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## Environmental Resource Economics, WSSD and policy

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## 1 INTRODUCTION

In deciding how best to entertain you all with what I have to say to you today I asked myself “what are the most intriguing environmental science questions emerging from my own experience within a bureaucracy in incorporating environmental resource economics into national environmental policy”.

I will start off by posing the question and giving the direction I am taking in answering them.

I want to lead on from there to plant some seeds for policy debate in the fertile grounds of WSSD issues that the previous speaker has raised in your minds.

I would like to conclude by drawing domestic and global spheres together in ways of incorporating environmental resource economics into environmental policy in order to stimulate policy debate.

This is the purpose of my talk, in keeping with the non-aligned approach that has made the Forum for Economics and Environment the success that it is. Since I am not directly involved with the WSSD preparations, what I have to say in this regard does not commit the Department of Environmental Affairs and Tourism in any way. This makes it easier for me to play my role as a member of the Forum for Economics and the Environment.

## 2 ENVIRONMENTAL RESOURCE ECONOMICS

There are two questions that intrigue me.

Firstly, why have the successes I have experienced so far turned out to be the opportunities we are looking for to bridge the economics/environment divide.

Secondly how does cumulative experience of these successes construct an approach to identify opportunities that can be utilized by bureaucrats in my kind of role to drive continuous improvement of bridging the process?

I would like distil what experience I have had in the past few years in answering these intriguing questions.

In my sphere of work, the opportunities for success in using environmental resource economics arise when environmental policy implementation begins to have substantial impacts on the economy. A different way of saying this is that the opportunities arise when the environment begins to have an impact on the economy. It is because of this determining influence that we have already begun to bridge the economics/environment divide.

The way I have experienced this is that strong political will in implementation of environmental policy that affects the economy creates opportunities for using environmental resource economics.

A highlight for me is that practical economic solutions can be found by pursuing economic arguments with unorthodox networking. This kind of networking crosses boundaries between line functions, departments, public administration and politics and between government, business and labour constituencies.

Given the role of political will in creating the opportunities to use environmental resource economics and the role of bureaucrats in utilizing the opportunities, a partnership between bureaucrats and politicians is needed to elicit action. This partnership would make it useful to plan opportunities instead of just hoping to take them when they arise.

A more strategic approach that predicts opportunities that are likely to arise provides a basis for systematically creating and exploiting opportunities whose time has come.

This suggests that continuous improvement in bridging the economy/environment divide will focus on identifying where the environment will have the greatest impact on the economy. This approach will use environmental resource economics in a strategic partnership between bureaucrats and politicians to reduce economic risks resulting from the impact of the environment on the economy.

I would like to talk about this approach in the WSSD context to illustrate it a bit further. My interaction with WSSD is from the perspective of understanding the event as an impact of the environment on the economy.

The economic risks that the WSSD creates provide the opportunities to use environmental resource economics. I am integrating the opportunities presented by the WSSD event into the staff advisory function I have in the Department. This is a process of identifying aspects of WSSD endorsed policy whose implementation environmental resource economics has the potential to control or influence.

### **3 WSSD**

South Africa sees a new global deal with high-level political agreement a one of three basic ingredients for a successful outcome of the WSSD. Political will to implement economically sound global environmental policy that has substantial economic impact must become a focal point for non-aligned policy debate. This should play its rightful role in supporting political agreement at the WSSD that political will can piggyback on after the event. This will create better opportunities for environmental resource economics to influence environmental policy.

The aspects of such policy that environmental resource economics has the potential to control or influence must be identified to ensure that these are available for incorporation in an environmental management programme that is part of the Johannesburg plan of action which South Africa envisages to be a second pillar for a successful outcome.

A thread should be pulled through policies and programmes to sectoral agreements that create the gap for environmental resource economics to make a difference in a variety of areas. This should support the Global Deal as the third pillar for a successful outcome of the WSSD.

### **4 POLICY**

The reasons for successful entry of environmental resource economics into certain domestic environmental policy areas, the political will behind policy implementation and the three pillars for successful outcome of the WSSD can be combined to identify opportunities for driving continuous improvement to bridge the economics/environment divide in environmental policy.

As this entry of environmental resource economics into policy happens, ripple effects will begin to take effect on a broad range of economics/environment issues not initially contemplated at the more sharply

These entry points for environmental resource economics have scarce resources at their disposal. Taking advantage of the ripple effect should therefore focus on directing reallocation of resources in medium term expenditure frameworks for aligning the environmental management activities of the numerous institutions that are typically responsible for implementing environmental policy in government.

A philosophy that the environment has an impact on the economy is the point of departure. The strategy is to anticipate where and when in the economy these impacts will be substantial and to direct scarce resources for bridging the economics/environment division into economic risk areas that are created by strong political will.

This philosophy can be used to theorize that pre-modern economic responses to the impacts of the environment on traditional economies gave rise to a range of traditional tools for responding to environmental impacts on economic welfare. The impacts of the environment on modern economies gave rise to a corresponding range of modern tools.

The integration of traditional and modern tools is necessary in a post-modern era where the size of the global economy has a determining influence on ecosystem goods and services. This renders traditional and modern tools ineffective when applied on their own tools to respond adequately to the impact of the environment on economic welfare.

Dualistic economies need traditional and modern tools both separately and integrated in order to develop appropriate economic responses to the impacts of the environment on economic welfare.

The philosophising, strategizing and theorizing I have outlined can be applied to specific areas of South African environmental policy, its implementation and management of specific sectors. This will kick off some open policy debate on topics that can be used to create some entry points for environmental resource economics into environmental policy in South Africa whilst at the same time making some inputs to the global WSSD policy process.

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# Forum for Economics and Environment: Review of Activities

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## 1 INTRODUCTION

The objective of the Forum for Economics and Environment (FEE) is to:

*promote the interface of economics and the environment in southern Africa through the dissemination of information, the facilitation of open debate and the stimulation of research.*

To honour this objective in its broadest sense it is also necessary to reflect and ask a couple of pertinent questions, like: What has been done in the field during the past few years? Are there any significant trends in the economics and environment debate emerging? Are there any significant research gaps emerging? What kind of research priority could be set? How has the research that has taken place influenced science-policy interactions and how could this process be strengthened? An attempt to address some of these questions will be made here.

The reason for asking these questions is that the very reason for the birth of FEE is imperfect information regarding what research is actually done where and by whom and the consequent inefficiencies that follow such imperfections. The consequence of these inefficiencies includes the duplication of research, unnecessary research gaps and the loss of the potential synergy benefits. In such a way progress in the debate on environmental resource economics and its application are hampered. An example, however, will illustrate the benefit of having an open discussion forum.

Recent research done through FEE structures (obtainable from the FEE secretariat) indicates convincingly that the environment offers economic and business opportunities,<sup>5</sup> which could play an important role in alleviating poverty, the creation of employment and contributing to the sustainable use of any resource. Important, however, is the understanding and political will from both government and business alike to support and endorse projects which will promote and develop these opportunities. A prerequisite to make the most of the opportunities the environment offers is that all recommendations in this regard should be supported by research (empirical and otherwise) and the frequent interaction between all stakeholders. It is to this end that FEE is constantly working.

## 2 THE SCOREBOARD

Since the birth of FEE in June 1999 a series of activities to counter the deficiencies due to imperfect information mentioned above, was initiated. These activities include:

- researched and implemented most appropriate institutional setting for FEE, hosted workshops on climate change,
- hosted a workshop on the Africa Trade and Investment Policy Program (ATRIP),
- the establishment of an electronic list server - approaching 400 members,
- the compilation and distribution of a monthly electronic circular (newsletter),
- arranged donor funding and the issuing of six research grants,

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<sup>1</sup> This review has been written in personal capacity as being the members of the executive committee of the Forum for Economics and Environment and delivered during the Annual General Meeting of the Forum on 11 February 2002 during the Forum's conference. Though consulting wide in preparing this review, all views expressed are those of the authors and do not reflect those of any institution they may be involved with.

- the commissioning and completion of an economics and environment poster illustrating the environment as the platform for economic prosperity,
- arranging the first conference on economics and environment in South Africa,
- the formulation of an environmental resource economics classification system, and
- identifying environmental resource economics research gaps in South Africa.

It is stating the obvious that one can improve on both the quality and scope (depth and width) in every area mentioned above, but it does seem from interaction with members that FEE is playing an important role as an information clearing house. By playing this role, FEE promotes the subject matter of economics and the environment by providing networking services (communication via the Internet; organising and facilitation of conferences, workshops and training courses; acting as a research catalyst) without taking a position regarding certain environmental resource economic issues of its own. In fulfilling this role, the management of FEE attempted to answer some of the intriguing questions mentioned in the introductory paragraph. To do so one need to analyse the work that has been done in the field of economics and the environment, which falls largely in the category of environmental resource economics. Some evidence of work in the field of ecological economics and neo-institutional economics has also been found in South Africa, but these are few and far between. For practical purposes they will be classified as environmental resource economics for the remainder of this paper.

### 3 ERE IN SA

The discipline of environmental resource economics (ERE) is very young in South Africa and supported by a thin margin of human and financial resources. An effort was hence made to list and to categorise research in ERE in SA during the past five years in an effort to gain an understanding as to which areas are covered and which not. Doing so entailed firstly a categorisation of ERE and then the listing of ERE research in SA against this categorisation. This research is documented elsewhere (De Wit and Blignaut 2002; Blignaut and De Wit 2002).

Using the newly developed classification system (see de Wit and Blignaut 2002), environmental resource economic research conducted in South Africa of the last five years were quantified and classified in terms of number of academic papers in local accredited journals as well as a profile of consultancy or *grey* literature provided (see Blignaut and De Wit 2002). No assessment regarding the quality of the research has been done.

From this research it is evident that the main focus areas of research lie in the field of firstly the application of environmental and resource economics tools and instruments, secondly on the supply of raw materials (i.e. *sources*) and thirdly in the area of policy and institutions. The main gaps are in the areas of life-support systems (*services*) and the absorption of pollution and wastes (*sinks*). The focus on application and policy could indicate that there is a high demand for policy-relevant work on the interface between economics and the environment. The question, however, is to what extent this research actually influences policymaking and the outcome of policy decisions. This question is not addressed here though and is the topic of another study. Another unanswered question is whether these gaps are justifiable and whether the research that is done in the areas which is covered relatively well, is adequate and the right type of research and of high quality. Despite these gaps in the analysis, some striking gaps of national importance are evident:

- Contributions from an ERE viewpoint regarding the link between the environment and poverty and means how to alleviate poverty using the environment in a sustainable manner,
- demonstration models on grassroots level illustrating the applicability of economics and the environment to the general public,
- the integration of the economics and environment interface and principles in day-to-day business management and operations,
- though a large number of studies have been undertaken using environmental resource economics tools and methods, only a selective set of tools has been used. Very few contingent valuation studies and macro-modelling have been done, for example.

Clearly, these areas are of high priority and, while not scaling down on current activities, these areas will form a core focus of future FEE activities.

#### **4 THE FUTURE**

To function better as an information clearing house and to expand the knowledge on and the use of the interface between economics and environment, also to impact more directly on policy and both consumer and producer behaviour, FEE need to address a few critical issues rather sooner than later. These issues include:

- Capacity building in the field of ERE,
- The appropriate legal and institutional setting for FEE,
- Structural support for FEE through financial and human resources,
- Identifying and support focus area for research – how does this respond to needs identified by policy makers?
- Our role in supporting parliament,
- Diversification in sources of funding,
- Grants for thesis research and other bursaries in ERE,
- Investigate the possibility of a student conference, and, lastly
- Next year's conference and what format should it take on.

Thank you very much.

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De Wit, M.P. and Blignaut, J.N. 2002. *Environmental resource economics: Towards a classification system*. In Blignaut, J.N. (ed.) Proceedings of the Bridging the Economics / Environment divide conference: 7-13.

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# Environmental Resource Economics: Towards a Classification System

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## 1 INTRODUCTION

The recent rapid development of the discipline environmental and resource economics in South Africa and the opportunity to develop comprehensive research programmes, have highlighted the need for an effective classification system. The objective of this paper is to develop such a classification system. To do this, the theory on linkages between economic and ecological systems is reviewed, existing classification systems evaluated and a comprehensive classification system proposed.

## 2 A CONCEPTUAL UNDERSTANDING OF ENVIRONMENTAL RESOURCE ECONOMICS

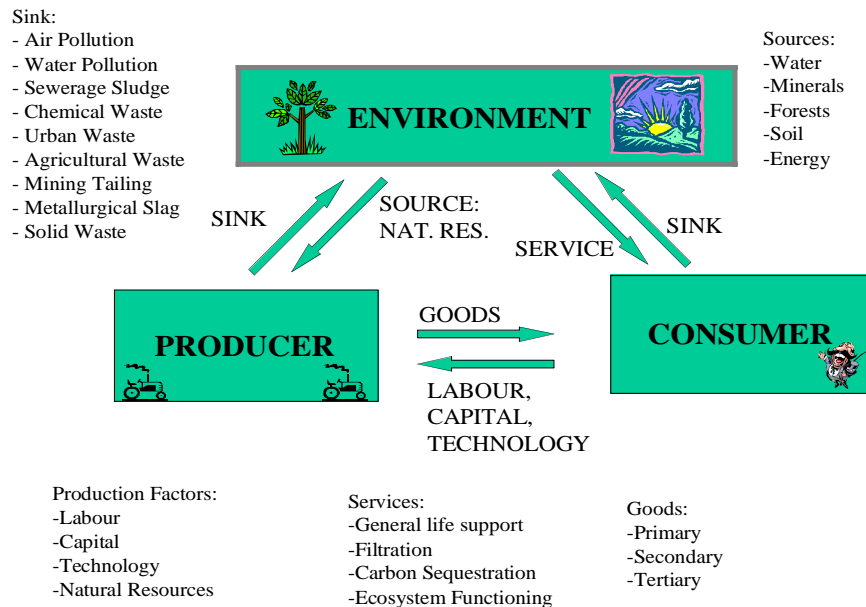
The economic and ecological systems interact in a variety of ways. To produce and consume goods and services one needs energy and material inputs (i.e. natural resources) from the natural environment. These economic activities are also often accompanied by pollution and waste streams that need to be absorbed in the natural environment. These economy-environment interactions have been described in detail in various earlier contributions to the field on environmental and resource economics (Ayres and Kneese 1969; Coddington 1970; Fischer and Peterson 1976, 1977; Kneese, Ayres and d'Arge 1970; Pearce and Turner 1991; Perrings 1987; Siebert 1992; Solow 1974; van Ierland 1993; Winpenny 1991). Coddington has developed the most elementary but also appealing model for its simplicity. This model has been used in earlier conceptual work on environmental and resource economics in South Africa (Blignaut and De Wit 1999 and De Wit and Blignaut 2000) and will therefore be evaluated as an initial point of departure in the development of research categories in the field of environmental and resource economics.

The focus in economics is on how to allocate limited resources among competing needs/desires, where this allocation process takes place through markets or other institutions. When trading takes place, goods and services flow from producers to consumers, while labour and other inputs flow from consumers to producers. Nevertheless, it is pointed out in the contributions on economy-environment interactions that the natural environment is a limited resource and has to be included in economic analysis. The Coddington model (1970) offers a simple summary of economy-environment interactions through an expansion of this economic circular flow model of production and consumption to include the environment, as illustrated in Figure 1.

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<sup>2</sup> Views expressed are those of the authors and do not necessarily reflect those of any institution they may be involved with

**Figure 1 Economy-environment interactions**



Source: Adapted from Coddington (1970).

The environment provides services to human activities. As illustrated in Figure 1, these services are (see also Winpenny 1991:1-2):

- the provision of life-support systems (services),
- supply of materials and energy (sources), and
- the absorption of pollution and waste (sinks).

As illustrated in this model, the main components in the economy-environment interaction are production, consumption and the natural environment itself. Different economic theories have different interpretations of the workings of the economy and the environment, and therefore would recommend different economic policies towards sustainable development. For example, environmental resource economics (ERE), neo-institutional economics and ecological economics all share the perception that the environment is a stock of natural capital that depreciates, but with varying degrees of substitutability – the capital theory approach. On the other side of the coin, the evolutionary approach to economics sees the environment as an integrated part of a holistic and dynamic process of development together with many other factors (Stern 1997; De Wit and Blignaut 2000). One can therefore broadly distinguish between the capital theory approaches (CTA) and evolutionary approaches in explaining the linkages between economics, human activities and the environment. In both broad approaches the important question is how many environmental services can be used sustainably in production and consumption processes and how many negative impacts can be mitigated. The unsustainable use of materials and energy or the stream of pollution and waste can occur as a result of the human activities of production and consumption and may lead to negative environmental feedbacks. Although scholars might disagree on how these interactions work, the Coddington model is robust enough to provide a framework for understanding the economy-environment interactions, though it never intended to act as a model for categorisation of research activities. For this one needs to go to another framework.

### 3 A CLASSIFICATION SYSTEM FOR ENVIRONMENTAL RESOURCE ECONOMICS

The *Journal of Economic Literature*, and more specific, the *EconLit* classification provides a classification system to the field on natural resource economics, see Table 1. Although these categories are in continuous development, they do provide a breakdown of the economic discipline, including environmental and resource economics<sup>3</sup>. It should be noted that Agricultural Economics and non-renewable Energy Economics are lone standing categories according to the *EconLit* classification and henceforth not dealt with further here.

**Table 1 EconLit classification of natural resource economics**

<b>EconLit Code</b>	<b>Category Description</b>
Q000	Agricultural and Natural Resource Economics: general
Q010	Agricultural and Natural Resource Economics: sustainable development
Q200	Renewable resources and conservation; environmental management: general
Q210	Renewable resources and conservation; environmental management; demand and supply; environmental modelling and forecasting (the commons)
Q220	Renewable resources and conservation; environmental management: fishery and wildlife
Q230	Renewable resources and conservation; environmental management: forestry
Q240	Renewable resources and conservation; environmental management: land; waste disposal and recycling
Q250	Renewable resources and conservation; environmental management: water; air; climate
Q260	Recreational aspects of natural resources; contingent valuation methods
Q270	Renewable resources and conservation; environmental management: natural and environmental disasters
Q280	Renewable resources and conservation; environmental management: Government policy
Q290	Renewable resources and conservation; environmental management: other
Q300	Non-renewable resources and conservation: general
Q310	Non-renewable resources and conservation: demand and supply
Q320	Exhaustible resources and economic development
Q330	Resource Booms (Dutch disease)
Q380	Non-renewable resources and conservation: government policy
Q390	Non-renewable resources and conservation: other

Source: *EconLit*

It was felt that this classification system is too broad to act as an adequate framework to identify ERE research areas well covered by research and which not. It was hence decided to use an elaborate Coddington-model framework as base and to develop a classification system that could be used internationally as well. The following meta-level research categories are therefore proposed (with classification code provided in parenthesis) followed by an extended version of the classification system in Table 2 below:

- the environment's provision of life-support systems (ERE1),
- the environment's supply of materials and energy (ERE2),
- the absorption of pollution & waste by the environment (ERE3),
- policy and institutions (ERE4),
- supportive tools and methods (ERE5), and

<sup>3</sup> Referred to as *natural resource economics* in this classification.

- other (ERE6).

In category ERE1, the overall focus is on understanding the relationship and economic benefits of life-support systems provided by the environment, and the economic costs should the ability to supply these services be impeded. This is the *services* category in the Coddington model. In category ERE2 the focus is on the optimal use of natural resources over time - an applied field of resource economics, or the *sources* category. In category ERE3 the focus is on the optimal amount of pollution and waste that can be released into the environment - an applied field of environmental economics, or the *sinks* category. ERE4 focuses on policy and institutions and the application of policy instruments while the focus of ERE5 is the application of ERE tools and methods. ERE6 is an open category.

**Table 2 Proposed classification of environmental and resource economics**

Category I	Code	Category II	Code	Category III	Code			
Life support systems (Services)	ERE 1	Regulation functions	ERE11	Soil formation	ERE111			
				Nutrient cycling	ERE112			
				Biological and disease vector control	ERE113			
				Detoxification/waste treatment	ERE114			
				Climate regulation	ERE115			
				Atmospheric composition regulation	ERE116			
				Flood & erosion control	ERE117			
				Pollination	ERE118			
				Organisation & structure	ERE12		Biodiversity (genetic to landscape)	ERE121
							Landscape interconnection and structure/ refugia	ERE122
Space – availability and pattern of use of land and water (incl. urban centres, transport, industry)	ERE123							
Supply of raw materials and energy (Sources)	ERE 2	Non-renewable resources	ERE21	Mineral resources (coal, oil, natural gas, copper, tin, iron, silver, gold etc.)	ERE211			
				Non-renewable energy	ERE212			
				Renewable resources	ERE22	Renewable energy	ERE221	
						Forests & woodlands	ERE222	
						Fisheries	ERE223	
						Livestock	ERE224	
						Fauna	ERE225	
						Flora	ERE226	
						Freshwater (quantity)	ERE227	
						Food & fibre	ERE228	
Biochemicals, medicines	ERE229							
Absorption of	ERE	Pollution	ERE31	Air	ERE311			

Category I	Code	Category II	Code	Category III	Code
waste (Sinks)					
				Water	ERE312
		Degradable waste	ERE32	Radioactive substance	ERE323
		Non-degradable waste	ERE33	Toxics	ERE331
				Metals	ERE332
Policy and institutions	ERE 4	Government	ERE41	National (e.g. trade, FDI)	ERE411
				Provincial	ERE412
				Local	ERE413
		Business	ERE42	Sector	ERE421
				Firm	ERE422
		Science-policy interactions	ERE43	Political decision-making process, policy design processes, decision analysis	ERE431
		Institutions	ERE44		ERE441
		Policy instruments	ERE45	Economic instruments, command and control, education and information, instruments, voluntary agreements, self-regulation, policy mixes	ERE451
Tools and methods	ERE 5	Valuation methods	ERE51	Expressed preference (Contingent valuation, choice methods, conjoint analysis, contingent ranking, participatory appraisal)	ERE511
				Revealed preference (travel cost method, hedonic price method – property and wages)	ERE512
				Assumed preference technique (change in productivity, cost of illness, human capital, replacement costs)	ERE513
				Benefit-transfer method	ERE514
		Economy-environment analysis/ modelling	ERE52	Macroeconomic (general equilibrium)	ERE521
				Sectoral (input-output, social accounting matrix)	ERE522
				Firm (value chain analysis, life cycle modelling)	ERE523
		Evaluation tools	ERE53	Cost-benefit analysis (incl. MCA, CEA, risk	ERE531

Category I	Code	Category II	Code	Category III	Code
				evaluation methods, e.g. shadow pricing)	
		Environmental indicators	ERE54	National, sectoral or provincial environmental accounts (incl. Natural mineral accounts, renewable resource accounts, environmental asset accounts)	ERE541
				Corporate environmental accounting (incl. Integrated bottom-line, triple bottom-line)	ERE542
				Other methods (e.g. genuine savings, national wealth estimates)	ERE543
Other	ERE 6		ERE61		
			ERE62		

Adapted from World Bank (c2002) & Millenium Ecosystem Assessment Project (2002).

Seldom, if ever, one will be able to confine any research work to only one category in the above (or for that matter any) research classification system. Valuation methods, for instance, can be used to inform social cost-benefit analysis. In such cases dual classification under ERE52 and ERE53 would be appropriate. Such dual classification will only pose a problem of double-counting if the system is used to singularly count the number of publications or research outputs in certain categories. If such analysis needs to be done, a simple solution would be to rank categorisations in terms of their dominance and only used the first category in counting research outputs.

Any such system carries with it an amount of subjectivity and an over-confidence in being able to pin down the reality of disciplines in flux. Environmental and resource economics is no exception. Several scholars have pointed out that the subject field is changing, both from a theoretical point of view with the integration with new developments in economic science, and from a policy point of view where advice is needed on the management of increasingly complex environmental issues such as global climate change. For example, Carraro (1998) points towards the developments in endogenous growth models, the development of new trade theories and industrial organisation theory as areas where linkages with environmental and resource economics are being made. Castle (2001) argues that implicit normative values will become more exposed in ERE, mainly through valuation, cost-benefit analysis and the new institutional analysis. ERE would have to brace itself, just like the economic sciences did earlier on and many disciplines do all the time, for a critical assessment of its scientific objective basis.

#### 4 CONCLUSION

This paper proposed an ERE classification system in response to the rapidly growing field of environmental and resource economics. It can be concluded that the standard *EconLit* classification system is too coarse to provide structural support in the classification and manage broad and longer-term research programmes. nevertheless, it is recognised that any attempt to classify a dynamic field, such as environmental and resources economics, would have to be open to revision on a frequent basis.

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# What has been done in Environmental Resource Economics in South Africa: A Survey

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## 1 INTRODUCTION

The boundaries of environmental resource economics (ERE) has been established and a classification system developed to categorise ERE research, both for South Africa as well as internationally (see De Wit and Blignaut 2002). The question that arises now is what is the magnitude and content of the research done in South Africa? This question has been dealt in two separate, but parallel exercises. Firstly, how many academic research publications have been published in the last five years, in which fields and, parallel to that, the same questions regarding so-called *grey* literature. This paper provides a summary of the results of this research by firstly focussing on academic research and then on the *grey* literature.

## 2 ACADEMIC RESEARCH

Table 1 summarises the result from the survey regarding academic research papers in nine local journals. These journals have been selected as being the most likely ones to carry a paper within the subject matter of environmental resource economics.

**Table 1** Number of environmental resource economics papers in a selected number of accredited journals: 1996-2000

Year	Total number of papers	Number of EREpapers	Percentage
<b>AGREKON</b>			
1996	50	0	0.0
1997	44	5	11.4
1998	45	1	2.2
1999	61	4	6.6
2000	57	1	1.8
<b>Development Southern Africa</b>			
1996	57	4	7.0
1997	37	1	2.7
1998	59	6	10.2
1999	45	1	2.2
2000	30	1	3.3
<b>Meditari</b>			
1996	14	5	35.7
1997	15	1	6.7
1998	19	2	10.5
1999	14	1	7.1
2000	13	1	7.7

<sup>4</sup> Views expressed are those of the authors and do not necessarily reflect those of any institution they may be involved with

**Table 1 (cont.)**      **Number of environmental resource economics papers in a selected number of accredited journals: 1996-2000**

South African Journal of Economic and Management Sciences			
1996	33	1	3.0
1997	12	0	0.0
1998	32	0	0.0
1999	32	0	0.0
2000	31	0	0.0
South African Journal of Economic History			
1996	15	0	0.0
1997	7	0	0.0
1998	5	0	0.0
1999	13	0	0.0
2000	8	0	0.0
South African Journal of Economics			
1996	26	1	3.8
1997	27	2	7.4
1998	26	2	7.7
1999	24	1	4.2
2000	38	1	2.6
Journal for Studies in Economics and Econometrics			
1996	16	0	0.0
1997	13	0	0.0
1998	18	0	0.0
1999	15	0	0.0
2000	20	0	0.0
Business Dynamics			
1996	21	1	4.7
1997	19	0	0.0
1998	17	0	0.0
1999	17	0	0.0
2000	16	1	6.3
Journal of Energy in South Africa			
1996	20	7	35.0
1997	23	5	21.8
1998	27	5	18.5
1999	21	8	38.1
2000	17	3	17.6
TOTAL			
1996	252	19	7.5
1997	197	14	7.1
1998	248	16	6.5
1999	242	15	6.1
2000	230	8	3.4
TOTAL	1 169	72	6.2

Source: Own analysis.

Since the study only focussed on local journals, South African authors publishing in international journals have therefore not been captured in the survey and this includes the work of some leading specialists. From the table it should be clear that a negligible proportion of all academic papers fall in the category of

environmental resource economics and the following number of casual observations can be highlighted, namely:

- With the exception of 1997, the total number of papers remained generally consistent throughout the period (approximately 240),
- The number of environmental economic papers published constitute a very small percentage of the total number of publications - about 7% in most years except 2000; it is not clear whether the drop in 2000 represents a trend or not.

Following the results from Table 1, Table 2 elaborates by listing the fields of study covered in the papers covering environmental resource economics, followed by the respective *EconLit* and ERE classification codes (see De Wit and Blignaut 2002). Each paper has been individually scrutinised before making the classification and therefore the allocation provided here does not originate from the journals themselves. The allocations of the ERE categories was done according to the closest fit on detailed level of classification, before moving to higher levels of classification.

**Table 2 Environmental resource economics fields covered by journals: 1996-2000**

Journal	ERE fields covered (back-link to meta-level and possibly lower level categories)	Econ Lit code	ERE code
AGREKON	Pollution insurance & environmental policy Water treatment cost The value of water Water trade Sustainable development & integrative policies Trade and the environment	Q200 Q250 Q250 Q250 Q010 Q000	ERE451 ERE31 ERE51 ERE451 ERE411 ERE411
Development Southern Africa	Clean electricity Sustainable energy Value of wildlife Forest strategies Nature-based tourism Use of fuel wood	Q250 Q400 Q200 Q230 Q260 Q230	ERE311 ERE212/311 ERE512/131 ERE222 ERE12 ERE222
Meditari	Environmental corporate reporting Environmental corporate accounting Environmental corporate information	Q000 Q000 Q000	ERE542 ERE542 ERE542
South African Journal of Economic & Management Sciences	Entropy and a sustainable economy	Q010	ERE4
South African Journal of Economics	Environmental discounting Marine pollution Sustainable resource use Sustainable development Environmental policy: mining sector Trade and the environment	Q200 Q220 Q010 Q010 Q320 Q000	ERE51 ERE223/312 ERE2 ERE4 ERE211 ERE411
Journal for Studies in Economics and Econometrics	N/A	N/A	N/A
Business Dynamics	Environmental reporting	Q000	ERE542
Journal of Energy in South Africa	Renewable (or alternative) energy Air pollution Sustainable energy Technology transfer Clean development mechanism Energy efficiency	Q210 Q250 Q010 Q250 Q250 Q210	ERE221 ERE311 ERE2 ERE2/115 ERE2/115 ERE2

Source: Own analysis.

According to the *EconLit* classification, 11 themes could be identified categorised under Q000, 16 themes under Q200, 1 theme each under Q300 and Q400. Using the ERE classification, 4 themes has been addressed under ERE1, 11 themes addressed under ERE2, 5 themes under ERE3 and 7 themes each under ERE4 and ERE 5 respectively.

From this count it is obvious that the fields generally well covered using the *EconLit* classification is sustainable development (*EconLit* Q000) and renewable resources and conservation; environmental management (*EconLit* Q200). The area weakly covered is non-renewable resources and conservation (*EconLit* Q300). As stated above though, the *EconLit* classification is perhaps too broad and hence the introduction of the ERE classification system.

Using the ERE classification system, the area generally well covered pertains to the supply of raw materials and energy, source sources (ERE2). Policy and instruments (ERE4) and tools and methods (ERE5) received average coverage whilst life support systems, or services (ERE1) and the absorption of pollution and waste, or sinks (ERE3) received very little coverage.

From the above a tentative conclusion is that whatever academic research in environmental resource economics is published in accredited journals, it covers only a very selected number of fields. There is therefore some degree of research focus or concentration when it comes to papers published in environmental resource economics. But, on the other hand, this also reveals the research gaps. Obviously, neither the quality of the publications nor whether they addressed a relevant policy or environmental management issue appropriately is evaluated.

### 3 GREY LITERATURE

It can be expected that most literature on ERE in South Africa will be grey literature (i.e. consultancy reports, internal departmental research documents, etc.) for two reasons. First, most environmental and resource economists in the country are involved in consultation work for business and government. Second, the area is relatively new in South Africa and research programmes are not well entrenched yet.

An email-based survey was sent out on the Forum for Economics and Environment (FEE) list server with the purpose to measure the number, scope and size of grey literature published in the field, but with limited response. This could indicate that very little actual research is done in the field of ERE. However, this could not be the case as a small, but active community of ERE practitioners in South Africa are working, or propose to work, on a vast range of issues. These issues include the following:

- Economics aspects of climate change (e.g. economic analysis of impacts, CDM and impacts of economic activities such as coal mining and coal-based electricity generation on emissions, economic viability of carbon sequestration) - ERE115/ERE211/ERE212,
- Economics of line-fishing - ERE223,
- Economics of water use across various land-uses (e.g. forestry, sugar and subtropical fruits) - ERE227,
- The external costs of air pollution impacts (e.g. indoor and outdoor human health costs, economic costs to loss in maize production) - ERE311,
- External costs of mining (e.g. asbestos) - ERE31/ERE33,
- Economic costs of deterioration in water quality (e.g. water salinity) - ERE312,
- Conservation strategies - ERE4,
- Spatial organisation of resources for policy planning - ERE451,
- Charges and tariffs (e.g. water, waste discharge) - ERE451,
- Costs of subsidies harmful to the environment - ERE451,
- Economic valuation of ecosystem goods and services (or loss of these) (e.g. forests and woodlands, medicinal plants, the coast, fynbos, alien plants) - ERE51/ERE1,
- Conjoint analysis (e.g. tree cultivars) - ERE511,
- The value of open areas in urban surroundings (e.g. Cape Town) - ERE511/ERE123,
- Economic costs of land degradation (e.g. loss of production due to erosion) - ERE513/ERE117,
- Cost and benefits of Working for Water programme - ERE531,
- Business attitudes to environmental care (e.g. fruit industry, costs and benefits of safety, health and environmental (SHE) policies) - ERE42/ERE542/ERE531,

- Costs of fires (e.g. Cape Peninsula) - ERE531,
- Macroeconomics and the environment (e.g. fiscal and monetary policies and the environment) - ERE41/ERE52,
- Studies on foreign direct investment, trade and the environment - ERE52, and
- Natural resource accounting (e.g. forestry, minerals, water, fisheries) - ERE541.

Though it is acknowledged that the above list is by no means exhaustive of all the current research activities in this field, neither does it say anything on the quality of the research done, it does provide a useful profile of the general research fields.

Clearly ERE tools and methods (ERE5) dominates followed by policy and institutions (ERE4). Though indicated by only a single entry above, a large volume of work is in progress on climate change (ERE2). Very few other areas with regard to life support systems (ERE1) and the absorption of pollution and waste (ERE3) are covered.

#### 4 CONCLUSION

From this casual observation it seems therefore that there is, as was the case with regard to academic research, quite a specific focus in research covered and that the focus areas correspond with each other.

Though the quality of the research and whether or not the research was appropriate has not been evaluated, it does seem as if there is a lack in research regarding life support systems and the absorption of wastes. Furthermore, this research has revealed that there is gaps in research that is of national and strategic importance such as:

- contributions from an ERE viewpoint regarding the link between the environment and poverty and means how to alleviate poverty using the environment in a sustainable manner;
- demonstration models on grassroots level illustrating the applicability of economics and the environment to the general public, and
- the integration of the economics and environment interface and principles in day-to-day business management and operations.

This calls for a concerted effort from both researchers and policy-makers alike to close the gaps.

#### REFERENCES

De Wit, M.P. and Blignaut, J.N. 2002. *Environmental resource economics: Towards a classification system*. In Blignaut, J.N. (ed.) Proceedings of the Bridging the Economics / Environment divide conference: 7-13.