoption of a cautious position with respect to such uncertainty:

> 'The future generations may be placed in a very difficult situation and this provides a strong justification for recommending greater concern.'
>
> (1978, pp.11-12)

Savings

Lecomber and Fisher suggest that the taxation system 'far from countering these imperfections' is instrumental in their exacerbation (1978, pp.12-20). The taxation of income from savings acts as a disincentive to save and thereby contributes to the stimulation of demand for goods and services in the economy. The objection is not directed at the texation of income from savings per se, but at the fact that '... concessions and allowances act in a most uneven and capricious way, with highly undesirable consequences' (Lecomber and Fisher, 1978, p.12). In the South African context the concessions and allowances are predominantly directed at the encouragement of economic growth (see Sections 4.2.2.2.2 and 5.3.4). The discouragement of savings 'is offset by tax allowances and investment grants ... favouring some of the least deserving sectors' (Lecomber and Fisher, 1978, p.13) and prejudicing others, e.g. conservation of natural resources.

To correct this bias against savings and investment in the future the following possibilities have been suggested:

1. Real rather than monetary returns to savings should be taxed : besides reducing the discouragement to savings, this is more equitable (Lecomber and Fisher, 1978, p.14).

2. Concessions currently available to approved forms of saving (see The Income Tax Act No. 58 of 1962, Section 10(1)) should be extended to all forms of saving (Lecomber and Fisher, 1978, p.14) and proposals to penalise dissaving should be pursued (see Meade, 1978).

3. The present system of investment grants should be reappraised. This reappraisal has proceeded in South Africa (see Section 4.2.2.2.2).

These proposals, apart from suggestion 3. are unlikely to win the support of the revenue authorities (Hassan). They are, nevertheless, interesting suggestions and the extent and manner in which environmental concerns would benefit from these changes in taxation policy need to be further researched. The macro-economic implications of these proposals need to be clearly specified, particularly in the context of South African peculiarities.

5.4 Renewable Resources

> 'Biological resources differ from exhaustible resources in that they have the capacity to reproduce themselves over time. Biological resources tend to be more complex than extractive resources.'
>
> (Randall, 1981, p.222)

In the economic analysis of problems relating to biological resource management, the question of property rights is paramount. Where property rights are nonattenuated (see Section 2.4.1) as may occur where crops, forest products and livestock are produced on privately owned lands, biological resources may be described as managed ... (Randall, 1981, p.223). If ... the establishment of exclusive property rights in biological resources is infeasible (e.g. in the case of ocean fisheries) biological resources ... (are described) as unmanaged (Randall, 1981, p.223).

5.4.1 'Managed' Renewable Resources

Many natural components of South Africa's biological heritage are in danger of being irreversibly lost to humanity (see Section 6.2.4). The most important

provisions directed at the conservation of these resources are, it is submitted, contained in the legislation regulating land usage (see Section 6.3) and, to a lesser degree, legislation dealing with plants and animals directly and pollution control legislation (see Fuggle and Rabie, 1983, Chapters 13, 14 and 18 in particular). The conservation of habitats and ecosystems is a pre-requisite for the effective conservation of individual species. Hall, et al (1980, p.171) state that:

> '... the first priority in conserving a threatened plant is to give it a secure habitat. The habitat should have all the essential amenities and pressures that the plant had known in the wild state over many previous generations ... The factors are more complex than the regimes of soil, water, light and temperature that are given to plants in cultivation.'

The conservation of viable populations of indigenous biological components of the environment necessitates protection of ecosystems and habitat.

Hall and Rabie submit that:

> '... threatened plants are seldom made extinct by direct destruction : usually the cause is the loss of some essential feature of their habitat... For example, Renosterveld once covered vast areas of the Western Cape Lowlands ... Today it has been reduced to only 3% of its former area, now broken up into patches most of which may be too small to save.'
>
> (In: Fuggle and Rabie, 1983, p.166)

The conservation of animals (i.e. fishes, amphibians, reptiles, birds and mammals) is more complex but similar concerns are evident. Habitat destruction, overexploitation, interference with ecosystem dynamics and incompatible human land usage have contributed towards population declines and species

extinctions (see Fuggle and Rabie, 1983, pp.191-197).

Compliance with environmental legislation dealing directly with the protection of plants and animals is primarily secured by the employment of the criminal sanction as a primary sanction and, to a lesser degree, as a subsidiary sanction. The inadequacies of achieving compliance by way of the criminal sanction was reviewed in Section 3.3.3. The inadequacy of these provisions, in isolation, in ensuring conservation of renewable resources is demonstrated with reference to legislation dealing with indigenous plants.

Legislation is available to control direct damage to plants outside reserves, e.g. all indigenous plants are protected in all provinces on or along public roads (e.g. Section 63(1)(b)(ii) of the Cape Nature and Environmental Conservation Ordinance), and no indigenous plant may be picked without the permission of the landowner (e.g. Section 63(1)(c) of the Cape Nature and Environmental Conservation Ordinance). Numerous provisions apply to the various categories of protected plants (see Fuggle and Rabie, 1983, pp.174-179) and a wide variety of legislation is relevant to the protection of plants, e.g. the Forest Act 72 of 1968 and the Soil Conservation Act 76 of 1969 (see Fuggle and Rabie, 1983, p.174). The adequacy of the legislation is assessed by Hall and Rabie as follows:

> 'The legislation for the prevention of direct damage to plant life is reasonably satisfactory. But damage can also ensue from damage to ecosystems and habitats, and this can be of far greater significance than, for example, the destruction and extinction of species. Immense changes have taken place with the increase in grazing pressures by

> domestic stock in natural pastures, to an extent that these have become critically sensitive to even quite small draughts.'
>
> (In: Fuggle and Rabie, 1983, p.180)

A number of proposals are considered in Chapter 6 to help preserve habitat and ecosystems, e.g. preferential assessments (Section 6.5.3.1) and land trusts (Section 6.5.3.2). These complementary financial alternatives offer potential in combatting the destruction of habitats and ecosystems.

A significant contributory factor to the problems of habitat and ecosystem destruction is the exceptional taxation status afforded to farmers.

In terms of the 1st Schedule to The Income Tax Act farmers are treated generously for taxation purposes. A brief introduction to some of the more important provisions is presented below.

1. Livestock valuation procedures (see para.'s 2-5 and 6-7) provide an effective deferral of taxation, an incentive to increased stocking.

2. Para. 12 capital allowances are very extensive, providing a 100% write-off for a wide range of capital expenditure:

   (a) the eradication of noxious plants;

   (b) the prevention of soil erosion;

   (c) dipping tanks;

   (d) dams, irrigation schemes, boreholes and pumping plants;

   (e) fences;

   (f) the erection or extensions, additions or improvements to buildings used in connection with farming operations;

(g) the planting of trees, shrubs, perennial plants for the production of grapes or other fruit, nuts, tea, ... and the establishment of any area used for the planting of such trees, shrubs or plants;

(h) the building of roads and bridges used in connection with farming operations;

(i) electric power transmission lines;

(j) the acquisition of machinery, implements, utensils and articles used by the farmer for farming purposes.

It must be noted that only deductions (a) and (b) may be used to create an assessed loss.

These capital development allowances are available to farmers without distinction between regional and local environmental variations. It is submitted that the capital development incentives should, as far as possible, be integrated into a national land use plan that is sensitive to environmental parameters and, therefore, selectively stimulates capital development.

3. Plantation farmers may deduct any expenditure incurred in the establishment or maintaining of a plantation, para. 15(1)(a), e.g.

- road building costs
- clearing costs

The farmer may deduct the cost of acquisition of any plantation acquired by him, the cost being the portion of the purchase price relating to the trees, not the land, para. 15(1)(b).

These provisions, together with the rating formula, para. 15(3), contribute towards the financial

rationale for establishing plantations. As these incentives are not linked to a desirable land use plan, plantations may be established in environmentally unsuited areas.

4. The rating formula, para. 19, together with drought relief, para. 13A, and forced sale provisions, para. 13, protect the farmer from climatic and other environmental vagaries. This financial protection may well contribute towards overstocking and overgrazing and, therefore, the concomitant environmental problems of soil erosion, siltation, etc.

   The para. 19, rating formula,

   - results in the farmer paying tax on his actual income at a rate based on his average income;
   - always operates to the farmer's advantage (see Huxham and Haupt, 1984, pp. 153-156).

   Para. 13(a) provides relief to farmers who prove, to the satisfaction of the Commissioner, that a forced sale of livestock took place due to drought, stock disease, or damage to grazing due to fire or plague. It is interesting to note that the relief applies only if the farmer replaces the livestock within four years after the year of assessment in which they were sold. Para. 13(b) similarly provides that relief in terms of a Government livestock reduction scheme may be granted only if the farmer replaces the stock within nine years after the close of the current year of assessment. These requirements may promote the continued overstocking of farms.

   Para. 13A provides relief for a farmer who, because of drought, has sold his livestock and has deposited some or all of the proceeds with the Land and

Agricultural Bank of South Africa. The proceeds so deposited are not included in the farmer's gross income for a maximum period of four years. This relief further protects the farmer from the financial effects of environmentally unwise stocking practices.

5. Section 17A of the Income Tax Act provides for the deduction of expenditure, with certain conditions, incurred by the lessor in respect of the construction of soil conservation works. Although the specific consideration of soil erosion is beyond the scope of this report it is interesting to note that soil conservation has been stimulated by financial rewards.

> 'These economic incentives have been used with some success, particularly by providing subsidies for soil conservation works, veld utilization works, and the stock reduction scheme.'
> (Fuggle and Rabie, 1983, p. 153)

A number of innovative policy proposals have been suggested to promote soil conservation (e.g. Napier, 1981; Paul et al, 1983; Collins, 1982 and Pollard et al, 1979).

5.4.2 'Unmanaged' Renewable Resources

The control of unmanaged biological resources, e.g. fish in the ocean, is extremely difficult to effect. Property rights do not attach to individual fish, no individual controls access to the ocean fishery and policing to ensure adherence to regulatory prescriptions is extremely difficult. There is a 'tendency towards overexploitation, with a correspondingly greater risk of extinction' (Fisher, 1981, pp. 75-76) for this common property resource. This complex topic deserves the attention of a separate report.

Although the coastal zone, estuaries and lagoons are important conservation concerns, the ocean fisheries are discussed here to highlight some of the problems relating to the control of 'unmanaged' renewable resources. It is nevertheless deemed necessary to mention that the primary concern with all marine resource management in South Africa is that:

> 'The existing complex system of multiple jurisdiction over marine resources has developed as a result of conservation intent having been secondary to the exploitative intent of the control legislation. This multiple jurisdiction has not led to effective co-ordination, administration or actions conducive to the sustained utilization of South African marine living resources. No uniform policy for marine or coastal zone management exists and the various existing advisory committees have inadequate authority to enforce their recommendations.'
>
> (Fuggle and Rabie, 1983, p. 276)

Policies designed to improve control of environmental degradation at the coastal zone, estuaries and lagoons need to be investigated. Apart from improved regulation (see Fuggle and Rabie, 1983, pp. 274-277) the following possibilities are suggested:

1. greater dependence upon private ownership as an alternative to 'entangled' administration (e.g. see Kockleman and Blanchfield, 1982);

2. improved land usage, especially holiday township developments and factory sitings (see Section 6.5), and improved pollution control (see Chapter 4), and

3. the creation of additional marine reserves (established in terms of the Sea Fisheries Act) deserves further attention.

The Ocean Fisheries

The most important provisions affecting conservation of the ocean fisheries are those contained in the Sea Fisheries Act. A number of provisions affecting: the establishment, control, and management of fishing harbours, the registration and licensing of fishing boats, the licensing of fishing factories, the stipulation of closed seasons and of quotas, the control of fishing nets and other methods of catching fish, specific measures to protect lobsters and other kinds of fish, and the control of whaling (see Fuggle and Rabie, 1983, p. 270) are contained in the legislation.

A number of factors contribute towards the difficulty in selecting effective control policies:

1. It is extremely difficult to control the operations of foreign vessels and to police South Africa's long coastline, territorial waters and extensive fishing zone. Inadequate international co-operation precludes the co-ordination of the exploitation of the ocean fisheries.

2. Different species may require different protection, e.g. net size and season. This complicates the administration of the fisheries.

3. Incomplete knowledge about optimal species exploitation has frequently resulted in overfishing. The West Coast pilchards fishery provides a useful example.

> 'The pilchard fishery in the 1950's was initially not intensive, fluctuating between 66 000 and 154 000 tons. But during the early 1960's the yield increased tremendously and a record catch of 410 721 tons was landed from the

> west coast of South Africa in 1962. Thereafter catches declined rapidly.'
> (Fuggle and Rabie, 1983, p. 264)

A number of taxation proposals have been recommended 'to help improve the control of the exploitation of the ocean fisheries' (e.g. Fisher, 1981, pp. 88-89). It is submitted, however, that policing, enforcement, international agreement and improved understanding of the species exploitation are essential prior to the effective implementation of any control policy.

5.5 Conclusion

The demand for environmental resources, both renewable and exhaustible are growing rapidly. Ecological interdepencies exacerbate the impacts of overexploitation of natural resources. Restraint and sound husbandry are required to help reduce wide scale environmental degradation and resource depletion.

Current financial legislation extends generous incentives for exhaustible resource exploitation (Section 5.3.1). These extensive incentives need to be evaluated in terms of environmental impact, resource destruction and the political and economic realities of Southern Africa. Additional policies designed to control the rate of virgin resource exploitation need to be investigated (Section 5.3.2) e.g. the resource depletion tax (Section 5.3.2.1). The important role of repair, reuse and recycling in rational resource usage has not received adequate attention (Section 5.3.3). Current financial legislation is inconsistent in the treatment of various repair, reuse and recycling activities. Apart from these inconsistencies repair, reuse and recycling industries receive comparatively less advantagous incentives than mining operations. Correction of these inconsistencies and the consideration of additional incentives are recommended, e.g. the through-

put tax (Section 5.3.3.2). The usage of exhaustible resources may be curtailed by policies directed at the control of demand stimulation (Section 5.3.4). The advertising tax (Section 5.3.4.1) and the promotion of savings (Section 5.3.4.2) are less specific in addressing the problems of excessive exhaustible resource usage but are interesting in the broader context of environmental concern.

Control over the use and destruction of renewable resources is more complex. Owners of renewable natural resources, i.e. animal and plant components, outside reserves receive disincentives to the environmentally desirable management of these resources. Prejudicial financial treatment and inadequate land usage prescriptions have largely contributed to ecosystem and habitat destruction. The taxation advantages extended to farmers (Section 5.4.1) frequently promote overstocking, capital development and spatial expansion of farming activities. These farming incentives need to be re-evaluated with regard to regional and local environmental parameters. Common renewable resources, e.g. the ocean fisheries (Section 5.4.2) present a unique control problem in that effective policing, enforcement and international co-operation are extremely difficult to ensure.

CHAPTER 6 : REGULATION OF THE SPACE ECONOMY

6.1 Introduction

Land use policy is frequently regarded to be the most important aspect of environmental policy for the efficacious application of environmental resource management.

> 'Land use policies influence air and water pollution and almost every other form of environmental degradation. In decisions about land use, the most fundamental economic, human, and environmental values come into conflict.'
>
> (Barbour, 1980, p.149)

Aldo Leopold conceived of land as '... one organism' (1970, p.190). He uses the image of a 'Round River', a never ending circuit of life, to convey the concepts of natural cycles, energy flows and the interrelationships of all life forms (1972, pp.188-202). Leopold argues that ecological interdependencies necessitate a broad conception of land. Land ... is not merely soil, it is the fountain of energy flowing through a circuit of soils, plants and animals (1972, p.253). The significance of his philosophical revelation is translated into principles for conservation which is defined as 'a state of harmony between man and land' (1972, p.189). To maintain harmony, the essence of our life support system, man's interrelationship with the natural environment requires cognisance of ecosystem functioning and a refined taste for natural objects.

Increasing population and an expansion of human activities and wants have accelerated the burgeoning demands on land resources.

> 'In most countries population, urbanization, commerce, industrialization, transportation and tourism have accelerated pressures for land development. This has imposed competing demands for the retention and use of land for

> purposes of preservation, conservation, agriculture, urban development, major projects, industry, mining, recreation and tourist facilities.'
>
> (Beale, 1980, pp.80-81)

It is submitted that land use planning, and, indeed, the planning of other natural resources, should be holistic in the sense that all significant components of the decision matrix need to be addressed. Ecological constraints as well as human welfare, both present and future, represent broad categorizations of such components. Very often short term human wants dictate natural resource policy. The rationale for the incorporation of the welfare of future generations into the calculus has been adequately explored in previous chapters, e.g. the irreversibility of various actions and the non-substitutability of ecosystem. Ecological constraints and concerns are seldom afforded more than perfunctory attention. This inadequacy is easily demonstrated with reference to selected illustrations.

A large proportion of the essential nutrients in a tropical forest system are bound up in the mass of vegetation. The cutting and burning of this vegetation is likely to result in a loss of fertility in the system and extensive soil erosion. In contrast, it is known that temporate zones have areas where, despite continuous cultivation over long periods, robust soils have remained fertile. 'Land allocated for use in accordance with its ecological characteristics may often be modified or transformed without loss of fertility' (Beale, 1980, p.87).

The ecological need for appropriate land use is motivated in terms of the undesirable, detrimental impacts of inappropriate land use:

> 'Natural ecosystems have evolved over millenia and therefore the biotic components are well adapted to the abiotic conditions. Modifications by man, if abrupt and extensive, are

> almost always detrimental to the natural system and require great inputs of energy to maintain productivity and equilibrium.'
>
> (Stauth, 1980, p.146)

The appropriate usage of land presupposes a knowledge of the dynamics of this 'life support system' and the corresponding translation of such knowledge into spatial and temporal usage prescriptions.

Beale suggests that an effective mechanism for the achievement of a desirable land use allocation is the development of 'land capability' systems which indicate basic constraints as well as opportunities in environmental planning. Land capability refers to the suitability, potential and intrinsic value of an area for particular or multiple uses (1980, p.83).

> 'Land capabilities are flexible concepts for environmental planning purposes. Plans which are based on land capability systems can indicate environmental capabilities - the extent to which development is compatible with environmental aims; the specific development exclusions which might be necessary; the environmental standards needed to preserve land capabilities.'
>
> (Beale, 1980. p.83)

The concept of a guide plan, as envisaged in Section 6 of the Physical Planning Act 88 of 1967, offers an ideal medium for the expression of 'land capability' systems. The guide plan lays down guidelines for the future spatial development of a particular defined area. It is submitted that meaningful land use regulation is impossible without the scientific investigation of ecological, socio-economic and temporal implications of alternative land usage. These findings must be expressed in the form of spatial and temporal prescriptions for land usage. These prescriptions should be reviewed frequently and should be conservative to buffer unforseen impacts resulting from inadequate information and incomplete understanding of relevant variables.

6.2 Land Use Problems

Inadequately planned land use may give rise to a number of problems. Four general categories of perceived land use problems may be identified.

6.2.1 Incompatible Uses

This results where the proprietor's land usage imposes an external diseconomy on the user of another parcel of land.

> 'Many kinds of land use impose external diseconomies on the residential land user : noisy, ugly or polluting industry; certain agricultural uses ...; commerical establishments, such as taverns, (restaurants), ... and gasoline stations ... and many kinds of locally obnoxious public facilities, . such as airports, jails and garbage dumps.'
>
> (Randall, 1981, p.332)

Different residential uses may also impose external diseconomies. For example, an aesthetically unappealing house would impose an external diseconomy on neighbouring houses. Conflicts may also arise between industrial and commercial land uses and between different kinds of industrial and commerical uses.

> 'Professional offices and high class boutiques are unlikely to choose locations in noisy and congested environments. High technology, 'clean' industries, like the data processing and communications industries, prefer to avoid locations near old technology, 'dirty' industries, like steel milling and oil refining.'
>
> (Randall, 1981, p.332)

It is submitted that problems resulting from incompatible land uses, primarily an urban land use problem, are relatively easily regulated by effective land use zoning (including a number of innovative

amendments), resort to private law remedies and reliance upon market forces. However, effective land use zoning is dependent upon the establishment of a well researched spatial plan of compatible and appropriate land uses. The technical and administrative problems associated with the compilation of a comprehensive plan are beyond the scope of this report. Nevertheless, it is suggested that a multidisciplinary research methodology should be employed and that recourse should be made to expertise beyond the confines of the administrative body, e.g. universities, private consultancies and experts in their field. Private law remedies are concerned with balancing the interests of the individual litigants (as against serving the public interest (Fuggle and Rabie, 1983, p.43). In this regard the interdict and delictual remedies, namely actio legis Aquiliae and actio injuriarium, may be of some use in protecting subjective individual rights. These remedies provide a certain amount of protection of individual legal rights (see Rabie, 1976, pp.17-18, and Fuggle and Rabie, 1983, pp.39-43 and pp.375-376).

6.2.2 Urban Sprawl and Leapfrog Development

Many large South African cities exhibit an undesirable 'urban sprawl' with the population arrayed hapharzardly across a large land area. The 1980 Official Yearbook of the Republic of South Africa estimates that cities, towns, roads and railways currently utilize 24,7% of the total land surface (p.596).

Many public services, e.g. water, sewage and household garbage collection, are supplied to the consumer at his place of residence. The cost of supplying such services is directly proportional to the relative compactness of the housing in the area, i.e. the total costs are lower when the

population resides in a relatively smaller area. The consumers of these services are usually charged on the basis of the average cost of serving all consumers in the community (Blumenthal, 1984). The charge system for these essential services offer no incentive to the land developer or home builder to locate developments in socially desirable areas. Land on the urban fringe is often less expensive than established suburbs and, frequently, the aesthetic advantages of these areas often stimulate development activity.

> '... Inefficiencies in the financing of public services and utilities result in an inequitable distribution of costs, so that the residents of long established neighbourhoods nearer the city centre in effect subsidize urban sprawl and leapfrog development at the urban/rural fringe. The pattern of development that results may create external diseconomies (e.g. degrading the aesthetic quality of the fringe area, or by generating excess runoff, which may lead to siltation, pollution, and flooding problems in formerly rural streams), and may render agriculture nonviable in the immediate urban/rural fringe, resulting in the premature withdrawal of land from agricultural use.'
>
> (Randall, 1981, p.333)

The extent to which such disincentives to rational urban development function as incentives for urban sprawl needs to be further investigated. If empirical evidence supports the above assertions, a rationalization of charges for public services is required in order to help promote ordered urban development and protection of the urban fringe.

A number of additional innovative policy mechanisms have been suggested and implemented in the United States of America which aim to preserve rural land resources and stem urban sprawl. These policy alternatives are reviewed in Section 6.5.

6.2.3 Destruction of Aesthetic Qualities of the Natural and Near Natural Environment

> 'Direct contact with nature provides man with aesthetic and spiritual goods which significantly enhance his wellbeing. Literature is replete with references to the salutory effects of natural influences, which suggest their value in bringing man closer to self-actualization or fulfilment.'
>
> (Stauth, 1980, p.40)

Certain features or qualities of the natural environment contribute to overall wellbeing of those who physically interact with it. It is even submitted that a mere knowledge of the continued existence of particular natural environmental features may be significant in the determination of overall human welfare. An example to support this assertion would be the extraordinary conservation status afforded to the whale by millions of concerned individuals worldwide, many of whom have not even had the fortune to sight one.

The rationale for the preservation of these aesthetic qualities is often motivated as follows:

> 'Some kinds of land, in some particular kinds of uses, generate external economies in that they provide aesthetic or recreational enjoyment for persons other than the owner. Thus, non owners may assert a 'public interest' that would be violated if such land was converted to a quite different kind of use.'
>
> (Randall, 1981, p.323)

An extension of this motivation for the preservation of natural and near natural aesthetic qualities is suggested by Sauth who submits that:

> '... natural amenities contribute to higher quality of life,'

and, further

> '... (to) maximise opportunities for ultimately achieving a high and sustainable quality of life.'
>
> (1980, p.8)

The incorporation of future generations into the calculus significantly extends the sphere of concern.

Many aesthetic components of the natural environment are indirectly afforded protected status by one or more of the myriad of different environmentally related Acts and Ordinances, e.g. The Mountain Catchment Areas Act 63 of 1970 and the Provincial and Local Nature Conservation Ordinances. In almost every instance of aesthetic preservation of the natural environment, as a result of legislative provisions, it is apparent that this has been achieved by default. This observation is suggested as the legislation, affording preservation to aesthetically desirable land or landscape, is not specifically intended to achieve such preservation. For example, the Mountain Catchment Areas Act 63 of 1970 may indirectly help preserve scenic mountain slopes and prevent unsightly development scars, but this is achieved as a by-product of its primary goal, i.e. the protection of water catchments.

The effective preservation of the character and aesthetic qualities of the natural environment requires identification of relevant traits. The compilation of an acceptable priority listing of natural or near natural areas deserving preservation on aesthetic grounds is a prerequisite to the achievement of this objective. A study undertaken by Ferrario (1978) attempts to list and 'evaluate the potential attractiveness of any area in relation to tourism' (1978, p1). The absence of a broader,

more comprehensive study for Southern Africa is a serious impediment to the preservation of natural areas or objects of national aesthetic importance.

As was indicated above, public, and tracts of private land, are frequently afforded some indirect protection. The compilation of the aforementioned priority listing could nevertheless enhance the quality of public management of areas specifically listed; particularly if private sector, state, provincial and local government developments in such areas were required to conform to the prescriptions of sensitive aesthetics.

The maintenance of aesthetic quality and the preservation of environmental character is of great difficulty when applied to land in private ownership. Although a number of statutes regulate the usage of privately owned land, e.g. the Mountain Catchment Areas Act 63 of 1970 provides for the regulation of land usage by way of directions to landowners issued by the Minister of Environment Affairs (Section 3(1)), the maintenance of aesthetic quality and the preservation of land character are not specifically provided for. Difficulties exist due to ownership boundaries transcending natural or near natural features. A change of land use on any one of the mosaic of privately owned land parcels could have a significant impact, even an irreversible impact, on aesthetic quality and land character. No stimulus or incentive exists whereby the actions of individual land owners can be co-ordinated in the interest of social welfare. The Subdivision of Agricultural Land Act 70 of 1970 does provide limited protection in that it regulates the division of farms into smaller units. This Act functions, however, to maintain economically viable land units. However, the following difficulty has

emerged:

> 'The spirit and intent of the Act are being infringed by the persistent practice of establishing holiday townships and resorts away from existing urban centres, usually along the coast and in inland areas of scenic beauty, or on river banks or adjacent to game reserves.'
>
> (Fuggle and Rabie, 1983, p.450)

Even within the built environment, the maintenance of 'green belts' or natural or near natural features by the private owner, is given no encouragement. In fact, the rational decision maker should develop all land as he earns no economic benefit from the welfare derived by society from public undeveloped land. Furthermore, the landowner is burdened with a high levy, in the form of property rates, on his dormant investment (see Section 6.5.3.1).

Public lands, i.e. owned by government departments, provincial or local authorities, in the urban or peri-urban environment have only very recently been actively managed and planned as a 'green belt' for the urban dweller (see City Engineers Department, 1982). The extent and nature of the optimal development and management of such areas is beyond the scope of this report. It is nevertheless submitted that urban development should be planned in order to preserve land character and aesthetic features.

6.2.4 Destruction of Ecosystems

> 'The first goal (of conservation) is an acknowledgement that the human habitat is now the biosphere as a whole. Modern human societies draw on a wide range of ecosystems near and far for the resources that sustain them. Furthermore human activities have global impact. Man's capacity to alter the biosphere greatly exceeds his current understanding of it, and in some instances (e.g.

> desertification) it seems likely that the productivity of the biosphere has been reduced permanently. The second goal of conservation is to maintain indefinitely the biosphere's capacity to produce the resources needed by people. Humanity's future needs are unpredictable. History suggests, however, that the needs of people a few generations hence could be very different from those today. Thus the third goal of conservation should be to keep open as many options as possible in order to meet these potential needs of future generations.'
>
> (Siegfried and Davies, 1982, p.4)

The cultural and period variations in the meaning of nature conservation are significant. The ecosystem concept has wide implications for conservation and, in particular, land use planning. Although numerous benefits flow from protected areas, the need to adopt an ecosystem approach to conservation is essential.

Siegfried and Davies (1984, p.4) identify the following three goals of conservation:

1. to ensure that the biosphere can continue to renew itself and provide the means for all life;

2. to ensure human survival and wellbeing, and

3. to keep options open.

The concept of nature conservation has been considerably expanded in that ecological interdependencies dictate the necessity for an ecosystem approach applied nationally and even on a global scale. In particular the following considerations are essential for direction of conservation activities.

1. A global objective should be maintenance of

essential ecological processes and life support systems. The role of ecosystems in the cycling of minerals and maintenance of the chemistry of the planet has not yet been adequately described. Nevertheless, regional systems need to be managed to ensure their continued efficaciousness, e.g. soils for agriculture (International Union for the Conservation of Nature, 1980, Section 2).

2. It is essential to maintain species and genetic diversity in order to maintain the resilience of the biosphere. Species diversity is essential to the continued efficiency of ecosystem processes whilst genetic diversity ensures the continued survival of species (International Union for the Conservation of Nature, 1980, Section 3).

3. A conservative utilisation of both species and ecosystems is required due to incomplete knowledge about their characteristics. Furthermore effective management of living resource utilisation necessitates an understanding of the respective ecosystem and component interrelationships (International Union for the Conservation of Nature, 1980, Section 4).

As extremely small areas of the planet are considered protected areas, non-protected areas are much more important for maintaining essential ecological processes, to ensure sustainable utilisation, for human survival, wellbeing and for keeping options open. Protected areas do, however, provide research and teaching opportunities, help maintain species and genetic diversity, provide human recreation areas and promote public understanding and demand for conservation. It is submitted that it is essential and urgent that planners recognise the need to protect

sensitive areas and should do so as soon as possible to avoid confrontation between conflicting uses.

A report published by the Wildlife Society of Southern Africa (1979, p.3) asserts that:

> 'The status of ecosystems and their components within the 57 major national parks and nature reserves which occupy 41 904km² or 3,4% of the Republic's land surface is good, but serious problems exist outside these areas.'

Similar concern has been expressed in surveys of terrestrial ecosystems undertaken by other researchers. Edwards (1974) and Huntley (1978) submit that conservation measures for grassland, karoo and lowland fynbos are inadequate. Noble and Hemens (1978) conclude that inadequate conservation protection is afforded to wetlands, inland water ecosystems and estuaries.

There is an urgent need to devise mechanisms for the conservation of ecosystems, particularly where land is fragmented and in private ownership. A few preliminary suggestions are reviewed in Section 6.5.

6.3 Land Use Planning in South Africa

Land use planning has expanded beyond the traditional bounds of provincial and local concern. The national and regional importance of appropriate land usage is gradually being recognised.

The salient feature of land use regulation in South Africa is the existence of a multiplicity of authorities, at national, provincial and local level, that administer many relevant Acts and Ordinances (Rabie, 1984). Page and Rabie refer to this problem as 'the problem of divided unco-ordinated control' (Fuggle and Rabie, 1983, p.477). A number

of additional problems exacerbate this unsatisfactory administration of land use:

1. These (various) ... administrative bodies have a long tradition of autonomy as far as their planning and control of the land use which has been entrusted to them are concerned. In this exercise of autonomy an environmental sensitivity has, unfortunately, been lacking (Fuggle and Rabie, 1983, p.477).

2. The function of co-ordinating land use planning and control has, as a result of the rationalization of the Civil Service, been granted to the Physical Planning Branch of the office of the Prime Minister, which since August 1982 resides in the Department of Constitutional Development and Planning (Fuggle and Rabie, 1983, p.477). This department is not involved in environmental affairs and it is reasonable to presume that environmental concerns are unlikely to attract sufficient consideration.

The Physical Planning Act 88 of 1967 is the most important legislation dealing with land use control, although a number of other Acts and Ordinances are of relevance with regard to the planning of land use from an environmental perspective. The responsibility for the administration of this Act is vested in numerous departments, namely the Department of Constitutional Development and Planning, the Department of Community Development, the Department of Commerce and Tourism and the Department of Mineral and Energy Affairs.

Sections 6.3.1 to 6.3.8 below review the range of policies currently employed in the legislation relevant to land usage in South Africa.

6.3.1 Restricting the Purpose for which Land is Used

The Physical Planning Act is the only environmental statute which contains provisions restricting the

purpose to which land is used to the particular purpose(s) for which the land was lawfully used immediately prior to the imposition of the restriction. This control of land use is usually affected by means of a permit system (see Sections 4(1) and 4(2)).

> 'Although such a provision is in the nature of a condition restricting the use of the land, it may at the same time be viewed as constituting a concession to the landowner, in that it allows him to continue the present use of his land.'
>
> (Fuggle and Rabie, 1983, p.470)

6.3.2 Subdivision of Land

The Physical Planning Act 88 of 1967 regulates the zoning, subdivision and use of land for industrial purposes whilst the Subdivision of Agricultural Land Act 70 of 1970 primarily regulates the subdivision of agricultural land. The various town planning Ordinances also play a role in control of land subdivision.

6.3.3 Establishment of Specified Areas

Environmental land use legislation makes provision for the establishment of areas that are set aside exclusively for a specific form of land use or that serve to define the area within which certain control measures can be applied (Fuggle and Rabie, 1983, p.472). The legislation stipulates prohibited conduct (relying on the criminal sanction for compliance) and specifies the administering authority (Rabie, 1984). The following are the most important of these specified areas.

1. The Physical Planning Act makes provision for the reservation of land for the purposes of a nature area. It also provides for the establishment of controlled areas, without their being

linked to any specific purpose or subject (see Fuggle and Rabie, 1983).

2. The establishment of various types of nature reserves are achieved by a number of Ordinances and Statutes, e.g. the National Parks Act 57 of 1976, the Forest Act 72 of 1968, etc.

3. Certain land may be declared a national monument in terms of the War Graves and National Monuments Act 28 of 1969.

4. The Lake Areas Development Act 39 of 1975 provides for the declaration of certain land to be a lake area. Control over land use is exercised in such areas.

5. The Mountain Catchment Areas Act 63 of 1970 provides for the declaration of an area as a mountain catchment area. Control over land use in such areas is exercised through directions to landowners.

6.3.4 Guide Plans

A guide plan lays down guidelines for the future spatial development of a particular defined area (the Physical Planning Act Section 6A(1)(a)), in that it determines that land may be utilized for a specific purpose or purposes only (Section 6A(1)(b)).

Page and Rabie state:

> 'Potentially the most important provisions relating to land use planning from an environmental perspective are those contained in the Physical Planning Act 88 of 1967 concerning guide plans.'
>
> (Fuggle and Rabie, 1983, p.473)

A serious limitation to the effective application of these provisions in the sphere of environmental planning is the observation that:

> '... administration of the Act is no longer undertaken by a department whose objective is environmental conservation ... although .... abundant opportunities exist for environmental concerns at least to be articulated in the process of the drafting of guide plans.'
>
> (Fuggle and Rabie, 1983, p.473)

Although guide plans have only been drawn up at metropolitan or municipal level, it is conceivable that the process could also be applied to a large area, such as some of the 38 development regions depicted in the National Physical Development Plan (Fuggle, 1983).

6.3.5 Expropriation, Purchase and Sale of Land

Expropriations, governed by the Expropriation Act 63 of 1975, are justifiable when:

> '...more control of the actions of the individual landowner concerned, would not suffice to achieve the desired goal, and where the state's use of the land would be so extensive that it would require all the rights of ownership in order to serve the public interest effectively.'
>
> (Fuggle and Rabie, 1983, p.468)

It must be noted that other environmentally relevant legislation makes provision for expropriation in specific circumstances.

The state may obtain ownership of land by means of purchase or exchange. The following Acts make provision for such purchases: The Land Tenure Act 32 of 1966, The Lake Areas Development Act 39 of 1975 and The National Parks Act 51 of 1976. Furthermore, land may be disposed in terms of the State Land Disposal Act 48 of 1961.

Purchase and expropriation represent drastic and

costly measures by means of which land use is controlled. The Expropriation Act makes provision for compensation of landowners.

6.3.6 Administrative and Legislative Directives

Administrative directives authorised by a number of Acts, specify actions or regulate the use of land by owners or occupiers. For example, the Soil Conservation Act 76 of 1969 provides for the issuance of directives prescribing to owners or occupiers of land certain agricultural practices aimed at conservation farming (see Sections 3(1) and 4(1)). Such directives are binding on owners or occupiers as well as their successors in title (e.g. the Soil Conservation Act, Section 3(2)). Failure to comply with a directive constitutes an offence (e.g. the Soil Conservation Act, Section 21(1)(b)). Some Acts provide for the administration to perform the directive if the owner or occupier fails to comply and for the recovery of such costs (e.g. the Soil Conservation Act, Sections 4(4) and 19).

Land use control is also accommodated through general environmentally relevant land use provisions that are enacted in legislation, usually in regulations, and that are binding in respect of the area defined in such legislation (Fuggle and Rabie, 1983, p.469).

6.3.7 Zoning in Terms of Town Planning

Town planning Ordinances provide for zoning or reservation of areas for different land use purposes. The quality of the built environment is often dependent upon environmental sensitivity in such planning. It was noted in Section 6.3.2 that the Physical Planning Act 88 of 1967 regulates zoning of land for industrial purposes.

6.3.8 Land Use by an Administrative Authority

Administrative authorities are also empowered to perform certain environmentally relevant actions both with respect to private and public owned land (e.g. the Soil Conservation Act 76 of 1969 (Sections 7,8,19) and the Mountain Catchment Areas Act 63 of 1970 (Section 12)).

6.4 A Review of these Regulatory Mechanisms

The survey of South African land use regulatory mechanisms reveals that relevant provisions exist almost entirely within the sphere of administrative law. Alternative policies, apart from the possible use of a servitude (see Fuggle and Rabie, 1983, pp.41-42) and the creation of conservation trusts (see Fuggle and Rabie, 1983, pp.42-43), have not been considered. The continued worsening of the problems associated with inadequate land use control, see Section 6.2, demands the reassessment of existing provisions in the light of alternative mechanisms. To demonstrate the disarray and 'unco-ordinated control' characteristic of existing provisions, the plethora of relevant legislation has been presented in Table 6.1. It is necessary to divide such provisions between the built or urban environment and the rural environment as land use control is effected differently. It must be mentioned that the distinction between urban and rural land use is not always clear cut.

TABLE 6.1 : Urban and Rural Land Use Policies

	URBAN	RURAL
(a) Change in Ownership		
(1) Expropriation	Expropriation Act 63	Expropriation Act 63 Unbeneficial Occupation of Farms Act 29 of 1937 The Water Act 54 of 1956 The Forest Act 72 of 1968 The Soil Conservation Act 76 of 1969
	The National Roads Act 54 of 1971	The National Roads Act 54 of 1971 The Lake Areas Development Act 39 of 1975 The National Parks Act 51 of 1976
(2) Purchase and Sale of Land		The Land Tenure Act 32 of 1966 The Lake Areas Development Act 39 of 1975 The National Parks Act 51 of 1976 The State Land Disposal Act 48 of 1961
(b) Restrictions on Ownership		
(1) Administrative and Legislative Directives		The Weeds Act 42 of 1937 The Soil Conservation Act 76 of 1969 The Mountain Catchment Areas Act 63 of 1970 The Environmental Conservation Act 100 of 1982
	Mines and Works Act 27 of 1956	Mines and Works Act 27 of 1956
(2) Restricting the Purposes for which Land may be used		The Physical Planning Act 88 of 1967

TABLE 6.1 : Urban and Rural Land Use Policies Continued

	URBAN	RURAL
(3) Licencing of Land Use Practices	The Physical Planning Act 88 of 1967	The Physical Planning Act 88 of 1967
	The Factories, Machinery and Building Work Act 22 of 1941	
	The Nuclear Energy Act 92 of 1982	The Nuclear Energy Act 92 of 1982
(4) Control of Subdivision of Land	The Physical Planning Act 88 of 1967	The Subdivision of Agricultural Land Act 70 of 1970
(5) Control over the use of Land by Administrative Authorities		The Land Tenure Act 32 of 1966
		The Soil Conservation Act 76 of 1969
		The Mountain Catchment Areas Act 63 of 1970
		The National Parks Act 51 of 1976
	The Water Act 54 of 1956	The Water Act 54 of 1956
	National Roads Act 54 of 1971	National Roads Act 54 of 1971
	Provincial Roads Ordinances	Provincial Roads Ordinances
	The South African Transport Services Act 65 of 1981	The South African Transport Services Act 65 of 1981
	The Aviation Act 74 of 1962	The Aviation Act 74 of 1961
	Electricity Act 40 of 1958	
(c) Proclamations, Notices and Zonings		
(1) Zoning	Various Provincial Town Planning Ordinances	
(2) Guide Plans	The Physical Planning Act 88 of 1967	The Physical Planning Act 88 of 1967

TABLE 6.1 : Urban and Rural Land Use Policies Continued

	URBAN	RURAL
(3) The Establishment of Specific Areas		
- Water Reserves		The National Parks Act 57 of 1976 The Forest Act 72 of 1968 The Sea Fisheries Act 58 of 1973 The Physical Planning Act 88 of 1967 Provincial and Local Nature Conservation Ordinances
- National Monuments	The War Graves and National Monuments Act 28 of 1969	The War Graves and National Monuments Act 28 of 1969
- Lake Areas		The Lake Areas Development Act 39 of 1975
- Mountain Catchment Areas		The Mountain Catchment Areas Act 63 of 1970
- Water Control Areas		The Water Act 54 of 1956
- Controlled Areas	The Physical Planning Act 88 of 1967	

Comment

The extent to which divided, unco-ordinated control describes the South African land use regulation is clearly revealed by the above listing of legislation. Regulatory mechanisms employed can be generally classified as administrative law enforced by way of criminal sanction. In the urban environment the predominant land use control mechanism employed is that of zoning, whereas a plethora of legislation with various utilitarian objectives, regulate rural land usage. The problem of divided and unco-ordinated control is clearly evident.

6.5 A Review of Policy Alternatives

6.5.1 Restrictive and Prohibitive Legislation

Police power is the power of the state to ' ... (promote) the public welfare by restraining and regulating the use of liberty and property' (Freund: in Roe 1976, p.421). It is the recognised power of the state to promote the health, safety and welfare of the public (McConnel, 1981, p.90). Regulation, by means of police power, to control the spatial and quality of land usage, have been expressed by way of zoning, subdivision restrictions and building requirements.

6.5.1.1 Zoning

Zoning is the most prevalent form of such 'police power' regulations. Zoning has traditionally been exercised at the local government level by way of provincial town planning Ordinances. The trans-regional nature of land use control has been recognised in the Physical Planning Act 88 of 1967 which makes provision for the drafting of guide plans. A guide plan lays down guidelines for the future spatial development of a defined area (see Section 6.3.4).

Experience in the United States, where zoning has been applied to rural land usage as well as urban land usage, has revealed that:

> 'Zoning ... has been ineffective in preserving agricultural and environmentally important land.'
>
> (Roe, 1976, p.421)

A number of reasons are suggested for these purported failures:

1. An investigatory report submitted by The Nature Conservancy and the State of North Carolina suggests:

> 'Although zoning per se has inherent problems as a means of land use control, these problems are often exacerbated by poor administration of zoning problems. Local governments authorised to use zoning, if they, in fact, adopt zoning regulations, are too often permissive, arbitrary, and unco-ordinated in their enforcement of those regulations. Zoning Ordinances are often unrelated to community or regional plans and objectives or to other regulatory devices. Thus, the fragmented structure and parochial views of local government defeat the potential of zoning regulations for ... (conservation) ... on a regional scale.'
>
> (Roe, 1976, pp.421-422)

The dependence upon local and even provincial authorities to optimally regulate land usage, in accordance with social interest at large and ecological interdependencies is limited by spatial limitations placed upon their jurisdiction and is constrained by local or regional concerns and goals (Fuggle, 1983).

> 'The potential of police power regulations for rural land preservation is severely limited by the short sighted administration characteristic of most

> local governments. Piecemeal and ad hoc administration fail to meet broader regional needs. To better control land resources of areawide importance, regulatory powers should be exercised by regional governing boards with review by state agencies. Yet a major reordering of governmental authority is unlikely, and police power regulations as presently administered remain ineffective for protecting rural land.'
>
> (Roe, 1976, p.422)

In the South African context, even though local and provincial autonomy is less developed than the American situation, the above concerns are applicable. The continued fragmentation of Southern Africa by way of land transfers to Black National States, the increasing autonomy of urban black areas and greater decentralization envisaged in the'new constitutional arrangement', as suggested by Malan (1983), also pose serious limitations to the national application of zoning requisites.

2. The economic implications of various zoning alternatives are important to the adoption and implementation of such schemes.

   Initial zoning by permitting intensive uses on some lands but not on other lands, confers the potential for large capital gains (not taxable where the landowner is not a property dealer) on some landowners but not on others (Kantor, 1984). Individual applicants may have much to gain financially from the granting of a variance or exception to an existing zoning provision. When land is rezoned to permit more intensive use, in order to accommodate future growth in the community, some favoured individuals will enjoy windfall gains while others will not.

These economic implications impose immense burdens upon members of zoning boards and commissions. Randall suggests:

> 'They (people responsible for zoning decisions) are subjected to intense pressures from competing private interests and public interest groups. Because of the large profit potentials at stake, it is not unknown for zoning board members to be tempted with bribes or other inducements that are illegal or of dubious morality. This is only to be expected, since zoning boards are empowered to redefine the rights that pertain to property, and to create, maintain, and on occasion modify an artifical scarcity of land that is available for various purposes.'
>
> (Randall, 1981, p.340)

Assuming that zoning could be effectively administered to direct land usage, in accordance with an overall national plan, the policy might still be unacceptable from an equity viewpoint, i.e. it may have undesirable distribution implications.

6.5.1.2 Subdivision Controls

The Unbeneficial Occupation of Farms Act 29 of 1937 was introduced to combat the uneconomic subdivision of land and for the appropriation and allotment of land which is not being beneficially occupied for farming purposes. This Act has failed for a number of reasons:

1. no policy has been formulated, particularly as
2. no machinery has been created to enforce the Act;
3. the Act makes no provision for measures preventing the subdivision of agricultural land;
4. the Act does not restrict unbeneficial occupation in respect of large unbeneficial holdings

> and land held for speculative purposes (Rabie, 1983).
>
> (See Fuggle and Rabie, 1983, p.157)

However, the subdivision of Agricultural Land Act 70 of 1970 does help regulate the subdivision of agricultural land. The Act regulates the creation of uneconomic farming units with concomitant adverse effects on soil erosion. The Act is deficient in that it does not provide for the consolidation of existing uneconomic farming units (Fuggle and Rabie, 1983, p.158).

A further problem exists in that the spirit and intent of the Act are being infringed by the continued establishment of townships in aesthetically and environmentally sensitive areas, e.g. along estuaries (see Fuggle and Rabie, 1983, p.450).

The distinction between holiday townships and holiday resorts is that the former sell sites for development by the purchaser, whereas the latter are developed and maintained by a single body and cannot legally be sold freehold.

Township developments negotiated between local authorities and developers frequently do not require that the developer bear the initial capital costs of providing services, e.g. roads, electricity, water, to the subdivision (Barry, 1984). The Township Application Form (Section 21) requires that developers negotiate the installation with the local authority , (in Provincial Administration of The Cape of Good Hope, 1983). An example is provided in the document proposing the development of Infanta Erf 134 which states that 'aspects ... to be cleared up (i.e. negotiated) with the council will be ... services'

(Moss, 1982, pp.3-4). Existing provisions exhibit a number of inadequacies:

1. They do not require the developer to bear the initial costs of all relevant services and utilities. The developer is not required to build roads from the subdivision to the major traffic arteries and is not required to bear the costs of widening or upgrading major traffic arteries and provide electric transmission lines (Barry, 1984). Average cost pricing results in residents of established neighbourhoods bearing a substantial portion of the costs of extending the services to new subdivisions. An appropriate cost allocation system for the provision of services to new subdivisions or township developments would do much to internalize the marginal costs associated with the provision of such services. It is submitted that this charge system would act as a disincentive to the flourishing speculation in holiday township development.

2. Quality control with respect to the facilities provided by developers has often been inadequate (Grindley, 1984). The developer disposes of plots so as to maximise the return on investment. Under these conditions is is rational for the developer to plan and construct facilities with a short time horizon in mind. It is often observed that township roads soon deteriorate, sewage treatment 'plants' (which are seldom installed - Grindley, 1984) become sources of pollution, alien vegetation flourishes and the natural environment is adversely affected (Grindley, 1984). The developments often impose high social costs, most of which was not considered in the decision making process. It is

in this sphere of concern that environmental impact assessments and cost benefit analysis techniques are of extreme relevance and importance. Many innovative techniques have been devised to incorporate these nonmonetised costs into the decision matrix, e.g. shadow pricing, willingness to pay and compensation (see Stauth, 1983).

6.5.1.3 Building Regulations

Building codes are, predominantly, directed at the protection of health and safety.

> '... They provide protection to the consumer ... On the other hand, they may increase construction costs and retard innovations in construction techniques.'
>
> (Randall, 1981, p.342)

At present building regulations only have limited significance for built environment aesthetics by eliminating some structures that would be aesthetically inferior or would deteriorate rapidly, and by requirements that specify maximum building heights, distance from road, etc. These regulations offer potential specifically in the sphere of the built environment, which is not considered in this report.

6.5.2 Innovative Alternatives

> 'Experience has shown that communities must use all available tools to preserve farmlands.'
>
> (Amato, 1979, p.13)

Throughout this chapter numerous financial incentives have been mooted as complementary regulatory mechanisms designed to support and reinforce existing legislation. Some suggestions are investigated below.

6.5.2.1 Pricing of Public Services

Sections 6.2.2 and 6.5.1.2 have discussed the implications of average cost pricing for public services, e.g. water, electricity and household waste removal. The restructuring of charge bases and rate schedules could act as a disincentive to urban sprawl imposing the full marginal cost of extending the public service to the developer.

6.5.2.2 The Auctioning of Zoning Changes

Clawson has attempted to overcome equity based objections to the zoning of land use by suggesting that zoning authorities should auction variations in rights (1971). It is suggested that zoning authorities, after deciding which lands should be subject to zoning charges and variances, should auction the rights created to the highest bidder. He suggests that this lessening of restrictions on the operation of the price mechanism would result in markets in land becoming more efficient, spatially and intertemporally, as land would be more likely to gravitate to its highest valued use. These auctions would provide finance to government.

Where rights are created to allow more intensive land usage it is suggested that the subsequent auctioning of such rights would help reduce speculation in land. Speculation would be reduced as the financial windfall would benefit government as against the developer. In this way inequities resulting from zoning would be reduced as well as the incentives for corruption on the part of the zoning authorities. A possible problem exists in that the creation of such rights might be viewed as an easy source of revenue for government (Goldberg, 1984). The revenue earned by these auctions could be used to compensate landowners for the imposition of more restrictive zonings.

Such compensation would need to be legislated as:

> 'There is no all-embracing principle nor legislative provision that the person prejudiced is entitled to compensation. Such compensation will only be payable if the legislation which authorises the curtailment of the landowner's right of ownership, makes specific provision for it (e.g. Section 4(1) of The Mountain Catchment Act 63 of 1970 provides for compensation for actual patrimonial loss suffered as a result of limitations on land usage).'
>
> (Fuggle and Rabie, 1983, p.476)

An extension of these suggestions could apply to nature conservation. Landowners could raise finance by way of auctioning of restrictions placed upon their land usage. Such restrictions could be registered in favour of the public generally by way of a public servitude registered in the deeds office against the title deed.

6.5.2.3 The Amenity Compact

A logical extension to the concept of auctioning zoning charges is that of an 'amenity compact' whereby developers are granted reasonable amendments to zoning ordinances in return for providing certain public amentities, e.g. open space (see the Municipal Act of British Columbia of 1972, Sections 702A, 702B and 703). The developer may, alternatively, be required to contribute to a 'social amenity fund'.

> 'The amenity compact notion explicity recognises that any development makes use of 'amenity rent', the social value of open space, aspect, fine views, etc., which belongs to the public as a kind of trust ... The notion implies that development of any kind is a privilege not a right, and should recognise ... the social amenity values that are being disturbed.'
>
> (O'Riordan, 1981, p.151)

The exploitation of the opportunities suggested by the amenity compact are dependent upon administrative efficiency, the relative bargaining powers of the administration and the developer, public pressure and the priority ranking afforded to social amenity. The adoption of this concept would provide a useful mechanism for the resolution of conflicting objectives.

6.5.2.4 Transfer of Development Rights (TDR's)

TDR's are based on the fundamental principle that land is not so much a private commodity as a public resource. A TDR scheme would grant each property owner:

> '... a bundle of development rights in accordance with a community environmental plan which identifies the amount, nature, location, and timing of growth.
>
> (O'Riordan, 1981, p.154)

This overall plan would need to be established by way of multidisciplinary investigations and consultations with interested parties. Developers would be required to accumulate a specified number of TDR's before their land could be developed. Ecologically sensitive areas would require a proportionately larger number of TDR's than would less sensitive areas. TDR's could be traded and a market is envisaged.

O'Riordan has termed the TDR scheme a form of 'Spaceship II quota zoning which recognises a limit to the exploitation of landscape amenity'. (O'Riordan, 1981, p.154).

It is submitted that the adoption of the TDR scheme, although it offers some exciting advantages, could prove problematical for the following reasons:

1. Experimentation with this approach, in the

Brandywine Scheme in Chester County, Pennsylvania, resulted in failure due to distrust and avarice (Thompson, 1969, pp.1180-1182). A successful application is therefore dependent upon effective rules and credible administration.

2. The scheme is unlikely to win the support of South African landowners, who would regard the TDR system to be an infringement of their property rights or individual dominium over discrete land parcels, a fundamental concept in the South African legal system (Goldberg, 1984).

The Report of the Planning Committee of the President's Council on Conservation and Development (1984, p.39) revealed that:

> 'According to the National Monuments Council and the Institute of South African Architects, the preservation of structures in the built environment can be considerably stimulated by the transfer of development rights from one property to another where the possible development of a property is being hampered by conservation considerations.'

This less sophisticated application of the TDR scheme could have application to developments concerning the natural environment.

6.5.3 Revenue Law

Within the framework of financial legislation many promising suggestions deserve further investigation.

6.5.3.1 Preferential Assessment

Preferential Rating is a method of lowering the tax burden on land, such as farms, forests, wetlands and historic sites which the community wishes to preserve. It is submitted that a simple area based

rating policy discriminates against owners of land with high social value.

Municipal rating structures are described as site based where only land is used in the rating computation, flat ratings where land and buildings are valued together and composite rating where land and buildings are valued separately (Craythorn, 1984). The use of land only in the rating computation 'encourages dispersal of ownership, high property turnover and development' (Craythorn, 1984). Craythorn observes that younger, development orientated municipalities, e.g. Durbanville, opt for the land based rating system, whereas the more established neighbourhoods, e.g. Cape Town, are rated on a flat or composite basis. Greater control over local rating policies for encouraging development, thereby increasing revenues, are desirable if sustainable developments, in the national interest, are to be established.

Preferential assessment for rural land does appear to have attracted attention, not as a conservation measure, but as an effective and equitable basis for levying rates, an important source of revenue. The preferential assessment is based upon, inter alia, the proportion of land, as estimated by aerial photography, under crop as against land not developed due to mountains and other topographical features likely to impede agricultural utilization of the land (Craythorn, 1984). As was mentioned above for urban lands, the environmental conservation potential of preferential assessments in the rural environment has not been explored. A common strategy suggested is that of a use value rating, whereby property is taxed on the basis of its value in current use, rather than market value which may reflect the value of the land in an alternative and

more intensive use. It is argued that market value taxation has an inbuilt bias against preservation and conservation activities. Concerns have been expressed that preferential rating could be misused as a subsidy to farmers, speculators and land developers. This objective has been tackled by 'rollback provisions' inserted into the legislation of a number of American states. These provisions require that a conversion of land use from the preferred, privileged use to some other use results in the difference between market value taxes and use value taxes, including interest, being levied for the previous several years (see Roe, 1976, pp.423-426).

An alternative preferential rating system is envisaged whereby lands are ranked or classified according to conservation status, e.g. a continuum between high conservation status to low conservation status. Proprietors of high conservation status lands would receive a subsidy for the maintenance of natural areas, whereas highly utilized, low conservation status lands would attract high rates.

The equity and efficiency implications of the above suggestions require further investigation. Many states in America have experimented with variations of the preferential land taxation system with varying degrees of success. These experiences present useful sources of reference (e.g. Roe, 1976, and Forkenbrock, 1982).

6.5.3.2 Land Trusts

Rabie and Erasmus state that:

> 'A similar result achieved through the imposition of a servitude can be achieved through the creation of a trust : The future of land for conservation purposes may be determined

> by the landowner through the creation of a trust by means of testament or contract.'
>
> (in Fuggle and Rabie, 1983, p.42)

Land trusts could be utilized for the aggregation of splintered ownership of ecosystems and aesthetic features by way of consolidation of small land units. This would greatly facilitate ecosystem conservation and the preservation and maintenance of land character and landscape aesthetics by means of co-ordinated planning for land managed in terms of the trust deed.

The characteristics and consequences of a trust were well explored in Thorne and Another N.N.O. v Receiver of Revenue (1976(2)S.A.50(c);30 S.A.T.C.1), where Van Winsen, J., clarified the nature of a trust in these terms:

> 'It is, I think, to be deduced from the authorities that in general a trust is created by contract, very often by a contract of donation or in virtue of an antenuptial contract or by way of a will. It is created in respect of defined property transferred to a trustee, who is burdened with the obligation to administer the property for the benefit of a third person, the latter being accorded a right against the trustee to enforce the trustees compliance with his obligations towards the beneficiary concerned. Generally trusts comtemplate an extended continuation of the administration of the property in favour of the beneficiary until terminated on the happening of some specified future event. A trust can also, of course, be created by statute.'

Much legal debate surrounds the treatment by the tax authorities of trusts as a taxable entity (Hassan, 1984). This practice will, for the purposes of this report, be regarded as the taxation status most likely to continue.

A Possible Mechanism

The donation of property, or partial rights therein, to a nature conservation company, society, association or trust would result in a donations tax exemption in terms of Section 56(2)(h) (read together with Section 10(1)(cB)) of the Income Tax Act No. 58 of 1962 (see the discussion on donations tax in Section 3.7.1). An inter-vivos donation (i.e. made during the life of the donor) would be deemed property for estate duty (The Estate Duty Act No.45 of 1955, Section 3(3)(c)) and would be valued for estate duty purposes in terms of Section 62 of the Income Tax Act (The Estate Duty Act, Section 5(1)(e)). A possibility exists that a corresponding estate duty deduction might be granted by the Department of Inland Revenue (Hassan, 1984). It is, however, unlikely that an amendment would be made to the Estate Duty Act to provide for the deduction of inter-vivos donations to conservation organizations (Huxham, 1984).

The financial implications of these provisions are complex and are best illustrated by way of the following simplified example.

EXAMPLE 6.1

Assume Mr A, who has a large estate, owns a tract of land, with a market value at 1.1.19X0 of R500 000, which attracts high conservation status. The following situations are envisaged:

1. he donates the property and is granted a deduction in terms of Section 56(2)(h);

2. he donates the land and pays donations tax;

3. as per 1. above but a corresponding deduction for estate duty purposes is granted.

Donations tax payable : Donation valued at R500 000 (Section 62(1)(d))

Taxed at 25% (Section 64(1))

Donation Tax Payable : R500 000 x 25%

= R125 000

Estate duty payable : Deemed property (Section 3(3)(c)) valued at R500 000 (Section 5(1)(e))

Taxed at 35% (per Estate Duty Tables)

Tax payable : R500 000 x 35%

= R175 000

	Case 1	Case 2	Case 3
	R	R	R
Donations tax	-	125 000	-
Estate Duty	175 000	50 000	-
Total	175 000	175 000	-

Comment:

1. Case 1 is the most likely to obtain, with the benefit derived increasing as the period between the donation and the date of payment of estate duty increases (due to the time value of money). Good tax planning would recommend such a donation where the donor has a long life expectancy.

2. Case 2, the tax status perceived by most environmentalists, would tend to discourage such donations as an 'immediate' donations tax burden would result.

3. Case 3 deserves further investigation and research as it clearly offers the most attractive incentive (indirectly by way of taxes avoided).

4. It is useful to view the comparative taxation status afforded to such land donations and 'easements' (see Hoose, 1981, pp.81-146).

6.6 Conclusion

Land usage, both spatial and temporal, is central to many pressing environmental issues. The establishment of socially desirable land usage patterns is a pre-requisite for the selection and application of efficient and equitable regulatory mechanisms. Current legislation reveals that land usage in the urban areas is effected predominantly by way of zoning ordinances whereas rural areas reveal divided unco-ordinated control. The plethora of Acts and administrative bodies, many of whom have a tradition of autonomy, reveal little environmental sensitivity and conservation would appear to be a low priority as against the dominant utilitarian ethic.

The implementation of desirable land usage prescriptions may be effected by way of many policy mechanisms. This brief review has revealed that:

1. many obscure incentives for land preservation already exist in the legislation, e.g. donations tax provisions, and that these deserve further investigation;

2. current regulatory mechanisms, e.g. land use zoning, do not fully exploit revenue earning capabilities and are frequently inequitable;

3. innovative amendments to these policies, e.g. the auctioning of zoning changes and the amenity compact offer exciting possibilities if the resulting revenue is directed towards conservation;

4. rates on land and buildings and the pricing of public services often promote undesirable land usage and development, these pricing structures should be investigated, and

5. South African legislation reveals little innovation or experimentation in land use regulation when compared to the United States of America.

CHAPTER 7 : SUMMARY OF CONCLUSIONS

7.1 General Conclusions

Environmental problems may be explained in terms of institutional inadequacies (Section 2.3). These inadequacies are categorized as either government (Section 2.5) or market related (Section 2.4). Efficacious environmental control necessitates the remedy of these inadequacies. It is submitted that remedies proposed to overcome legal and adminstrative shortcomings are politically and practically unrealistic (Section 2.5.2.2). Assuming these remedies could be effectively instituted, it is still not guaranteed that environmental resources would be efficiently and equitably utilized. The prescription to emerge from this review of government failure dictates that the alternative regulatory system, namely market related policies, should be increasingly utilized to complement and even replace direct government administration where possible.

In Chapter 3 the review of policy alternatives revealed that voluntarism (Section 3.2), although a weak and unreliable control policy, plays an important role in instances where alternatives are not feasible, e.g. littering in the wilderness. Direct controls, i.e. prohibition (Section 3.3.1) and regulation (Section 3.3.2), are subject to adminstrative failure and legal constraints (Section 3.3.3). The inordinate reliance upon direct controls in South African environmental legislation has, not surprisingly, contributed towards inadequate environmental control. In addition to these limitations, executives surveyed in the United States (Section 3.3.4), revealed a disregard for direct controls. Economists have long argued for market related policies (Section 3.4) on the basis of efficiency advantages. Environmentalists and conservation organizations have only recently recognized the need to investigate alternative control policies.

Current financial legislation, the Income Tax Act No. 58 of 1962 and the Sales Tax Act No. 103 of 1978 in particular, is replete with environmentally relevant provisions. Most of these provisions create disincentives to wise environmental resource management, e.g. the unnecessary promotion of overstocking in the Income Tax Act, Schedule 1, and concomitant environmental degradation (see Section 5.4.1). Even apparently innocuous aspects of taxation e.g. non residents shareholders tax, raise ethical environmental concerns (Section 3.7.1). The amendment or even scrapping of such provisions is essential for the successful amelioration of many environmental problems. Current fiscal concerns preclude the success of even well motivated applications for additional taxation allowances or the extension of existing taxation allowances to environmental objective (Sections 3.5.2 and 3.5.3). The review of policy alternatives revealed that environmentalists should pursue a well researched strategy which is sensitive to economic considerations (see Section 7.2 below).

Pollution is an external diseconomy, the resolution of which is proposed in terms of a host of possible regulatory mechanisms imposed at various locations in the production and consumption cycle (see Section 4.1 and Figures 4.2 and 4.3). The specification of production equipment or pollution control devices (Section 4.2.2.1) is an inefficient and inequitable regulatory approach. This approach is currently employed in South African pollution control legislation. The promotion of investment in pollution control equipment should form an important component of pollution control policy (Section 4.2.2.2.2). It is argued that investments in pollution control equipment are different to other commercial investments in that expected returns from the investment are, usually, not material and the investment decision is not subject to 'gut feel' business acumen, but is primarily dependent upon the net present value of financial incentives

received and fines, taxes, or charges avoided (see Section 4.2.2.2.2 and Example 4.2). The high degree of specificity and flexibility attainable through fiscal policy (Section 4.2.2.2.2), as against relatively blunt monetary and exchange rate measures (Section 4.2.2.2.1), must be increasingly incorporated into the pollution control calculus. The measures must be consistent with current and anticipated fiscal policy (Sections 3.5.2 and 3.5.3). This is essential as existing incentives to investments in pollution control equipment are hopelessly inadequate (see Example 4.2). Controls designed to regulate residuals generated are usually described as emission standards (Section 4.2.3.1) or emission taxes (Section 4.2.3.2). Economists have long argued the superiority of a uniform pollution tax compared to fiat regulation (see Figure 4.4). Current legislation makes extensive use of the standard to regulate pollution. The emissions tax has attracted much debate and numerous advantages and criticisms are evident. This fiscal control needs to be further investigated in terms of feasibility and applicability in a South African context. Subsidies or bribes to reduce emissions (Section 4.2.3.3) and the Pigouvian taxation of production (Section 4.2.5.1) do not present feasible policy alternatives. Research and development (Section 4.2.7) is highly regarded by both environmentalists and businessmen in the combatting of pollution problems. Current financial incentives are inadequate to promote research and development by the polluter (see Section 7.2 below).

Resource destruction problems, reviewed in Chapter 5, were analysed in terms of renewable and exhaustible resource categorizations (Section 5.1).

1. The importance of exhaustible resource exploitation to the South African economy demands that any major change in financial policy relating to this sector must be thoroughly researched (Section 5.3). The

generous taxation benefits (Section 5.3.1) extended to activities encompassed within the broadly defined terms of 'mining' and 'mining operations' (Section 5.3.1) may well result in a reduction of the price of resource extraction well below social cost. Greater selectivity is needed in the qualification criteria for these taxation incentives. In addition exhaustible resource depletion should be discouraged by way of a resource depletion tax (Section 5.3.2.1) which could be varied in magnitude in accordance with environmental impact. Repair, reuse and recycling (Section 5.3.3) have not received adequate attention. Current financial legislation is inconsistent in the treatment of various repair, reuse and recycling activities (Section 5.3.3.1 and Tables 5.1, 5.2 and 5.3) and these activities receive comparatively less advantageous incentives than mining operatings. Correction of these inconsistencies and the consideration of additional incentives are recommended, e.g. the throughput tax, including deposits on returnable bottles (Section 5.3.3.2). The usage of exhaustible resources may be curtailed by policies directed at the control of demand stimulation (Section 5.3.4). In this regard the advertising tax (Section 5.3.4.1) and the promotion of savings (Section 5.3.4.2) are less specific in addressing the problems of exhaustible resource usage, but deserve further investigation in the broader context of environmental concern.

2. Renewable resources present a complex problem for environmental management (Section 5.4). Owners of renewable natural resources outside reserves (Section 5.4.1) receive disincentives to the environmentally desirable management of these resources. These disincentives result from inadequate land use prescriptions (see Chapter 6) and taxation incentives for unwise usage of renewable resources. The taxation

advantages extended to farmers (Section 5.4.1) frequently promote overstocking, capital intensification and the spatial expansion of farms. It is generally accepted that many natural components of South Africa's biological heritage are in danger of being irreversibly lost to humanity (Section 6.2.4). These farms need to be re-evaluated with regard to regional and local environmental concerns. Common renewable resources, e.g. fish in the ocean, present a unique control problem in that effective policing, enforcement and international co-operation are extremely difficult to ensure.

Land use policy, reviewed in Chapter 6, is frequently regarded to be the most important aspect of environmental policy as land usage, both spatial and temporal, is central to many pressing environmental issues (Section 6.1). The establishment of well researched land usage patterns is a pre-requisite for the selection and application of efficient and equitable policies (Section 6.1). Inadequately planned land usage may give rise to a number of problems: incompatible uses (Section 6.2.1), urban sprawl and leapfrog development (Section 6.2.2), destruction of aesthetic qualities of the natural and near natural environment (Section 6.2.3) and destruction of ecosystems (Section 6.2.4). Current legislation (see Sections 6.3 and 6.4 and Table 6.1) reveals that land usage in the urban areas is affected predominantly by zoning Ordinances, whereas rural areas reveal divided unco-ordinated control. The plethora of Acts and administrative bodies, many of whom have a tradition of autonomy, reveal little environmental sensitivity and conservation would appear to be a low priority as against the dominant utilitarian ethic. The review of policy alternatives (Section 6.5) revealed that current regulatory mechanisms do not fully exploit revenue earning capabilities and are frequently in-

equitable. The auctioning of zoning changes (Section 6.5.2.2) and the amenity compact (Section 6.5.2.3) offer exciting possibilities if the resulting revenue is directed towards conservation.

A number of innovative policies are required to supplement current unimaginative legislation (Sections 6.3 and 6.4). The transfer of development rights (Section 6.5.2.4) is a particularly promising mechanism in the context of environmental protection. In the sphere of revenue law a system of preferential assessments (Section 6.5.3.1), integrated into a well researched land use plan, is essential to the promotion of wise land usage. Land Trusts (Section 6.5.3.2) also offer an excellent mechanism whereby splintered ownership of ecosystems could be aggregated to facilitate more co-ordinated management. Current provisions in the Income Tax Act need to be further explored to expose schemes that would offer advantages to participants (see Example 6.1).

7.2 Strategy Proposal and Aspects Requiring Additional Research

It has been demonstrated that financial policies and practices are of considerable significance in the context of environmental concerns. This introductory review suggests the following strategies and research domains for immediate consideration.

The current fiscal concern with revenue forgone as a result of taxation allowances (Section 3.5.2 and 3.5.3) necessitates that:

1. Applications for financial concessions to environmental activities should request subsidies, which would be administered by the appropriate government department, rather than pursue the avenue of taxation allowances.

2. Existing revenue law, the Income Tax Act No. 58 of 1962 in particular, should be reviewed with the objective of exposing provisions and devising schemes that promote desirable activities. It is submitted that environmentalists have afforded insufficient attention to the possibilities that already exist in the financial legislation (e.g. Section 6.5.3.2 and Example 6.1).

In addition it is essential that:

1. Disincentives and undesirable pricing policies (e.g. Sections 5.3.3.1 and 6.2.2) need to be identified and these provisions and pricing policies must be amended.

2. Innovative schemes need to be devised in conjunction with affected parties, so as to win co-operation of participants and satisfy and address, as far as possible, the respective concerns and financial objections. Innovative environmental protection policies in the United States and Canada provide useful references (e.g. Section 6.2.3).

This overriding strategy has been applied to the review and policy recommendations in the chapters dealing with pollution (Chapter 4), resource destruction (Chapter 5) and regulation of the space economy (Chapter 6). A succinct summary of these recommendations is presented below.

Investment in Pollution Control Equipment

Capital allowances (Section 4.2.2.2.2) currently provide inadequate incentives to investment in pollution control equipment. These investments must be encouraged by employing a number of complementary fiscal measures. An awareness of economic policy and fiscal concerns is essential to the successful lobbying for these additional positive incentives (Sections 3.5.2 and 3.5.3). The strategy proposed involves:

- Greater utilization of the 'extended' initial allowance (Section 4.2.2.2.2(a)) in Section 12 of the Income Tax Act.

- Lobbying for cash grants and subsidies (see Example 4.2 and Section 4.2.2.2.2(b)).

- Investigation of the feasibility and applicability of a residuals tax (Section 4.2.3.2).

Research and Development

The promotion of research and development into pollution control by polluters demands the extension of the inadequate provisions currently in the legislation. A proposed strategy would include:

- Lobbying for larger Section 11(p) and Section 11(q) incentives for research and development into pollution control equipment (Section 4.2.7).

- Lobbying for cash grants and subsidies (Section 4.2.7).

These recommendations also apply to research and development into other environmental problems e.g. reduction of environmental impact in open cast mining.

Resource Destruction

A decreased rate of exhaustible resource depletion (Sections 5.3.2 and 5.3.4), complemented by increased reuse and recycling (Section 5.3.3) is needed to reduce the risk of resource exhaustion as well as the minimisation of environmental damage. The following strategy is recommended:

- Current taxation advantages (Section 15(a)) of

the Income Tax Act in particular) extended to mining operations must be reviewed and more stringent qualification criterion established (Section 5.3.1).

- The feasibility and applicability of a resource depletion tax must be further investigated (Section 5.3.2.1).

- Reuse, repair and recycling activities deserve equal, and possibly even greater, taxation status than virgin resource exploitation (Section 5.3.3). In this regard the qualification criterion for capital allowances (Sections 12 and 13 of the Income Tax Act) must be re-evaluated (Section 5.3.3.1). A selective extension of the repair allowance (Section 11(d) of the Income Tax Act) is also desirable (Section 5.3.3.1). The feasibility and applicability of the throughput tax (Section 5.3.3.2), which includes consideration of performance guarantees, a materials usage fee, advertising controls and deposits for returnable bottles, must urgently be investigated further.

Renewable resource management (Section 5.4) is best achieved by way of land use planning. The following disincentives to wise management must be amended.

- The generous taxation benefits extended to farmers (Section 5.4.1) in Schedule 1 of the Income Tax Act, include capital allowances (para. 12), averaging provisions (para. 19) and drought relief (para. 13A) and forced sale provisions (para. 13), protect the farmer from financial difficulties arising from unwise environmental management. These provisions must be re-evaluated in terms of national environmental concerns.

Regulation of the Space Economy

Zoning (Section 6.5.1.1) is the predominant regulatory measure employed in the urban centre. A number of innovative amendments are required to improve efficiency and equity concerns.

- The auctioning of zoning changes (Section 6.5.2.2) should be incorporated into the zoning procedure. Proceeds should be directed towards conservation.

- The amenity compact (Section 6.5.2.3) is easily implemented and offers great potential. This mechanism should be immediately incorporated into the zoning procedure.

The following mechnisms are of particular interest in the determination of rural land usage:

- The transfer of development rights (Section 6.5.2.4) is an interesting suggestion and possible procedural complications deserve further investigation.

- An environmentally sensitive system of preferential assessments (Section 6.5.3.1) deserves urgent attention. This system would effectively promote desirable land use.

- Land trusts (Section 6.5.3.2) offer an exciting medium for ecosystem and aesthetic preservation. Further research of the financial implications, in particular, donations of partial ownership rights, would prove useful in identifying the magnitude of this promising incentive.

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APPENDIX : LIST OF INTERVIEWEES

1. Barry, R.L. Acting Chief Town and Regional Planner, Cape Provincial Administration.

2. Blumenthal, A.H. Assistant City Engineer - Solid Wastes, Cape Town City Council.

3. Craythorn, D.L. Deputy Town Clerk, Cape Town Municipality.

4. Du Toit, L.F. International Partner - Tax Division, Arthur Andersen & Co., Johannesburg.

5. Fish, E. Senior - Tax Division, Arthur Andersen & Co., Cape Town.

6. Fuggle, R.F. Director and Professor of School of Environmental Studies, University of Cape Town.

7. Goldberg, I. Member of Government Standing Advisory Committee on Company Law and Ancillary Committees.

8. Grindley, J.R. Associate Professor of School of Environmental Studies, University of Cape Town.

9. Hassan, M.M. Senior Lecturer in the Department of Accounting, University of Cape Town.

10. Huxham, K.T. Senior Lecturer in the Department of Accounting, University of Cape Town.

11. Jowell, K. Member of the Standing Commission of Enquiry with Regard to the Taxation Policy of the Republic and Assistant Director of the Graduate School of Business, University of Cape Town.

12. Kantor, B.S. Professor in the School of Economics, University of Cape Town.

13. Kingon, C.E. Chief Director in the Department of Inland Revenue, Johannesburg.

14. Kruger, D.J. Director in the Department of Inland Revenue, Pretoria.

15. Malan, J.G.S. Former Senior Professional Officer, Environmental Conservation Branch, Department of Environment Affairs, Cape Town.

16. Mark, M. Lecturer in School of Economics, University of Cape Town.

17. Rabie, M.A. Professor in the Department of Public Law, University of Stellenbosch.

18. Raimondo, J.P. Research Fellow in the School of Environmental Studies, University of Cape Town.

19. Schweppenhauser, C.F. The Commissioner for Inland Revenue, Pretoria.

20. Stauth, R.B. Former Lecturer at the School of Environmental Studies, University of Cape Town.

21. Stroebel, F.H. Director of the Southern African Nature Foundation, Stellenbosch.

22. Uliana, E.O. Senior Lecturer in the Department of Accounting, University of Cape Town.

23. Van Blerk, M.C. International Manager - Tax Division, Arthur Andersen & Co., Cape Town.

24. Wiles, K.P. International Manager - Tax Division, Arthur Andersen & Co., Johannesburg.