

wa



Environmental and Resource Economics Conference Synthesis Report

“Environment & Economy: Mind the Gap”

21st and 22nd May 2009

The Ritz Hotel and Conference Centre, Sea Point, Cape Town

Environmental and Resource Economics Conference Synthesis Report

“Environment & Economy: Mind the Gap”

21st and 22nd May 2009
The Ritz Hotel and Conference Centre, Sea Point, Cape Town

Compiled by Anton Nahman
CSIR: Natural Resources and the Environment

Author contact details:
Council for Scientific and Industrial Research
PO Box 320
7599 Stellenbosch
South Africa
Email: anahman@csir.co.za
Tel: +27(0)21 888 2403
Fax: +27(0)21 886 6518

CSIR Report number: CSIR/NRE/RBSD/ER/2009/0080/A

Funding for this report was made available through the World Wildlife Fund South Africa and the Table Mountain Fund (project number ZA 5156)

Table of Contents

| | | |
|-----|---|----|
| 1. | Introduction | 1 |
| 1.1 | Background: Environmental Resource Economics in South Africa | 1 |
| 1.2 | A two-day national conference on environmental resource economics | 3 |
| 1.3 | Objectives of this report | 4 |
| 2. | Data and methods | 4 |
| 3. | Progress, status quo and future trends for ERE in SA..... | 6 |
| 3.1 | Capacity..... | 6 |
| 3.2 | Research | 9 |
| 3.3 | Implementation..... | 16 |
| 4. | Key outcomes and recommendations with respect to implementation | 21 |
| 4.1 | Knowing your audience, and speaking their language..... | 21 |
| 4.2 | Pay attention to social, political and institutional issues | 24 |
| 4.3 | Apply what we already know through pilot studies | 26 |
| 5. | Conclusion..... | 26 |
| 6. | References | 30 |

List of Figures

| | | |
|------------|---|----|
| Figure 1. | Breakdown of delegates by sector | 6 |
| Figure 2. | Breakdown of respondents by sector (More than one option allowed) | 6 |
| Figure 3. | Breakdown of respondents by area of environmental management | 7 |
| Figure 4. | Extent to which quality of ERE researchers & practitioners has improved..... | 8 |
| Figure 5. | Conference paper topics..... | 11 |
| Figure 6. | Research needs and priorities compared with actual research activity..... | 12 |
| Figure 7. | Important areas for future ERE research | 13 |
| Figure 8. | Important issues and problems to address in future research | 14 |
| Figure 9. | Research & policy tools that should be developed & applied in future research | 15 |
| Figure 10. | Extent to which ERE has impacted on/is integrated into policy & management | 18 |
| Figure 11. | Extent of ERE impact & integration by type of respondent | 19 |
| Figure 12. | Strengths of ERE in terms of policy making, management & implementation.. | 20 |
| Figure 13. | Weaknesses in terms of policy making, management & implementation | 21 |
| Figure 14. | Extent to which ERE has a significant future role in policy & management | 21 |
| Figure 15. | Key factors in ERE successes | 24 |

Acronyms

| | |
|-----------------|--|
| ASSET | Africa's Search for Sound Economic Trajectories |
| C.A.P.E. | Cape Action for People and the Environment |
| CBA | Cost-benefit analysis |
| CEEPA | Centre for Environmental Economics and Policy in Africa |
| CSIR | Council for Scientific and Industrial Research |
| DBSA | Development Bank of Southern Africa |
| DEAT | Department of Environmental Affairs and Tourism |
| DST | Department of Science and Technology |
| DWAF | Department of Water Affairs and Forestry |
| DWEA | Department of Water and Environmental Affairs |
| ERE | Environmental and resource economics |
| EPR | Extended producer responsibility |
| EPRU | Environmental Policy Research Unit (UCT) |
| FEE | Forum for Economics and the Environment |
| FETWater | Framework Programme for Research Education and Training in Water |
| IAP | Invasive alien plant |
| MBI | Market-based instrument |
| NGO | Non-governmental organisation |
| ODA | Organisation Development Africa |
| PES | Payments for ecosystem services |
| R&D | Research and development |
| REDD | Reduced emissions from deforestation and degradation |
| SANBI | South African National Biodiversity Institute |
| SOE | State-owned enterprise |
| TMF | Table Mountain Fund (WWF) |
| UCT | University of Cape Town |
| WfW | Working for Water |
| WRM | Water resources management |
| WWF | World Wildlife Fund |

1. Introduction

1.1 Background: Environmental Resource Economics in South Africa

Environmental and resource economics (ERE) is a sub-discipline of economics that is concerned with the interactions between the economic system and the natural environment in which it is embedded. It aims to understand the economic causes and consequences of environmental (and, increasingly, social) problems, and to formulate rigorous insights and advice to support policy makers and managers to deal with and/or prevent such problems. In particular, it can contribute to policy and decision making regarding the allocation and management of land, water and other natural resources; as well as the management of pollution and waste; in order to meet social, economic and environmental goals, and thereby contribute to sustainable development (Nahman *et al.*, forthcoming). Some of the tools developed by environmental and resource economists are described in Box 1.

Box 1: The environmental and resource economics toolkit

- Economic-valuation tools, which are able to value natural resources, ecosystem goods and services, or environmental impacts in monetary terms, and which can therefore provide valuable information in cases where market prices are missing or inadequate, thereby overcoming problems of lack of information associated with missing markets and/or the existence of externalities (Pearce, 1993; Smith, 1993; Bateman *et al.*, 2003; Perman *et al.*, 2003).
- Decision-support tools, which compare development options/trade-offs (e.g. cost-benefit analysis, cost-effectiveness analysis, ecological-economic modelling, inputs to conservation planning, etc).
- Natural resource accounts and macro-economic indicators, which can expand the system of national accounts to monitor the impacts of development on the natural resource base and assess progress toward sustainable development, such as ‘green accounts’ for particular resources, green domestic/national product, genuine savings, and inclusive wealth (Hamilton and Clemens, 1999; Dasgupta and Maler, 2001; Arrow *et al.*, 2003; Harris *et al.*, 2004; World Bank, 2006).
- Market-based (or incentive-based, or economic) policy instruments aimed at changing behaviour. There are a wide range of such instruments available. Some, such as taxes, charges and tradable permits, aim to ensure that producers and consumers pay for (internalise) the external costs of their activities, thereby reducing pollution and other negative externalities, and facilitating more efficient resource allocations (Pigou, 1920; Magnani, 1973; Pearce, 2002). Payments for ecosystem services (PES), another market-based instrument (MBI) that is becoming increasingly prominent, aims to provide incentives for the provision of positive externalities, such as payments for catchment protection services (Pagiola *et al.*, 2002; Wunder, 2007; Jack *et al.*, 2008). A PES scheme can be defined as a “voluntary, conditional agreement between at least one ‘seller’ and one ‘buyer’ over a well defined environmental service – or a land use presumed to produce that service” (Wunder, 2007).

ERE is therefore particularly relevant in a developing country such as South Africa, where complex trade-offs between economic, social and environmental objectives must often be made. Many South Africans are simultaneously faced with poverty, degraded environments and limited access to safe drinking water and sanitation (Human Sciences Research Council, 2004; Kates and Dasgupta, 2007); unemployment is at least 25% and may be as high as 45% (South African Cities Network, 2004); the incidence of diseases such as HIV/Aids and malaria is high and increasing (Shisana and Simbayi, 2002; Department of Health, 2004); and socio-economic systems are heavily reliant upon the natural resource base, and therefore vulnerable to global change (Council for Scientific and Industrial Research, 2002). South Africa therefore faces a desperate need for rapid social and economic development in order to achieve the Millennium Development Goals.

Consequently, South African decision makers have tended to prioritise social and economic development agendas, often at the expense of environmental integrity. For example, the 'Accelerated Shared Growth Initiative for South Africa' (ASGISA) of 2006, the overarching macroeconomic framework guiding all policy development in South Africa until 2014, explicitly makes environmental goals subordinate to its socio-political and economic goals of halving unemployment (to below 15%) and poverty (to less than one-sixth of households) by 2014. It aims to achieve this through the promotion of continuous economic growth at an average 5% per year (Republic of South Africa, 2006).

Nevertheless, there is increasing recognition of the effects on the natural resource base of this bias towards the attainment of socio-economic goals, of the dependence of society upon nature, and of the importance of maintaining a healthy ecosystem capable of providing the goods and services necessary for a prosperous society. In response to this improved understanding and to meet its obligations under Agenda 21 (United Nations, 1993) and the Johannesburg Plan of Implementation (World Summit on Sustainable Development, 2002), the South African government released its "National Framework for Sustainable Development in South Africa" in June 2007 (Department of Environmental Affairs and Tourism, 2007). This strategy identifies five priority areas for strategic intervention based on analyses of trends in South Africa's natural, economic and social (including governance) capital, namely enhancing systems for integrated planning and implementation; sustainable use of ecosystems; investing in sustainable economic development and infrastructure; creating sustainable human settlements and responding appropriately to emerging human development, economic and environmental challenges (Department of Environmental Affairs and Tourism, 2007). The implementation of such interventions requires decision making and action, and these decisions will often require that complex trade-offs are made between economic, social and environmental objectives. Environmental and resource economics is well-suited to the resolution of precisely these types of trade-offs (Munasinghe, 2007; Baumgartner et al., 2008).

In South Africa, the potential contributions of ERE were first recognised at a policy level in the 1990s, when, in response to growing international environmental awareness and increased recognition of the ability of MBIs to alleviate environmental problems in developed countries, the former Department of Environmental Affairs and Tourism (DEAT) commissioned a series of investigations into the use of MBIs for addressing environmental problems in SA (Department of Environmental Affairs and Tourism, 1993a; b; 1996; 1997). These initiatives have continued into the new millennium, with the National Treasury commissioning investigations into environmental fiscal reform, specifically investigating the role that environmentally-related taxes and charges could play in supporting sustainable development in SA (National Treasury, 2006).

Two publications in particular led to an increase in the use and application of ERE to inform natural resource management in SA. These were the 'Brundtland Report,' which was influential in popularising the concept of sustainable development; and South Africa's new Constitution (Republic of South Africa, 1996), which stresses the rights of everyone, including future generations, to a healthy, protected environment, and emphasises the 'polluter-pays' principle, whereby polluters are responsible for paying the costs (including external costs) associated with the damage caused as a result of their activities (De Lange et al., 2008).

1.2 A two-day national conference on environmental resource economics

Interest and activity in the ERE field in South Africa continues to grow, fuelled by a greater appreciation of the need to understand the economic causes and consequences of environmental and social problems and to formulate economically sound solutions. However, opportunities for learning, sharing ideas and disseminating new knowledge are relatively limited. There is no regular conference focused specifically on ERE in SA, and other conferences that do provide a space for ERE-related topics are infrequent at best. There is thus a clear and urgent need to create a regular forum in which to share insights, report on progress, feed into policy and implementation and generally chart the way forward for the field in SA.

The South African National Biodiversity Institute (SANBI), through its Cape Action for People and the Environment (C.A.P.E.) programme, recognised the opportunity to act as a catalyst in this regard. It therefore hosted a two-day national conference on ERE in Cape Town on the 21st and 22nd of May 2009, with the aim of providing the type of forum referred to above. Its partners in hosting the event included the Botanical Society, the WWF Table Mountain Fund, Working for Water & the Department of Water and Environmental Affairs (DWEA), Africa's Search for Sound Economic Trajectories (ASSET), the UCT Environmental Policy Research Unit (EPRU), the Council for Scientific and Industrial Research (CSIR), Statistics South Africa and the Framework Programme for Research Education and Training in Water (FETWater).

The conference had a relatively broad focus on ERE as it applies to natural resource management, including the economics of:

- Biodiversity conservation;
- Water resources management, with particular emphasis on the management of natural aquatic environments;
- Agricultural resource management, with particular emphasis on the management of natural landscapes;
- Climate change as it relates to natural resource management questions; and
- Marine resources management.

It brought together those with an interest in ERE from the public and private sectors, academia and consultancy to share results of recent research and to discuss issues relevant to the practical application of ERE. By creating a mutual platform for those who commission work and those who undertake it, the conference aimed to contribute to the effective use of ERE for environmental policy and management, as well as influence the implementation and research agenda. In essence, it strived to match theoretical inputs with practical considerations regarding policy and implementation.

The conference therefore provided a platform to facilitate the kind of necessary interaction referred to above. In order to build on these interactions, it was thought appropriate to compile a synthesis report which broadly summarises the key outcomes of the conference, with a specific focus on implementation, so as to maximise the potential for exploiting key implementation lessons and opportunities. It is hoped that the outcomes of the conference itself, augmented by this report, can then be used to guide future directions, approaches and work within the ERE field in South Africa.

1.3 Objectives of this report

The objectives of this synthesis report are:

1. To review and document the progress, current status and future trends with regard to ERE research and development in SA.
2. To collate and document the outcomes of the conference with regard to implementation, including that focused on Payments for Ecosystem Services and other key topics in the field.
3. To understand the key areas within ERE that should reward future effort and investment, particularly from an implementation perspective.

The report is structured as follows. Section 2 summarises the data and methods used to address the three objectives. Section 3 reviews the progress, status quo and future trends of ERE in SA, in terms of capacity, research, and implementation. Section 4 highlights the key outcomes of the conference with respect to implementation, while Section 5 draws out key recommendations and concludes.

2. Data and methods

Data pertaining to the objectives listed above were obtained from a review of the ERE field in South Africa written prior to the conference (Nahman et al., forthcoming); from the conference presentations and discussions, including a plenary discussion forum on trends in ERE and the state of the discipline in South Africa; and from responses to a conference questionnaire that was distributed to delegates, so as to provide them with an opportunity to share lessons and personal insights.

The conference attracted a total of 205 delegates, from a variety of sectors (Figure 1)¹, of which only 53 returned their questionnaires (26% response rate). Figure 2 shows the distribution of questionnaire respondents in terms of the capacity within which they are involved in environmental issues. Fifty-three percent of respondents described themselves as being involved in environmental issues as a researcher or academic, 40% as a practitioner or consultant, 21% working for an NGO or civil society, 19% as a manager, 11% as a policy maker and 6% in a funding capacity. Others were students, worked for government, or, in only one case, were from the corporate world. Comparing the breakdown of delegates (Figure 1) with that of respondents (Figure 2), researchers/academics and practitioners/consultants appeared relatively more willing to participate in the questionnaire, as expected (they are likely to be more concerned with issues pertaining to the field in which they work, as compared to delegates from other sectors).

¹ Thanks to Martin Nicol of Organisation Development Africa (ODA) for this breakdown of delegates. SOE's = state-owned enterprises; NGOs = Non-governmental organisations; DBSA = Development Bank of Southern Africa

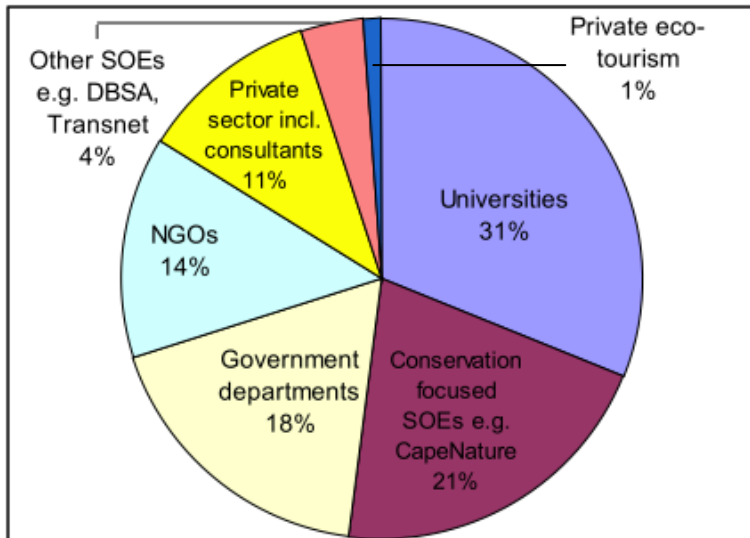


Figure 1. Breakdown of delegates by sector

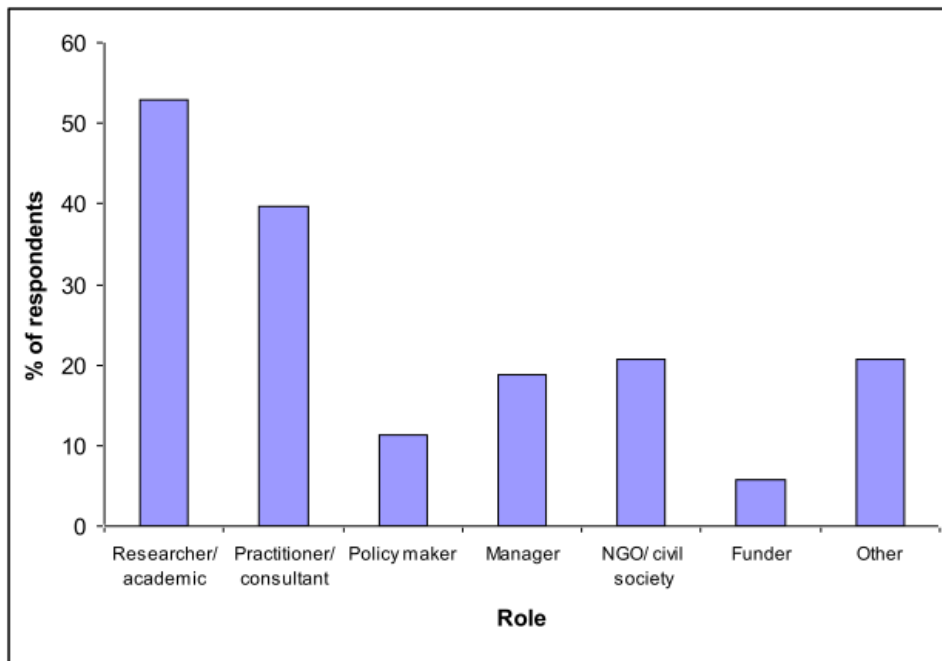


Figure 2. Breakdown of respondents by role in environmental issues (More than one option allowed)

Figure 3 shows the distribution of respondents by area of environmental management in which they work. As expected, given the focus of the conference on natural resource management, approximately 47% of respondents were involved in land-use planning and management (including agriculture), 42% in water resources management, 38% in management of land-based conservation areas, 36% in issues related to climate change, and 11% in marine resources management. Others were involved in the management of pollution and waste, ecosystem goods and services, or invasive alien plants; in sustainable harvesting (e.g. of fynbos or resources from communal and protected areas) or sustainable agriculture; or in environmental assessment, reporting or education.

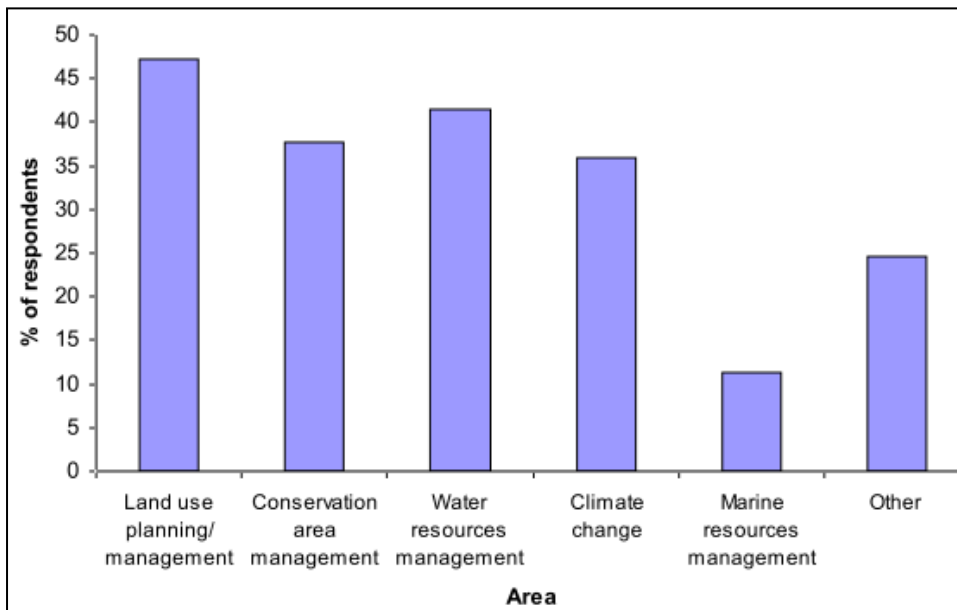


Figure 3. Breakdown of respondents by area of environmental management

Finally, familiarity with ERE tools and their application was normally distributed among the respondents, with 68% of respondents describing their familiarity with the discipline as either ‘medium,’ ‘low,’ or ‘very low.’ This implies a need for education and awareness raising, a point which came out strongly during the conference and which is discussed in more detail in later sections of the report.

3. Progress, status quo and future trends for ERE in SA

3.1 Capacity

Important role players with respect to ERE capacity development in South Africa include the major universities; as well as a small number of university-based research units and centres. These include the Centre for Environmental Economics and Policy in Africa (CEEPA, University of Pretoria), which provides degree (Masters and PhD) and non-degree training and scholarships in environmental economics and policy; and the recently established Environmental Policy Research Unit (EPRU, University of Cape Town), which provides “in-service” and postgraduate training programs focused on environmental policy analysis and research. Furthermore, the Council for Scientific and Industrial Research (CSIR) provides various options for students and graduates in ERE to further their training, including studentships and internships. Finally, ASSET Research is a non-profit NGO that undertakes collaborative research and capacity-building in the fields of ecology, economics and development. It aims to address skills shortages in inter-disciplinary thinking related to economics and the environment, including in the field of ERE, by linking public/private research funding and ERE student development (ASSET Research, 2009; De Wit, 2009a).

ASSET Research shares links with universities and with the Forum for Economics and the Environment (FEE), a professional association for the ERE community in South Africa established in 1999 (Blignaut and de Wit, 2002a). Prior to the conference, the Forum had attracted 472 members. Its main objective is information dissemination through a listserver (economics4environment@yahoogroups.com). With an average of 4 messages per month, the focus is not on lengthy discussions of ERE-related topics, but rather on announcements

with regards to employment opportunities in (South) Africa, conferences and other events (De Wit, 2009a). It also provides a training manual on environmental economics and natural resource policy analysis, available for download on its website (<http://www.econ4env.co.za>). Both the listserver and the FEE website will in future be administered by ASSET Research.

Sixty-five percent of respondents to the questionnaire agreed that the quality of practitioners and researchers in SA has improved over the last 5 years, while only 2% disagreed (see Figure 4).

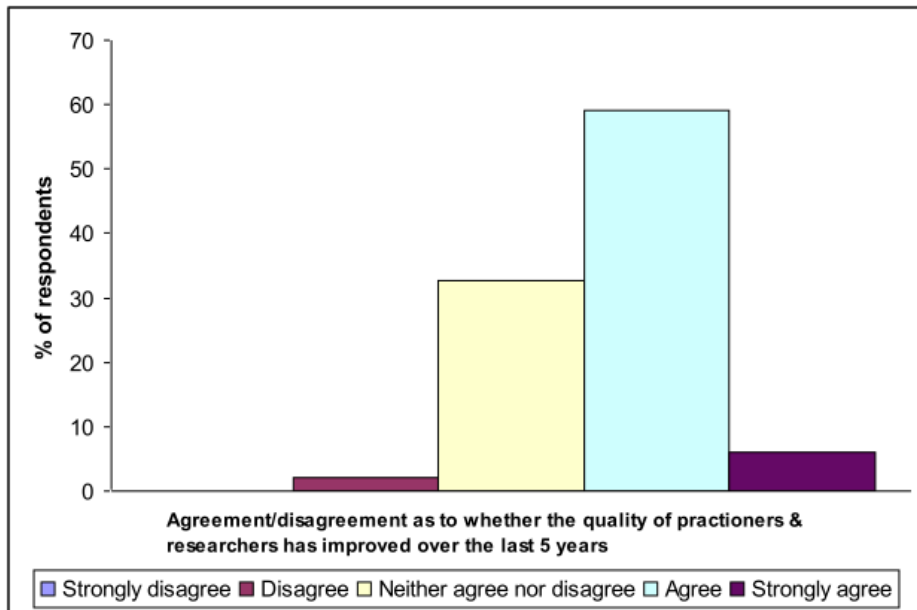


Figure 4. Extent to which quality of ERE researchers & practitioners has improved

However, although respondents agreed that the *quality* of practitioners and researchers has improved; respondents believe that the *quantity* of practitioners & researchers has not increased quickly enough over time to meet the increased demand for ERE services in the country. According to one respondent, “the problem of too few ERE practitioners/researchers was identified over a decade ago and nothing has changed.” There are therefore limited skills and capacity to address the growing demand, and a clear need for capacity building to increase the number of environmental and resource economists in South Africa. This requires developing and implementing a plan for building ERE research and development capabilities and capacity². At the same time, increased capacity will need to be matched by increased demand from the public sector over the longer term for investment in such capacity development to be justified. Indeed, there is evidence for such an increase in demand (this can be seen, for example, in government’s recent emphasis on research with ‘impact’); which should in turn drive supply.

A possible reason for this lack of ERE practitioners/researchers is the relatively small, young nature and low profile of the discipline in SA, which means that it is unable to attract students. According to one delegate, there is too much focus at the post-graduate level, and insufficient investment in the undergraduate level, such that the ‘base’ of ERE students is

² One step in this direction is a Department of Science and Technology (DST) project currently underway at the CSIR, which aims to develop a plan for building research capacity in the economics of global change and sustainability.

too small. However, South African academic and research institutions have increased undergraduate teaching in ERE since the early 1990s, which is reflected in the growing number of undergraduate ERE students and courses offered by universities (Blignaut and de Wit, 2002a; b; Antrobus, 2009). According to one lecturer, at one of the smaller universities in SA, the third year environmental economics class has grown from around 30 students in 2003 to 100 in 2008, suggesting that the subject is becoming more popular, and that the undergraduate 'base' of ERE students is growing.

However, the problem seems to lie in insufficient follow-through from the undergraduate to postgraduate levels, and therefore in getting people qualified as ERE practitioners/researchers. One reason for this is the shortage of high quality ERE postgraduate programmes, lecturers and supervisors at South African universities, and of strong university-based ERE groups; such that graduates in ERE pursue their training and interests overseas, or pursue careers in different fields³ (although initiatives such as the recently established EPRU referred to above should help improve this situation). In all likelihood, there is a need for government to invest in both the undergraduate levels (in order to grow the ERE base), and in the postgraduate levels (in order to ensure that students from the undergraduate level follow through to becoming qualified). Government support should not, however, be restricted to financial investment. There is a need for other types of government support in the field through tertiary institutions; e.g. providing support that fast tracks processes for getting ERE courses, degrees, and diplomas developed, approved and implemented within tertiary (and other) institutions (it currently takes around two years for a new degree programme to be approved). Crucially, there also needs to be a greater emphasis on post-degree initiatives such as internships and other forms of on-the-job training that can offer graduates an attractive start to their professional lives.

In addition, many students have come through the system and are therefore qualified as environmental or resource economists, although they end up working in different fields or sectors. There is therefore in all likelihood a significant 'latent' supply of potential ERE practitioners. This suggests the need for a comprehensive database of people trained in ERE and for a drive to attract and recruit potential ERE practitioners. There is also a need to create awareness of capacity-building success stories.

The issue of building capacity in inter-disciplinary thinking was raised by a number of respondents to the questionnaire. For example, the need to be able to show linkages to social and biophysical issues (i.e. a holistic social-ecological system view) was seen as important; as was the need to understand the socio-economic and ecological resilience of such systems, and to link economic data with spatial data so as to show spatial linkages and interdependencies. There is therefore a need to develop systems thinking and an improved understanding of ecology (rather than a narrow focus on monetary values) among ERE practitioners and researchers, and for ERE to become more integrated with other disciplines (particularly the natural sciences) if it is to make an impact in natural resource policy and management⁴. For example, Turpie (2009) and De Lange et al. (2009) attempt to link economic and spatial data in order to provide economic analyses that are more spatially

³ However, some students move to doing post-graduate studies in Agricultural Economics, and then move back to ERE after qualifying.

⁴ While it is important for ERE to incorporate insights from non-economists/natural scientists, (Abrahamse, 2009), economics also needs to be incorporated more strongly in the natural sciences. For example, respondents felt that ERE should become incorporated more strongly into classical conservation thinking to support this sector and ensure that its ideas are mainstreamed; and that ecological research questions should be formulated in such a way that the answers can be 'translated' into their economic consequences.

explicit. However, it is important to find a balance between adopting an holistic, integrated, transdisciplinary view in which all of the issues are covered; and presenting findings that are too broad/general and that won't have an impact on or be taken up by decision makers (Massey and Hamman, 2009).

Other recommendations relating to the issue of capacity building included:

- the need to link up with Sector Education & Training Authorities (SETAs);
- the need to find champions to structure a strategy for capacity building;
- the need to improve knowledge of ERE among the interested community, e.g. by providing short courses (such as those already presented to the former Department of Water Affairs and Forestry (DWAF), among others);
- the need to educate scholars and students and to raise awareness and interest in the field among all members of society; e.g. by incorporating ERE into primary, secondary, tertiary and continuing education curricula⁵;
- the possibility of 'merging' with agricultural economics. In many other countries, the ERE and agricultural economics fraternities and institutions are often grouped together or at least well integrated, whereas in South Africa they are relatively far removed from each other; and
- the possibility of developing a degree programme specifically in ERE (rather than the current situation, where aspiring environmental and resource economists graduate with degrees in economics, or agricultural economics).

Finally, existing ERE capacity in SA is not well coordinated. In this respect, a number of delegates identified the need for a working group to identify priorities and research gaps and to develop a research plan for the field in SA, which develops a framework for ERE research in SA, in order to better coordinate such research. Furthermore, most participants agreed that there is a need for conferences and other such events on a more frequent basis, although not necessarily in the same format. For example, there should perhaps be smaller events more often, focused on particular topics, rather than trying to cover the entire scope of ERE in a single event. However, for this to be possible, the issue of funding needs to be addressed. Although there is some interest from other partners, and some ad-hoc funding, there is a need for someone to make a long-term time and financial commitment, in partnership with others in the field, instead of relying on ad-hoc funding.

3.2 Research

ERE research productivity and outputs have increased in recent years, reflected in the growing number of publications in which ERE has been applied to inform and evaluate environmental policy and management since 1990 (Blignaut and de Wit, 2002a; b). Although there are no South African journals devoted specifically to ERE; ERE research is published in journals such as *Agrekon*, *Development Southern Africa*, the *South African Journal of Economic and Management Sciences*, the *South African Journal of Economics*, and the *Journal of Energy in South Africa*. Much of the ERE research in SA is also of international relevance and has been published in journals such as the *Journal of Environmental Management*, the *Journal of Environmental Economics and Management*; and *Ecological Economics* (Blignaut and de Wit, 2002a; b; Nahman et al., 2009).

⁵ One suggestion for getting young learners interested in ERE was to present television shows (e.g. BBC World's Nature Inc & Earth Report; CNN's EcoSolutions) that present fundamental ideas of ERE in an entertaining way using layman's terms.

ERE research initiatives in SA are problem-driven and have tended to focus on seven main areas or issues: the impacts and control of invasive alien plants (IAPs); valuation of ecosystem services⁶, primarily biodiversity, carbon sequestration, and water; livelihoods and poverty; pollution and waste; climate change mitigation and adaptation (including energy and food security); agriculture and forestry; and natural capital restoration. For example, the 50 papers presented at the conference (excluding those by invited international speakers) were focused on the following topics (see Figure 5):

- Land (including issues related to land-use planning, management and change; agriculture, forestry and mining; soil; land-based conservation and restoration; urban areas; invasive alien plants; terrestrial biodiversity and ecosystem services; and livelihoods and poverty (26 papers);
- Water (8 papers);
- Climate change (3 papers);
- Marine (5 papers);
- Natural resource accounts and macro-economic issues/indicators (4 papers); and
- Pollution and waste (4 papers)

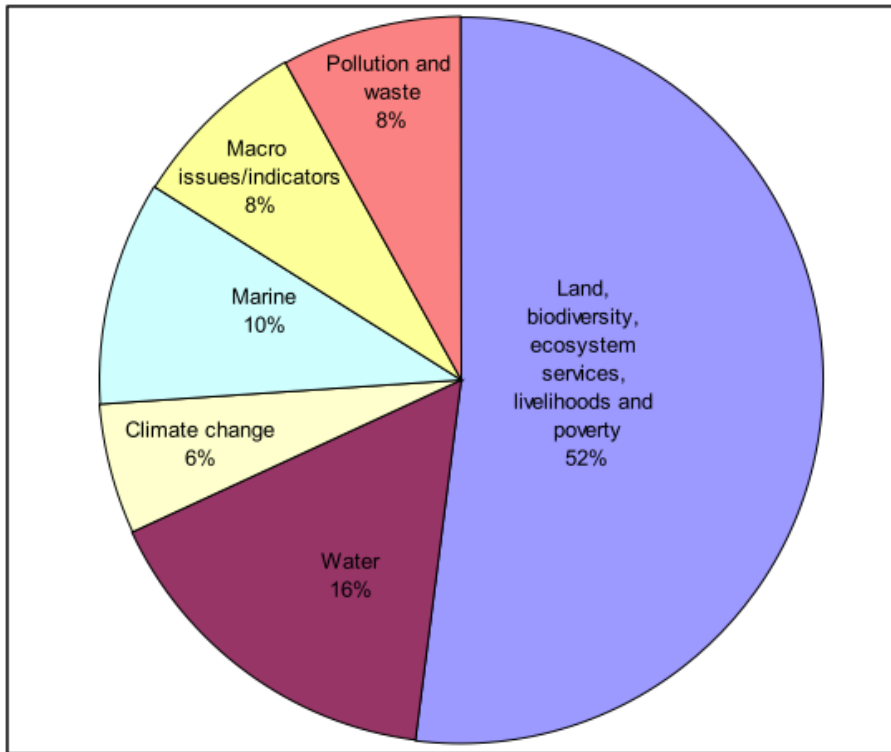


Figure 5. Conference paper topics

However, it must be borne in mind that the main focus of the conference was on natural resources management; and that the majority of attendees were involved in terrestrial and water resources management (see Figure 3). Thus, to some extent, the distribution of topics shown in Figure 5 was expected, and does not necessarily reflect the overall distribution of ERE research activity in South Africa.

⁶ Progress has also been made in terms of the mapping of ecosystem services, the impact on values of changes in ecosystem quality, and the integration of this understanding into conservation and development planning (e.g. Blignaut *et al.*, 2008; De Lange *et al.*, forthcoming).

The distribution of conference paper topics (Figure 5) is compared with the areas of environmental management in which respondents are involved (Figure 3)⁷ in Figure 6, where the left-hand column for each area shows the percentage of all responses indicating involvement in that area of environmental management, while the right-hand column shows the percentage of papers at the conference that were devoted to each particular topic. It can be seen that the distribution of papers presented was more or less in line with the interests and areas of involvement of attendees.

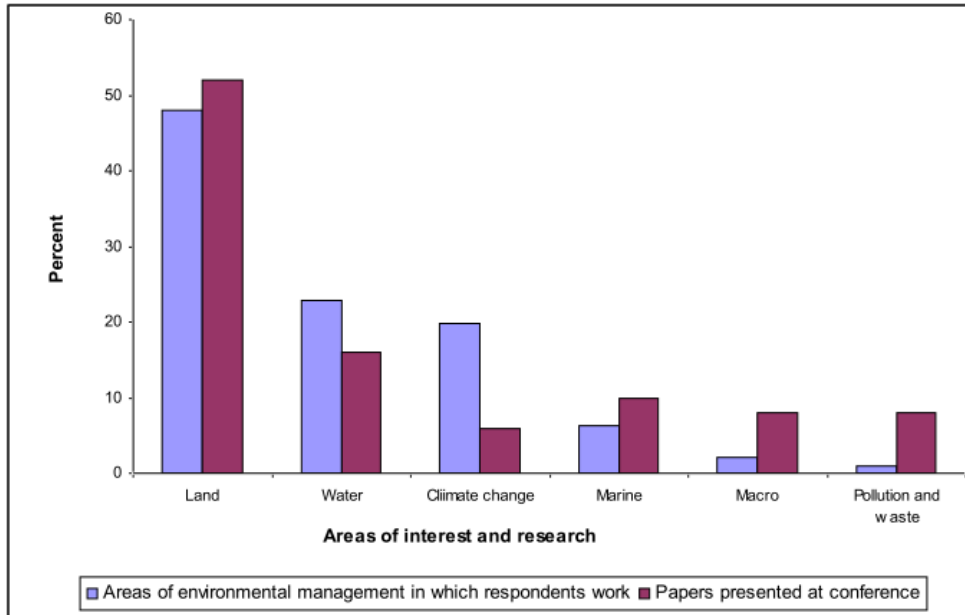


Figure 6. Research needs and priorities compared with actual research activity

Respondents to the questionnaire were asked to identify three important topics for future ERE research, listing them in order of importance. Responses to this question were firstly collated, coded and grouped together into categories relating to **areas** of research. Each response was then scored (a score of ‘3’ was given if the area was listed first, i.e. of greatest importance; ‘2’ if it was listed second, and ‘1’ if it was listed third). The scores were then aggregated to obtain total scores for each area (in terms of the frequency with which the area was mentioned, weighted by the importance attached to it by respondents). Results with respect to important areas for future research in ERE are presented in Figure 7, and specific issues under each category are discussed below. Again, however, the dominance of land and water issues was expected given the interests and activities of the conference attendees; and does not necessarily imply that these are the most important issues for future research in South Africa. Indeed, it has been suggested that the dominance of these types of responses reflects a lack of frontier thinking, and that a needs-driven research programme that focuses on priorities and research gaps is needed. This will be discussed again in the recommendations section of this report.

⁷ However, note that in Figure 6, ‘land use planning and management’ and ‘conservation area management’ are combined into a single ‘land’ category.

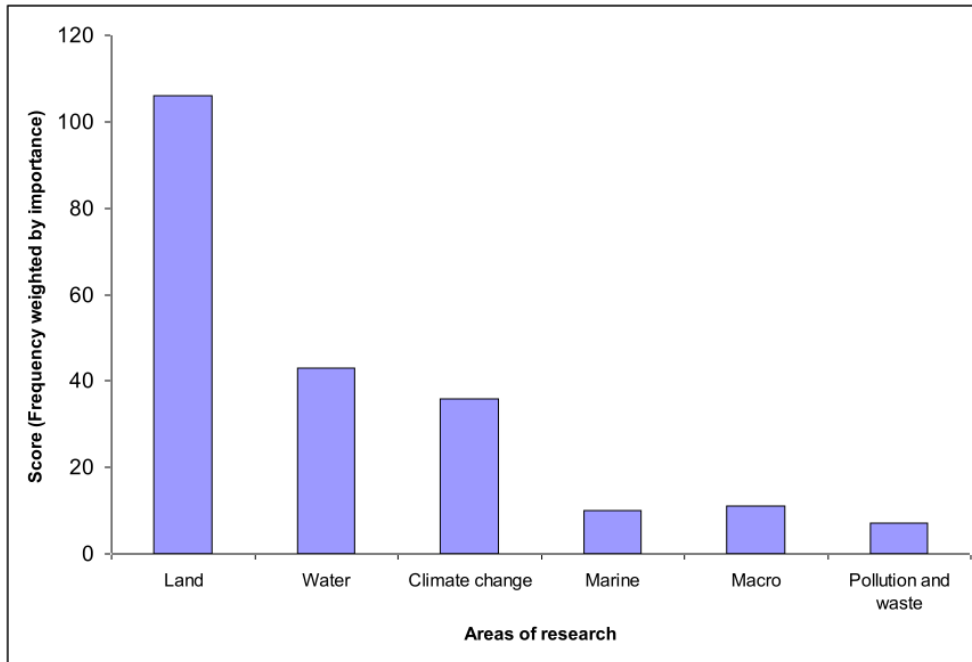


Figure 7. Important areas for future ERE research

The ‘**land**’ category was defined broadly to include issues related to land-use planning, management and change; agriculture, forestry and mining; soil; land-based conservation and restoration; urban areas; invasive alien plants; terrestrial biodiversity and ecosystem services; and livelihoods and poverty. Specific issues that emerged here included carbon emissions/sequestration related to land use and land use change; the value of ecosystems and ecosystem services (in terms of their contribution to the economy and/or to livelihoods); and the need to develop innovative mechanisms to ensure financing for conservation and restoration.

Within the broad category of ‘**water,**’ respondents highlighted the need for research regarding the role of ERE in contributing to water resources management (WRM); issues related to water allocation and use (e.g. sustainable use in industry and mining, and the assessment of externalities in water use); issues related to water security and tradeoffs (e.g. with carbon, biodiversity, bio-energy and waste), particularly within the context of global change; and the development of water accounts and indicators (e.g. a water ‘footprint’ for SA).

Within the broad category of ‘**climate change,**’ the main research needs centred around the contribution of ERE to climate change policy, including carbon taxes (particularly comparing taxes and other incentive-based instruments), payments for carbon sequestration, and reduced emissions from deforestation and degradation (REDD); with the emphasis on greater integration of ERE into policy and decision making for climate change⁸. Other research needs included assessing the impacts and costs of climate change, pricing carbon, and assessing trade-offs between carbon sequestration and biodiversity/water conservation. Furthermore, a study⁹ on South African research capacity in the economics of global

⁸ For example, during discussions in one of the parallel sessions, the need was highlighted for ERE to influence decisions such as that taken by the SA government on the building of new coal-fired power plants; e.g. by lowering the costs associated with renewable energy relative to fossil fuels (e.g. by means of carbon taxes).

⁹ This is a DST project currently underway at the CSIR, which aims to develop a plan for building research capacity in the economics of global change and sustainability.

change and sustainability has found that most research in the economics of climate change is done in mitigation, while adaptation is largely left untouched. Moreover, the connections between climate change and other issues (e.g. water and livelihoods) are not often made; such that these issues are looked at in isolation rather than in a holistic way.

Beyond these specific areas of application, respondents also highlighted certain cross-cutting **problems/issues** that need to be understood and dealt with. These included:

- Issues related to livelihoods, poverty and sustainable use of natural resources, including community-based natural resource management, poverty alleviation, and benefit sharing
- Food and energy issues (including food and energy security, externalities associated with energy generation and distribution, and bio-energy)
- Issues related to producer and consumer behaviour
- Issues related to trans-disciplinarity and systems thinking, such as socio-economic systems and resilience
- Trans-boundary issues, such as management of oceans and other trans-boundary resources
- Institutional issues
- Issues related to mainstreaming and implementation of ERE into management, policy and decision making, including issues related to knowledge brokering

These were analysed in the same way as the ‘areas’ of research above, and the results are presented in Figure 8.

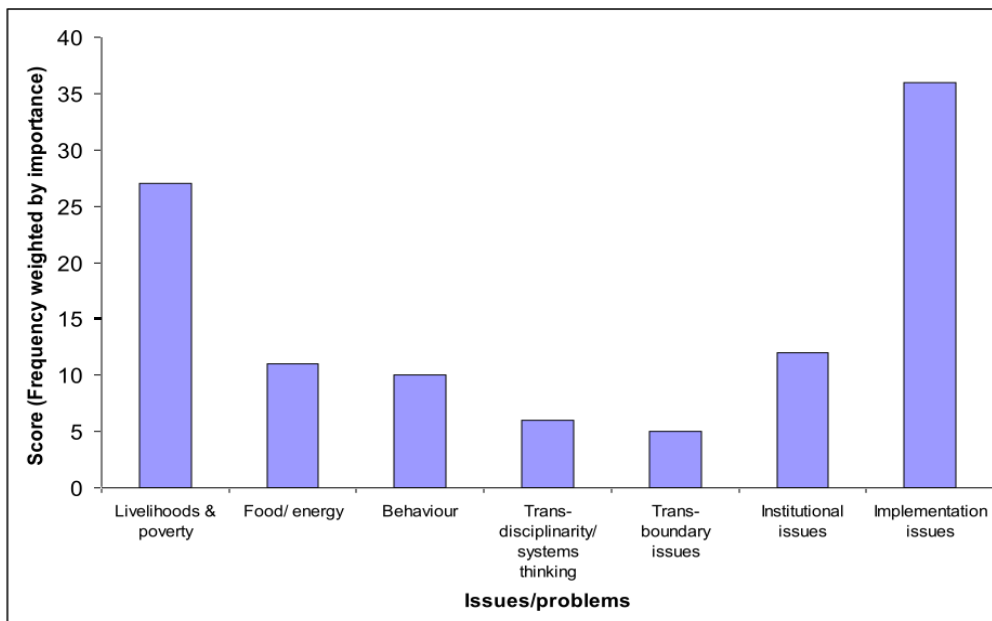


Figure 8. Important issues and problems to address in future research

Importantly, many respondents highlighted the need to find ways of mainstreaming and implementing ERE into management, policy and decision making as an important issue for future research. Key issues and specific recommendations relating to implementation are discussed in Sections 4 and 5.

Finally, respondents highlighted important research and policy **tools** (or sets of tools) that need to be developed and applied across the various research areas in order to address the issues and challenges identified above. These included valuation tools, decision-support tools (including cost-benefit analysis), natural resource accounts and macro-economic indicators, economic or market-based policy instruments (including taxes, such as carbon taxes; and incentives, such as REDD), PES, and other tools for leveraging investment in conservation and restoration (including biodiversity credits, stewardship, and conservation easements). These were again analysed as above, and the results are presented in Figure 9.

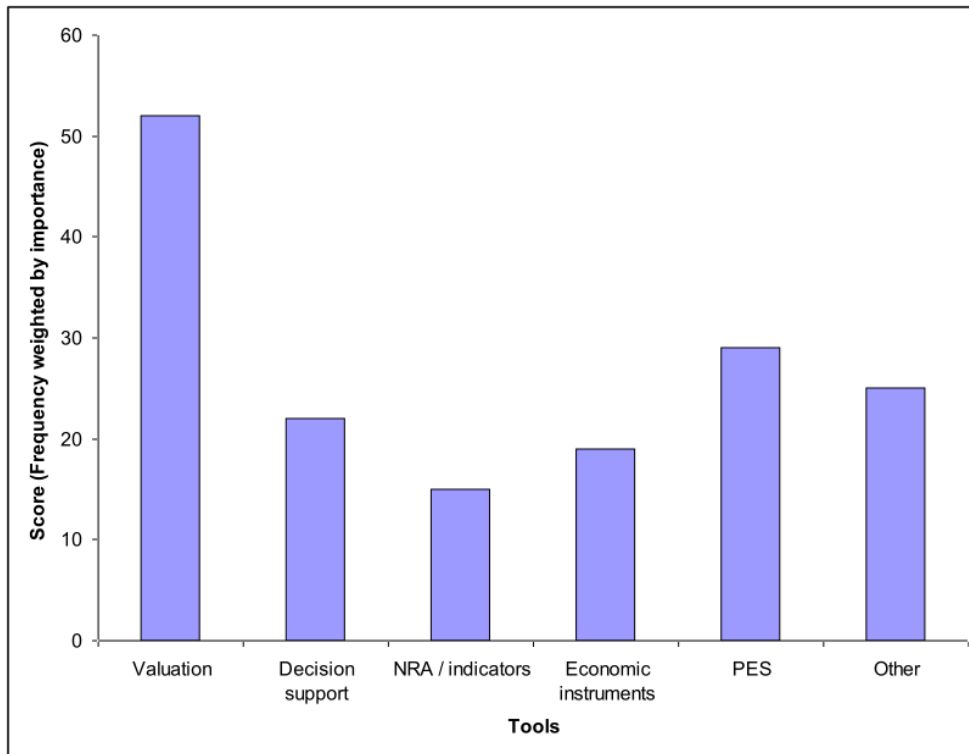


Figure 9. Research & policy tools that should be developed & applied in future research

Valuation and PES featured prominently, as expected. Perceived research needs with regards to ‘**valuation**’ varied widely, and included:

- Valuation of ecosystems¹⁰, for example in terms of their contribution to livelihoods, corporate profits, or to the local, provincial or national economy
- Valuation of ecosystem services¹¹; particularly carbon sequestration, water and biodiversity; so as to assist in making tradeoffs between these services, assess their contribution to the national economy, incorporate their value in prices, and inform PES (e.g. payments for biodiversity and carbon sequestration)

¹⁰ Specific ecosystems that were identified included oceans/coasts, and woodlands/forests.

¹¹ There is a definite lack of SA-specific research/data on many ecosystem services (e.g. Rademan *et al.*, 2009; Turpie, 2009). There should be a focus on developing rigorous methodologies to value specific services so as to value them more accurately, but it is also important to look at all ecosystem services in a holistic/integrated way; as ecosystem services are inter-connected and cannot be looked at in isolation (Rademan *et al.*, 2009). There is also a need for collection of basic biophysical data relating to ecosystem services (their nature, distribution, the relationship between the supply of ecosystem services and environmental quality, etc) in order to inform valuation (Turpie, 2009); although this type of research is more within the realm of the natural sciences than ERE. Finally, a need was identified to value ecosystem services within protected areas, and within metro & local municipalities that currently have important biodiversity assets.

- Valuation of externalities; including externalities associated with industry, mining, agriculture, and energy generation¹²; the costs of land degradation and land use change; and the costs of climate change and of not taking immediate action
- Comparing the different valuation techniques as they apply to the SA context

The important research needs within the ‘PES’ domain included:

- Developing markets and other institutional mechanisms necessary for PES to work (see Section 4)
- Investigation and implementation of PES through focus areas/pilot studies; and adaptive management thereof so as to ensure learning-by-doing (see Section 4)
- Mainstreaming conservation issues and ecosystem concerns into the financial world through PES (and other innovative economic mechanisms/tools) so as to secure financing for conservation and restoration¹³
- PES linked with climate change (e.g. payments for carbon sequestration)
- PES linked with land use options/management for landowners (e.g. commercial farmers, local communities and subsistence farmers), including on communal lands
- PES linked with livelihoods and poverty alleviation¹⁴
- the need for more data on the costs of controlling IAPs and on the transaction and other costs associated with developing PES (Wise and Musango, 2009).

Finally, within the category of ‘**decision-support tools**,’ the need to evaluate trade-offs emerged as an important issue, both in the questionnaire responses, and in the discussions during the conference. These included

- trade-offs between different development/policy options (and the economic implications thereof)
- trade-offs between social, natural and manufactured capital (how to more effectively influence decision makers to acknowledge these trade-offs and consider them in decisions¹⁵)
- trade-offs between different ecosystem services (e.g. between carbon, biodiversity and water, e.g. in the context of alien vs. indigenous vegetation)
- trade-offs between different components of biodiversity (and the related question of whether protecting individual *components* of biodiversity is the same as protecting biodiversity)
- trade-offs between bio-energy, waste & water in economic development planning.

¹² A particular research need that was identified was to compare the *true* costs (including externalities) of electricity generation and water supply with the tariffs that consumers and industries actually pay.

¹³ In particular, there is a need for research on restoration in developing countries, since most of the research comes out of developed countries, whereas the *need* for restoration is in developing countries. Furthermore, the research that is undertaken makes little or no impact on policy, and rarely makes links to PES. There is therefore a disjuncture between *concern* for restoration, the *need* for restoration, and implementation of PES (Blignaut, 2009).

¹⁴ Recommendations here included , e.g. assessing the impact of PES on rural livelihoods, clarifying the links between PES and poverty alleviation, and using the revenues from a carbon tax to pay for PES projects in poor rural communities

¹⁵ ERE has a potentially important role in getting the balance right between these three components of the ‘triple bottom line’ (Myrdal, 2009). Current legislation is insufficient in that it lacks insights from an ERE perspective (Massey and Hamman, 2009).

3.3 Implementation

There are relatively few examples where ERE recommendations have been implemented at the national policy level in SA. For example, the Department of Water Affairs and Forestry (DWAF) has established a pricing strategy for raw water use charges that takes into account the costs of IAP clearing and management (Blignaut et al., 2007; Marais, 2009). DWAF is also investigating fiscal instruments such as a charge system for discharges of waste into water bodies (Department of Water Affairs and Forestry, 2000). The National Treasury has implemented a de-facto carbon tax through a fuel levy, along with income tax deductions to incentivise stewardship agreements on conservation-worthy lands; and continues to investigate the use of environmentally-related fiscal instruments in other areas. Market-based instruments have also been applied in the field of solid waste management, with a national product tax on plastic shopping bags, for example, which aims to reduce consumption of such bags and raise revenues for recycling them. Other areas of influence include contributions to the 1998 National Water Act (Department of Water Affairs and Forestry, 1998), the 2000 Coastal White Paper (Department of Environmental Affairs and Tourism, 2000) and the 2004 Biodiversity Act (Republic of South Africa, 2004); as well influencing the thinking of large municipalities such as Ethekweni and Cape Town (City of Cape Town Health Department, 2005; OneWorld Sustainable Investments, 2008).

There has also been growing interest in and attempts at implementing PES schemes (see Section 1) in South and southern Africa. A recently completed South African inventory lists eight PES schemes at various stages of implementation (Blignaut, 2008). Three of the most recent are:

1. The Maloti-Drakensberg Transfrontier Project, which identified a strategy for developing incentives for land users to enhance the supply of environmental goods and services (Diederichs and Mander, 2004);
2. Government initiatives such as the Working for Water programme, which is a poverty relief public works programme that creates jobs and economic empowerment through funding of IAP clearing operations in order to address the problem of scarce water resources, and which had its origins in early ERE research in SA on the cost of fynbos degradation resulting from IAPs (Turpie et al., 2008); and
3. The natural-capital restoration project in the Baviaanskloof area of the Eastern Cape, which focuses on restoring degraded landscapes by planting indigenous thicket vegetation (spekboom). The potential for PES lies in spekboom's ability to sequester and store substantial quantities of additional carbon in both the soil and biomass (Mills and Cowling, 2006). The social, biophysical and economic assessments are in an advanced stage and strategies are being developed for mainstreaming ecosystem services (and PES) into the management and planning of the area (Cowling et al., 2008; Wageningen University, 2008).

Most of these efforts have involved detailed baseline assessments and model development; but only a few, mostly those within the Working for Water programme, have entailed actual financial transfers; and even then the structure and practice of these schemes falls short of the theoretically ideal definition of PES. The reasons for the inability thus far of PES schemes to take hold are consistent with experiences throughout the world (and particularly in developing countries). PES schemes require well-defined, tradable commodities as proxies for environmental services that can be cost-effectively measured and monitored; well-functioning, enforceable and transparent institutions and governance systems; a flexible mix of market, cooperative and regulatory arrangements; and a mechanism for

ensuring that the benefits and costs of PES are equitably distributed (Landell-Mills and Porras, 2002; Jack et al., 2008). The ERE research community in SA is focusing much of its efforts on overcoming barriers with respect to the economic arguments for PES. However, as discussed in Section 4, there needs to be a focus on understanding the institutional context (e.g. how decision makers operate), and on effectively communicating economic arguments to decision makers, and it is here that valuable contributions need to be made.

The conference questionnaire sought to obtain delegates’ opinions with respect to:

- (1) the extent to which ERE has made a significant impact on environmental policy and management in SA over the last 5 years; and
- (2) the extent to which ERE is well integrated into environmental policy and management practice in SA.

There was no consensus as to the first question (Figure 10, left panel), with respondents’ opinions differing widely. However, respondents were far more convergent in their responses to the second question (Figure 8, right panel), with the majority of them (82%) disagreeing with the statement that ERE is well integrated into policy and management practice. Many respondents believed that there have been few (if any) projects in which ERE has achieved success in implementation or management, and that the approach has yet to gain wider purchase. This supports the view that there is an over-emphasis on academic and research issues, and on planning, and insufficient focus on implementation, such that ERE’s arguments are often not followed through to policy instrument design & policy making processes. There is a definite need to incorporate insights from ERE into national strategy, and to convert strategy into implementation (Blignaut, 2009).

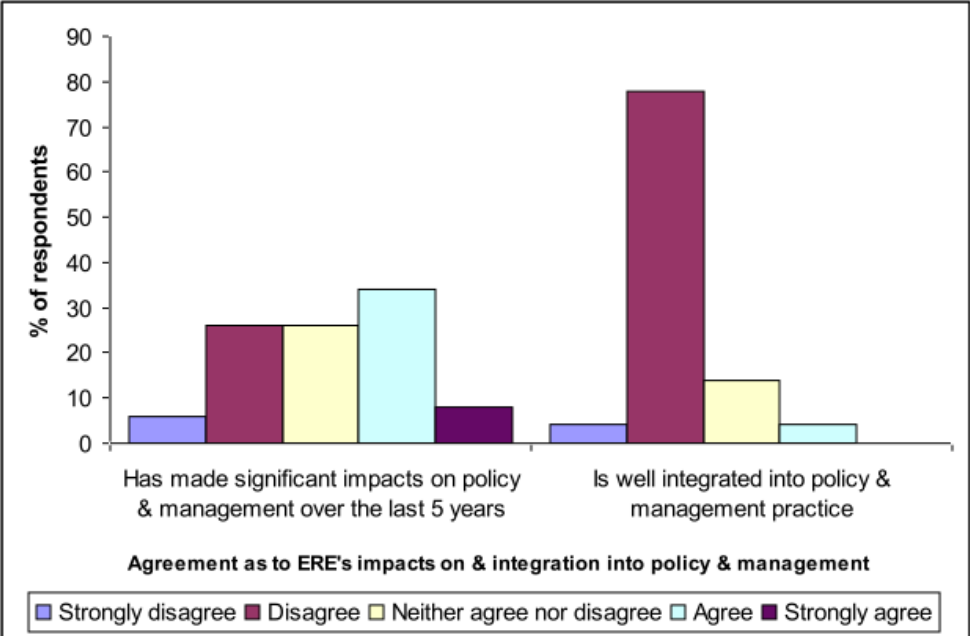


Figure 10. Extent to which ERE has impacted on/is integrated into policy & management

Breaking these responses down by type of respondent (Figure 11), it is interesting to note that NGOs/civil society, funders and policy-makers themselves are more optimistic regarding the extent to which ERE has made a significant impact on environmental policy and management in SA over the last 5 years; while researchers and practitioners are more

pessimistic (top panel). Similarly, although all types of respondents were pessimistic regarding the extent to which ERE is well integrated into environmental policy and management practice in SA, policy-makers and funders were again slightly less pessimistic than researchers and practitioners in this regard (bottom panel).

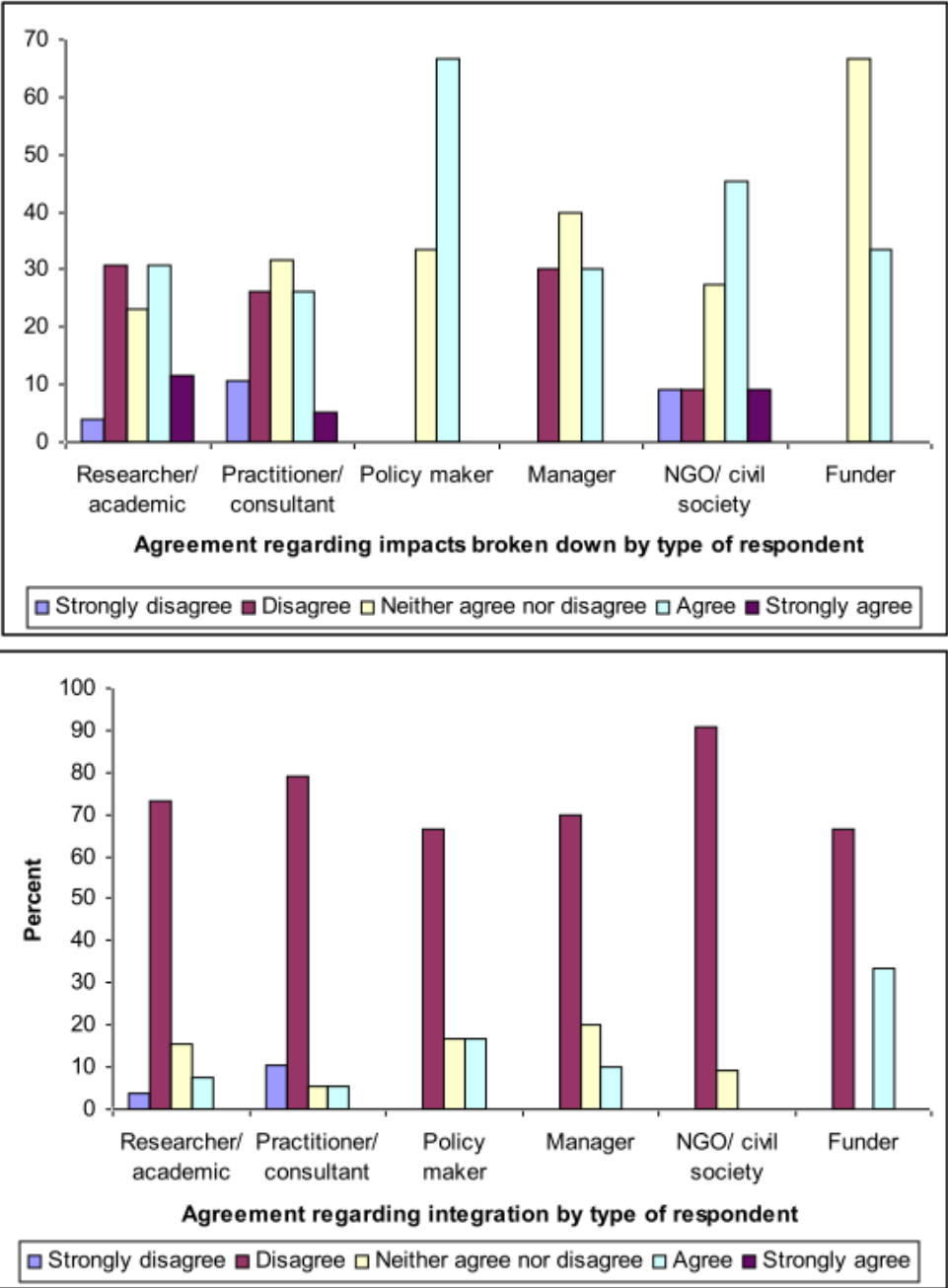


Figure 11. Extent of ERE impact & integration by type of respondent

Respondents were also asked questions relating to the strengths and weaknesses of ERE with regard to its usefulness to policy making, management and implementation. Respondents were in broad agreement as to the strengths of ERE, with the majority agreeing (strongly or mildly) that the following aspects of the discipline were strengths with regard to its usefulness to policy making, management and implementation (Figure 12):

- Provision of monetary values and/or economic perspectives that tend to get the attention of decision makers
- Understanding the interdependencies between natural and economic systems
- Clarification of economic costs and benefits of environmental outcomes
- Clearer illustration of trade-offs involved in decisions using scenarios
- Provision of options to change economic incentives

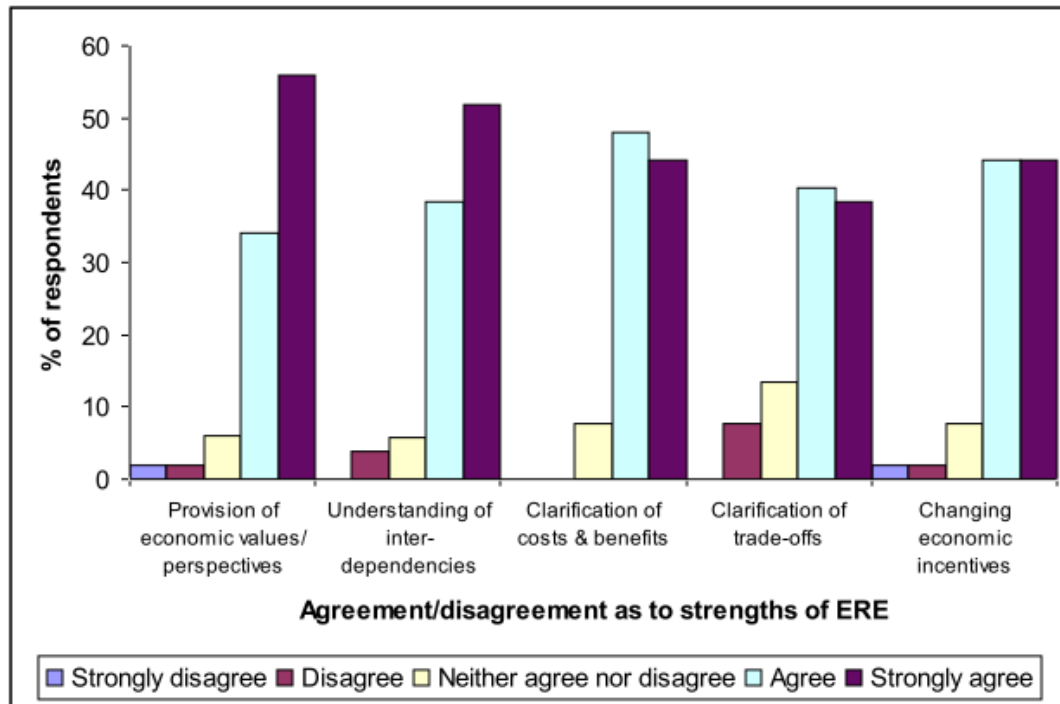


Figure 12. Strengths of ERE in terms of policy making, management & implementation

Other strengths mentioned by respondents included:

- Raising awareness and forcing people to confront the consequences of treating environmental goods and services as ‘free’; as well as providing a philosophical base for understanding the interactions and inter-dependencies between our economic activities and the environment;
- The extent to which it has led to improved decision making and the political and economic mainstreaming of natural resource management; and helped landowners, communities and local authorities make better decisions at the grassroots level; and
- The extent to which economic valuation has made great progress in becoming more accurate, and provides a basis for taking emotions out of decisions, which can therefore be made more objectively

Similarly, most respondents agreed that the following aspects were weaknesses of ERE with regard to its usefulness to policy making, management and implementation (see Figure 13):

- Complicated terminology and use of jargon
- Substantial data and resource needs
- Lack of compatibility with understanding of ecological processes

However, respondents tended to disagree with the statement that ‘over-emphasis on the provision of monetary values’ was a weakness of the discipline with regard to its usefulness to policy making, management and implementation.

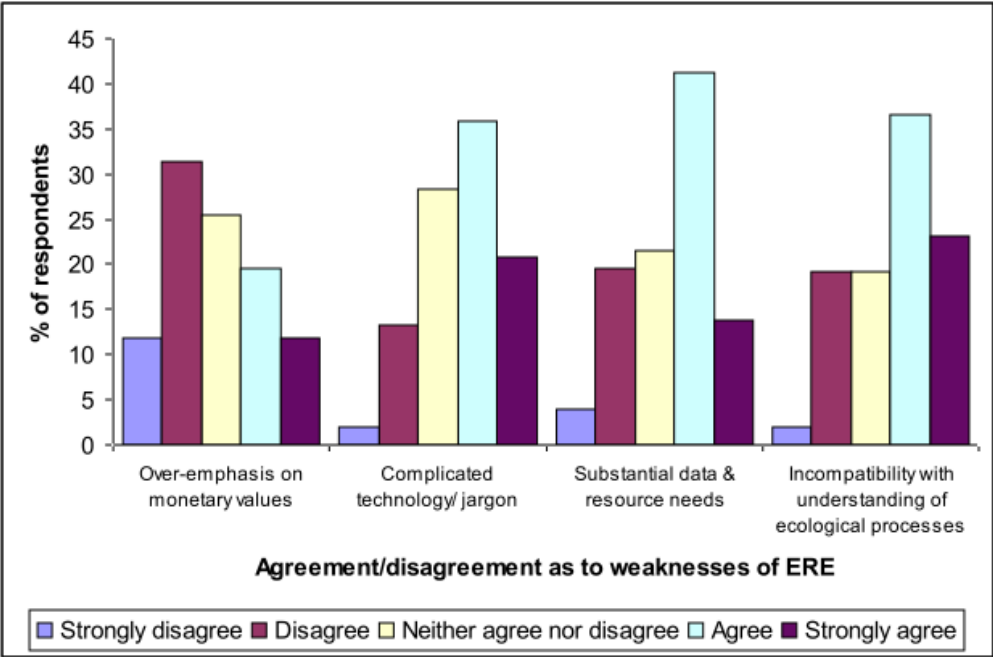


Figure 13. Weaknesses in terms of policy making, management & implementation

Although respondents were sceptical regarding ERE’s current impact on and integration into environmental policy and management (Figure 10), the vast majority of respondents (77%) strongly agreed that ERE has a more significant role to play in future environmental policy and management than it does at present (Figure 14), while another 19% agreed and only 2% disagreed. Most respondents recognised the need for ERE going forward, and the value that it could add to projects; and look forward to a time when ERE becomes a “natural part of all project designs.”

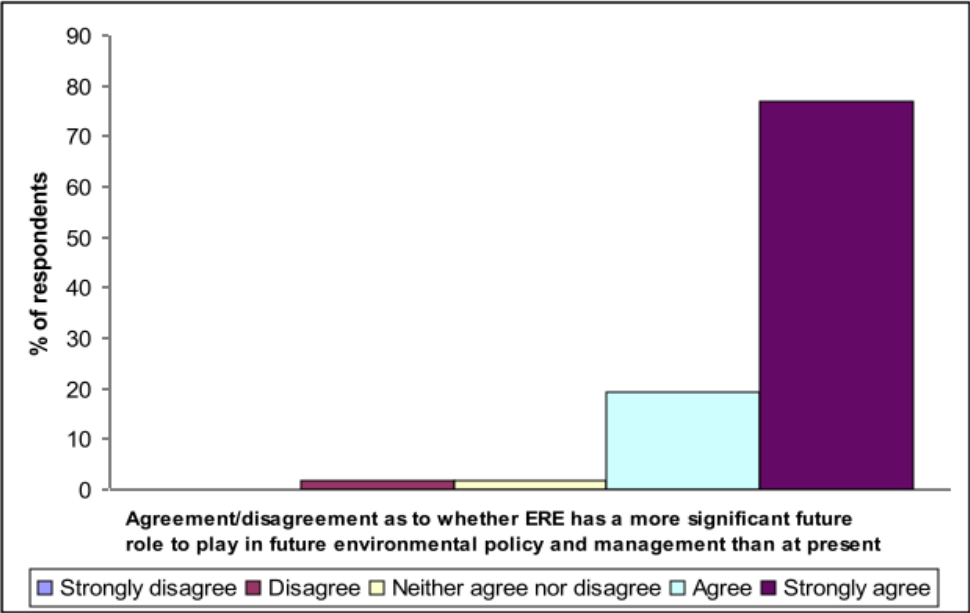


Figure 14. Extent to which ERE has a significant future role in policy & management

4. Key outcomes and recommendations with respect to implementation

According to Dr Carlos Manuel Rodriguez, former Environment minister in Costa Rica, and now with Conservation International, it is not technological or financial constraints that prevent solutions from being found to environmental problems, but institutional constraints and a lack of political will. For example, in the debate on renewable energy, many would argue that the technology is there and that the cost constraints can be overcome. However, the problem of ‘split ministries’ (e.g. separate government departments dealing with energy and the environment) is an institutional constraint that leads to inappropriate decisions being made (e.g. continuing to build new coal-fired power stations rather than investing in renewable energy). Similarly, a lack of political will leads to governments investing more in military expenditure than in renewable energy, for example (Rodriguez, 2009). According to both Dr Rodriguez and Kristy Facer of the International Union for Conservation of Nature (IUCN) (Facer, 2009), economics (and in particular, PES and other market-based instruments) can be used as a positive force to drive change, but it is important to:

1. understand and be able to communicate the ERE toolbox, while acknowledging limitations,
2. pay attention to political and institutional issues, and
3. build capacity in the use of these mechanisms through pilot studies

Indeed, these three issues emerged as three of the key recommendations of the conference with respect to implementation, and will be discussed in more detail below.

4.1 Knowing your audience, and speaking their language

One of the key themes emerging from the conference was the need for ERE practitioners and researchers to ‘know’ their audience, and to ‘speak their language.’ Information must be packaged appropriately according to the target audience, and results presented in terms that they can understand and relate to. In other words, the relevance, applicability and accessibility of information must be improved.

For example, putting *numbers* to the environment is key to being able to speak the language of businesses and policy makers (particularly finance ministers), who generally make decisions based on economic or financial criteria (Facer, 2009). In particular, communicating the economic/financial value of ecosystem services is an important tool for promoting biodiversity conservation (Veldtman *et al.*, 2009). These numbers tell government that there are high costs (both political and economic) to *not* taking immediate action. Thus, provided that the information is packaged appropriately, these numbers can be used to provide a good economic case for environmentally-beneficial legislation (e.g., including tools such as PES within the legislative framework) (Rodriguez, 2009). For example, in the implementation of PES in Costa Rica, it was initially difficult to convince the finance minister of the need for PES, because the argument was made in terms of the species that would be lost. A far more convincing case was made when the focus switched to the percent of GDP that would be lost (Rodriguez, 2009).

It is also important to emphasise that the ecosystem service values that are presented relate to what is *currently* produced, and that even more could be realised if there was investment

in natural capital to realise its full potential (Turpie, 2009). For example, in the case of the Table Mountain National Park, there is a need to persuade the City of Cape Town that investing in the park essentially amounts to investing in future economic growth (Myrdal, 2009). There is also a need to make society aware of the potential of tools such as PES (Blignaut, 2009), and to show government a sample of success stories (Holden, 2009).

In making the business case for conservation to the private sector, it must be borne in mind that finance managers think primarily in terms of the expected rate of return on investment, or benefit-cost ratios (De Wit, 2009b). It is therefore necessary to ‘think like a business, not an NGO’ and to develop a standard product, well-packaged with real opportunities for businesses to add value, so as to attract corporate investors (Houghton, 2009; Huyser, 2009). The private sector can also be engaged through voluntary schemes (e.g. certification) where compliance is in the best interests of the company (e.g. in terms of their public profile) (Rodriguez, 2009).

It is also important to be able to speak the language of the development community. Because the environment is not seen as enough of a priority at the political level, it is necessary to show the links between ecosystems and socio-economic development, e.g. in terms of livelihoods or employment, in order to move conservation to the top of the political agenda (De Wit, 2009b; Rodriguez, 2009). It must be shown that natural capital impacts on human capital, in that it provides the basis for food security, water security, and energy security, which are necessary conditions for the development of human capital (Blignaut, 2009). PES and other tools for leveraging investment in conservation and restoration, such as biodiversity credits, must therefore be ‘packaged’ in terms of economic development, livelihoods or employment objectives, as well as conservation objectives, if we want to sell them (Huyser, 2009). The ability to show dual benefits, and make socio-economic objectives explicit, explains the relative success of the Working for Water programme, for example (Myrdal, 2009; Tessendorf, 2009).

Finally, it is also important for ERE practitioners to talk in terms that landowners, communities & local authorities can understand when *they* are the target audience. ERE practitioners and researchers in SA need to be clearer regarding *what* they mean by ‘value,’ and regarding the question of value for *who* – i.e. *who* benefits, *when* do they benefit¹⁶ and *how*) (Abrahamse, 2009). For example, stewardship often comes across as a restrictive, top-down approach. Similarly, restoration has had positive *ecological* impacts, but the benefits to local communities must also be highlighted (Sigwela, 2009). It is therefore important to develop a platform to engage and incorporate insights from affected local communities, who can add value to the debate and ensure greater legitimacy of the results (Abrahamse, 2009; Marais, 2009). In other words, one needs to understand and address the real needs¹⁷ of the communities, and to package ecosystem services within a context that they can understand and appreciate, and to provide opportunities for learning and sharing of knowledge between communities (Sigwela, 2009).

The importance of clearly and effectively communicating results of research was also highlighted in the questionnaire, where respondents were asked to consider projects that

¹⁶ The question of *timing* of benefits is an important issue, as the delay in the benefits derived from improving/maintaining the environment often frustrates the intended beneficiaries and limits the attractiveness of such projects.

¹⁷ These needs tend to be immediate, but, as mentioned above, the rewards tend to be delayed, emphasising the need (and an important role) for government.

they have been involved in that have used ERE and achieved successes in implementation and management, and to rate each of the following factors in terms of their importance in contributing to these successes:

- Conceptually sound approach to supporting research
- Rigorous application of ERE techniques
- Well presented and focused results
- Use of scenarios and other ways to clarify uncertainties and assumptions
- Provision of a good narrative to augment figures and make key points clear
- Good timing in the political and budgetary cycle
- Ability to show linkages with other mandates that are not obviously environmental
- Forceful personalities to drive processes
- Availability of senior researchers to interact with decision makers

Respondents were in broad agreement as to the importance of these factors, with the majority rating the importance of each of these factors as high or very high, or at least of medium importance (see Figure 15).

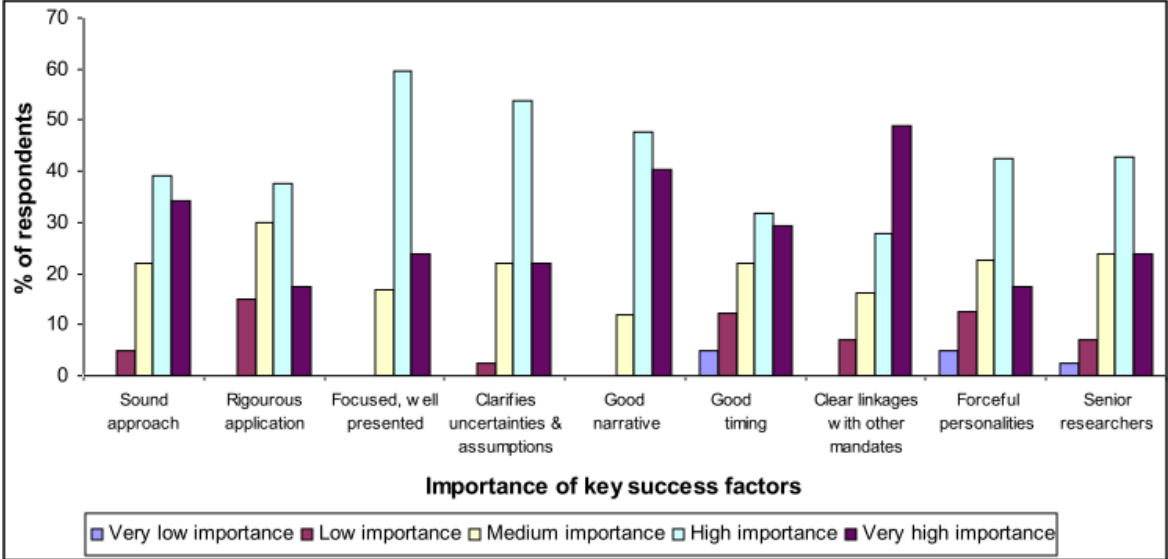


Figure 15. Key factors in ERE successes

In particular, respondents agreed that focussed, well presented arguments and results that are clearly and effectively communicated to decision makers, that clarify uncertainties and assumptions, and that employ a good narrative, are important factors in the successful implementation of recommendations arising from ERE research. Because of the number of assumptions made, the amount of terminology/jargon employed, the relatively intangible nature of concepts such as indirect and existence values, and the fact that decisions cannot usually be made based on economic criteria alone; there is a need to be clear about what the results mean, to explain complicated terminology/jargon, to be realistic regarding the implications of the results, and to make any assumptions and limitations clear, rather than claiming that the information provided can be used as a ‘blueprint’ or panacea. It is important to emphasise the value and importance of the information presented, without overwhelming the audience with technical details. Respondents emphasised that the use of good communication (clear and easy to understand) counts for much of the end product, and that presentation is crucial, as decision makers are pressed for time and easily irritated by unclear and untidy work.

Related to this, the ability to show linkages to other mandates was also highlighted as being important in a milieu where co-operative governance and partnership are seen as key levers. Respondents also emphasised the importance of having senior researchers available to interact with decision makers, and of strong champions of ideas. For some this was related to the idea of good timing, in that political issues (at all levels) often drive successful implementation, and that these issues are cyclical, such that there will be times when the end-users of information will be more receptive than others; therefore champions need to have persistence and patience and time their initiatives to coincide with times when the end-users are receptive. Times of crisis and change, such as the current global economic crisis, also tend to present opportunities for new ideas.

4.2 Pay attention to social, political and institutional issues

The need to pay attention to social, political and institutional issues also emerged as one of the key themes of the conference. There are both market and political/institutional failures that prevent solutions to environmental problems from being found (Rodriguez, 2009). Many existing policies, markets and prices are unsupportive of livelihoods and sustainability. Some policies tend to marginalise the poor, subsidies and other price distortions create perverse incentives, while there is a lack of functioning markets; these factors combine to ensure that there is too often little benefit from conservation (Faccer, 2009).

For example, the regressive nature of the plastic bag levy in SA suggests a failure to sufficiently account for social issues (Dikgang et al., 2009); while the manner in which government later bowed to pressure to lower the price of plastic bags suggests a lack of political will, diminishing the effectiveness of the legislation. Furthermore, the failure of government to use the revenues appropriately has also undermined the effectiveness of and public support for the levy; relative to what might have been the case if the funds had been ring fenced for providing alternatives or for subsidising collection, re-use and recycling. Another example from SA is that of water tariffs, which, as a result of governance/institutional issues, don't account for watershed services, and are therefore too low (Marais, 2009). Although the costs of clearing IAPs is included in the national water pricing strategy, there is a need to account for watershed services more generally, and an initiative to rectify this situation is under way (Marais, 2009).

Putting the correct political and institutional structures in place is crucial to overcome these types of problems. For example, in Costa Rica, the market share of renewable energy increased from 50% to 98% when the environment and energy ministries were combined (Rodriguez, 2009). Another example is that of PES, which has been successful in Costa Rica because institutions have been built upon the principles of sustainability, and because its protagonists were able to convince Congress of the benefits of natural ecosystems for human well being, and thus of the potential win-win opportunities from PES. A key factor in the debate was the market-oriented and financially-neutral nature of the mechanism, which ensured that it got the backing of the finance ministry.

Another set of problems of particular relevance in the SA context relates to weak governance and tenure arrangements; a lack of capacity among both municipalities and rural communities; and the complex nature of rural economies, which require integrated approaches to understanding, developing and implementing solutions (Sigwela, 2009). For example, in the context of mechanisms for leveraging conservation, as well as other

market-based mechanisms, there is a minimum level of governance/capacity that is required, especially in terms of enforcement. Furthermore, there is a real need for intervention targeting rural communities, but there are problems in delivering on what has been promised, largely because current approaches (such as the various “Working for...” programmes) do not always take the complex nature of rural economies into account, i.e. they are not integrated, and are not designed so as to ensure longevity and stable employment creation (Sigwela, 2009).

According to Stein Holden (2009), one of the main types of institutional failures is that of ‘power traps,’ i.e. institutional ‘blockages’ related to weak institutions and unequal distribution of power. There is therefore a need to place more focus on the *political* economy if successful implementation of good ideas is to be achieved. Institutional reforms are an important precursor to market reforms, and therefore to environmental restoration. For example, in Ethiopia, land reform was successful because the ‘power trap’ was broken (the landlord elite lost its power), and local institutions were established. By contrast, power traps are still undermining efforts at institutional reform in many other African countries.

In the South African context, it is fair to say that the economy is still structurally and institutionally divided between the ‘top deck’ (the wealthiest 20% of the population, who earn 65% of the income), and the ‘bottom deck’ (the poor). Economic policies are largely centred on the ‘top deck’, with the assumption that benefits will ‘trickle down’ to the poor (Blignaut, 2009). However, this expectation has not been realised in practice. Among other measures, closing the gap between the two ‘economies’ can be facilitated by investment in natural assets (Sigwela, 2009). Because PES can realise both conservation and livelihoods objectives, it could be an important tool for bridging the structural divide in SA, creating a ‘trickle-up’ effect instead of a ‘trickle-down’ effect (Blignaut, 2009). The ‘bottom deck’ has access to natural resources, and can therefore ‘supply’ ecosystem services; whereas the ‘top deck’ has access to financial resources, and a ‘demand’ for ecosystem services. Thus, although there is currently a lack of well developed markets for ecosystem services (Sigwela, 2009), the ingredients for the development of such a market are there (Blignaut, 2009)¹⁸.

Furthermore, because the environmental legacies of apartheid have not yet been eradicated, financially poor rural areas, which have the highest supply of ecosystem services, also happen to be priority areas for restoration (Blignaut, 2009). PES therefore has the potential to result in win-win outcomes (socio-economic and environmental). There is already evidence suggesting that various large scale restoration projects have been highly beneficial (e.g. Maloti-Drakensberg), and that PES could be the ideal vehicle to take conservation and restoration forward, perhaps even replicating the Costa Rican model (Blignaut, 2009). However, this requires that the institutional barriers are overcome, and that solutions are found across various institutions and disciplines, rather than from within a single discipline or institution. A need therefore exists for institutions similar to those in Costa Rica, to establish links between payment institutions and local authorities, and to overcome the problem of split ministries; although no discussions on such an approach have yet taken place within the SA government (Blignaut, 2009).

¹⁸ There was also a suggestion that in some cases government could be a buyer in a PES market, in order to fulfill its obligations to provide public goods. For example, DWAF could be a buyer in a market for watershed services, in order to meet its requirements in terms of the ecological reserve.

There is therefore a definite need for research towards putting the correct institutional, governance and economic structures in place for ERE policies to be effective (e.g. developing markets and other institutions necessary for PES to work). Current policies need to be evaluated in terms of where they are failing and how policy needs to be changed. For example, the extent to which mainstream economic policy and market practices have undermined the natural resource base should be quantified.

4.3 Apply what we already know through pilot studies

Another key lesson emerging from the conference was the need to find ways to apply what we already know through pilot studies on the ground. Because the research process is time consuming, it is often not possible to wait until we have all the answers, such that learning by doing becomes necessary. Furthermore, it is generally difficult to identify *a priori* the optimal policy or policy combination, implying the need for step-wise testing and adaptive management. In other words, pilot studies should be designed in a such a way that they can be systematically tested and adapted as new information becomes available (Holden, 2009)¹⁹.

In turn, provided that appropriate monitoring takes place and that data is collected and collated, important information will be generated through the implementation of pilot studies, which can then be used to inform future projects and policies (Marais, 2009). For example, there is a need for basic biophysical data relating to ecosystem services, as well as data on their value (Marais, 2009; Turpie, 2009). Although the Maloti-Drakensberg project established important baseline data, and the Baviaanskloof project is contributing further to our knowledge, there is a constant need for more data, which can be obtained through further PES pilot studies (Marais, 2009).

At the same time, however, there are economies of scale in projects in which market-based mechanisms are applied (small projects are often not cost-effective and carry a disproportionate amount of risk). There is also a need to focus on expanding regulations and projects across different types of systems (Knowles, 2009). This implies the need for a national-scale approach, such as the Sustainable Development Policies And Measures (SD-PAM) approach proposed by Winkler et al. (2007). However, this requires the development of government capacity and the leveraging of international funding to implement national scale projects (Knowles, 2009).

5. Conclusion

There is a growing demand for ERE research in South Africa, fuelled by a greater appreciation of the need to understand the economic roots of environmental and social challenges and to formulate economically sound solutions. However, there is limited capacity to address this growing demand, and a clear need for capacity building to increase the number of environmental and resource economists in SA. Some of the key recommendations from the conference with respect to capacity building included:

¹⁹ One respondent also suggested that there is a need for a robust, coarser decision support model or matrix that is less reliant on data and within which decisions can be made based on existing data (and adapted as more data becomes available); to ensure that the environment does not suffer as a result of decisions being delayed while data is still being collected

- Developing and implementing a plan for building ERE research and development capabilities and capacity;
- Government investment and support (financial and other²⁰) in both the undergraduate and postgraduate levels;
- Developing a range of undergraduate and post-graduate courses and programmes, ranging from short courses in ERE for non-economist graduates working in other fields (continuing education), to courses for students pursuing other degrees, to a specialised degree in ERE; and
- The need for a comprehensive database of people trained in ERE, and for a drive to attract and recruit potential ERE researchers and practitioners working in other sectors and fields.

In terms of research, a number of important topics for future ERE research were identified, relating primarily to land, water and climate change; where tools such as valuation and PES can be used to address environmental and social problems associated with information failures, market failures and political/institutional failures. However, the dominance of responses in the ‘land’ and ‘water’ categories was expected given the interests of conference attendees, and suggests that respondents were thinking in terms of reinforcing existing behaviour rather than pushing the frontiers of research. This suggests the need for a needs-driven research programme, i.e. for a working group to identify priorities and research gaps, and to develop an overall research plan for the field in SA, including a framework for ERE research in the country, in order to better coordinate such research. In addition, since research activity tends to gravitate towards areas for which there is funding, there is a need to encourage the channelling of funds to research in the priority areas that are identified.

Going beyond research and planning, and placing more emphasis on implementation, is critical if ERE recommendations are to be followed through to policy instrument design and policy-making processes. In particular, there is a definite need to incorporate insights from ERE into national strategy, and to convert strategy into implementation (Blignaut, 2009). Many delegates highlighted the need to find ways of mainstreaming and implementing ERE into management, policy and decision making as an important area for future research. This research will need to determine, among other things, how ERE approaches can be integrated into planning and decision making, from the local level up to the national strategic level (i.e., what processes need to be followed, what capacities are required, etc).

One of the key obstacles to implementation is the mismatch between the research that is undertaken and the needs of the end-users of such research, such that the research that is undertaken does not engage the priority research needs. An important reason for this is the lack of communication between those who undertake the research and those who commission it, or who use the outcomes of such research in making decisions. The generators of knowledge (researchers and practitioners) fail to effectively communicate the importance of their research; while there is also a failure among researchers and practitioners to understand the real needs and concerns of the users of such research.

There is therefore a need for regular two-way communication between the generators and users of knowledge. Practitioners and researchers need to emphasise the importance of the

²⁰ E.g., provide support that fast tracks processes for getting ERE courses, degrees, and diplomas developed, approved and implemented within tertiary (and other) institutions.

research that they are undertaking, in order to ensure that its relevance is understood and to secure sufficient funding for their research. However, they also need to listen to the end-users of research in order to understand their needs and concerns. Some of the recommendations in this regard include:

- Stakeholders should be consulted at an early stage of the research process in order to ensure that their needs are engaged from the outset (Cowling et al., 2008).
- There is also a need for conferences and other such events on a more frequent basis to ensure that opportunities for learning and cross-pollination are created. A regular forum for discussions between the generators and end-users of knowledge must be created, to ensure that the research that is undertaken is relevant and that it can be readily taken up by decision makers. However, the issue of funding needs to be addressed.
- Consider the development of a strategy for mainstreaming ERE research. This should be based on a formal assessment of the discipline and of the factors underlying the current mismatch between the research that is undertaken and the priority research needs, e.g. a SWOT analysis (strengths, weaknesses, opportunities and threats), perhaps based on a modified version of Cowling *et al.*'s (2008) model for mainstreaming ecosystem services for implementation. This should include a strategy for mitigating threats²¹ and for taking advantage of any opportunities²². A SWOT analysis has been undertaken to some extent (e.g. as contained in this report), although more work may need to be done in this regard. The next step is therefore to organise a planning workshop, involving those who undertake research, as well as the end-users and funders of such research.
- There is a need for strong champions and knowledge brokers to bridge the gap between the generators and users of knowledge; i.e. to take ERE suggestions forward to policy level and to ensure that they are understood and implemented.
- Finally, since there is often limited capacity within the receiving environment, implying that ERE results and recommendations are not well understood, there is also a need for short courses in ERE aimed at the end-users of ERE research.

According to Dr Rodriguez (2009), SA has strong potential to be a leader in sustainable development. However, this requires that institutional constraints, such as 'power traps' and a lack of political will, are overcome. It also requires that ERE researchers and practitioners become more confident in the knowledge, information and data that they already have and that they improve implementation and impact based on sound understanding and experience, and clear and simple communication. In this regard, the following key recommendations emerged from the conference:

- Know your audience, and speak their language. It is important to be able to communicate your results effectively (clearly and coherently), and to package them appropriately, in order to impact on decision makers, and to get them to understand the importance of ERE.

²¹ An example of a threat is the loss of qualified ERE researchers and practitioners to other fields of work, or overseas. There is therefore a need to find ways of developing, attracting, and retaining senior researchers and practitioners.

²² Examples of opportunities include the DST Global Change Grand Challenge, which focuses on a variety of issues relevant to ERE, institutional economics and ecological economics; and which identifies the economics of global change as an important area for future research; and prioritises it for future funding. There are also opportunities related to SA's developing country context, which provides potentially interesting research opportunities that may be of interest to overseas funding agencies.

- Pay attention to social, political and institutional issues. There is a need for research towards putting the correct institutional, governance and economic structures in place for ERE policies to be effective (e.g. developing markets and other institutions necessary for PES to work); and to be cognisant of, and sensitive to, issues related to political economy.
- Find ways to apply what we already know through pilot studies on the ground. Don't be afraid to make decisions (or even mistakes), even if you don't have all the information, as long as this is not imposed on local communities without their understanding and support. In fact, we shouldn't underestimate how much we know; in all likelihood, we know substantially more than Costa Rica did when PES was widely implemented there. But it is essential to design and implement pilot studies in such a way that they can be withdrawn or adapted later; i.e. within an adaptive learning and adaptive management framework that is responsive to the local context.

6. References

- Abrahamse, T. (2009). *Opening address*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Antrobus, G. G. (2009). Personal communication. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap. The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Arrow, K. J., Dasgupta, P. and Maler, K. G. (2003). Evaluating projects and assessing sustainable development in imperfect economies. *Environmental and Resource Economics*, 26: 647–685.
- ASSET Research (2009). Africa's Search for Sound Economic Trajectories. <http://www.assetresearch.org.za/>.
- Bateman, I. A., Lovett, A. A. and Brainard, J. S. (2003). *Applied environmental economics*. (UK, Cambridge University Press).
- Baumgartner, S., Becker, C., Frank, K., Müller, B. and Quaas, M. (2008). Relating the philosophy and practice of ecological economics: Thee role of concepts, models, and case studies in inter- and transdisciplinary sustainability research. *Ecological Economics*, 67: 384-393.
- Blignaut, J. N. (2008). An inventory of current and potential projects and markets for payments for ecosystem services in South Africa. Report prepared by Beatus Advisory services (james@jabenzi.co.za), South Africa for The Katoomba Group, <http://www.katoombagroup.org/>
- Blignaut, J. N. (2009). *Economic development and the restoration of natural capital*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Blignaut, J. N. and de Wit, M. P. (2002a). Forum for Economics and Environment: Review of activities. *Bridging the economics / environment divide*. J. N. Blignaut. Pretoria, Forum for Economics and the Environment.
- Blignaut, J. N. and de Wit, M. P. (2002b). What has been done in environmental resource economics in South Africa: A survey. *Bridging the economics / environment divide*. J. N. Blignaut. Pretoria, Forum for Economics and the Environment.
- Blignaut, J. N., Marais, C., Rouget, M., Mander, M., Turpie, J., Preston, G., Philip, K., Du Plessis, L., Klassen, T. and Tregurtha, N. (2008). Making markets work for people and the environment: Combating poverty and environmental degradation on a single budget while delivering real services to real people. unpublished. Pretoria. Research paper commissioned by: The Second Economy Strategy Project, an initiative of the Presidency
- Blignaut, J. N., Marais, C. and Turpie, J. K. (2007). Determining a charge for the clearing of invasive alien plant species (IAPs) to augment water supply in South Africa. *Water SA*, 33(1): 27-34.
- City of Cape Town Health Department (2005). Air Quality Management Plan for the City of Cape Town. Final Report AQM 20050823 - 001. Cape Town. Cape Town City Health Department, Air Pollution Control Section
- Council for Scientific and Industrial Research (2002). Sustainability analysis of human settlements in South Africa. Pretoria. Prepared for the Department of Housing by the Council for Scientific and Industrial Research - Building and Construction Technology
- Cowling, R. M., Egoh, B., Knight, A. T., O'Farrell, P. J., Reyers, B., Rouget, M., Roux, D. J., Welz, A. and Wilhelm-Rechman, A. (2008). An operational model for mainstreaming ecosystem services for implementation. *PNAS*, 105(28): 9483–9488.
- Dasgupta, P. and Maler, K. G. (2001). Wealth as a criterion for sustainable development. *World Economics*, 2(3): 19-44.
- De Lange, W. J., Wise, R. M., Forsyth, G. G. and Nahman, A. (2009). Integrating socio-economic and biophysical data to support water allocations within river basins: An example from the Inkomati Water Management Area in South Africa. *Environmental Modelling and Software*. In press. Available online: DOI 10.1016/j.envsoft.2009.06.011

- De Lange, W. J., Wise, R. M. and Nahman, A. (2008). Evaluation beyond valuation: Towards a new framework for assessing social-ecological tradeoffs in South Africa. *Exploring sustainability science*, pp: 87-116. M. Burns, A. Weaver and M. Audouin. Stellenbosch, African Sun Media.
- De Wit, M. P. (2009a). *ERE resources for the common good*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- De Wit, M. P. (2009b). *Methodology to value the natural assets of the City of Cape Town*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Department of Environmental Affairs and Tourism (1993a). General Guidelines for a policy on the use of fiscal instruments in environmental management. Research Report 1. Pretoria. Produced for the Department of Environmental Affairs and Tourism (DEAT) by Economic Project Evaluation (Pty) Ltd
- Department of Environmental Affairs and Tourism (1993b). The use of economic instruments in environmental management: A project aimed at influencing state and private sector environmental policy. Research Report 5. Pretoria. Produced for the Department of Environmental Affairs and Tourism (DEAT) by The BP Chair of Environmental Policy and Management, the Institute for Natural Resources, University of Natal, and Economic Project Evaluation (Pty) Ltd
- Department of Environmental Affairs and Tourism (1996). An assessment of market based instruments: Suitability for environmental management in South Africa. Research Report 11. Pretoria. Produced for the Department of Environmental Affairs and Tourism (DEAT) by the Deloitte and Touche Consortium of Consultants
- Department of Environmental Affairs and Tourism (1997). The use of market-based instruments for the management of South Africa's environment: A position statement Discussion document 4. Pretoria. Produced for the Department of Environmental Affairs and Tourism (DEAT) by the Deloitte and Touche Consortium of Consultants
- Department of Environmental Affairs and Tourism (2000). White paper for sustainable coastal development in South Africa: Our coast, our future. Pretoria. Department of Environmental Affairs and Tourism: Marine and Coastal Management
- Department of Environmental Affairs and Tourism (2007). People - Planet - Prosperity: a national framework for sustainable development in South Africa. Pretoria. Department of Environment and Tourism (DEAT), Republic of South Africa
- Department of Health (2004). National HIV and syphilis antenatal sero-prevalence survey in South Africa. Pretoria. Department of Health
- Department of Water Affairs and Forestry (1998). *National Water Act No. 36 of 1998*. (Pretoria, Statutes of the Republic of South Africa: Water).
- Department of Water Affairs and Forestry (2000). Development of a waste discharge charge system: Framework document. Second edition. Pretoria. Department of Water Affairs and Forestry (DWAF)
- Diederichs, N. and Mander, M. (2004). Payments for environmental services baseline study - Maloti Drakensberg Transfrontier Project. Final Report. futureWorks
- Dikgang, J., Leiman, A. and Visser, M. (2009). *The economics of the plastic bag legislation in South Africa and Botswana*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Faccer, K. (2009). *Rethinking the business of biodiversity conservation*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Hamilton, K. and Clemens, M. (1999). Genuine savings rates in developing countries. *The World Bank Economic Review*, 13(2): 333-356.
- Harris, M., Pearson, L. and Walker, B. (2004). Measuring and modelling sustainable development in Australia using inclusive wealth: Project description.

- Holden, S. (2009). *Institutions, markets and environmental and livelihood restoration*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Houghton, D. (2009). *Conservation easements - An innovative and flexible conservation strategy*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Human Sciences Research Council (2004). Fact Sheet: Poverty in South Africa. Pretoria. Geographic Information Systems (GIS) Centre, Human Sciences Research Council
- Huysen, O. (2009). *Developing biodiversity credits*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Kates, R. W. and Dasgupta, P. (2007). African poverty: A grand challenge for sustainability science. *Proceedings of the National Academy of Sciences, USA*, 104(43): 16747–16750.
- Jack, B. K., Kousky, C. and Sims, K. R. E. (2008). Designing payments for ecosystem services: Lessons from previous experience with incentive-based mechanisms. *PNAS*, 105(28): 9465–9470.
- Knowles, T. (2009). *Assessing the financial viability of taking carbon to market*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Landell-Mills, N. and Porras, I. T. (2002). *Silver bullet or fools' gold? A global review of markets for forest environmental services and their impact on the poor*. (London, UK, International Institute for Environment and Development (IIED)).
- Magnani, I. (1973). On the methodology of the economics of the environment. *Annals of Public and Co-operative Economy*, 44(4): 321-344.
- Marais, C. (2009). *Developing payments for watershed services in South Africa: Matching market efficiency with development opportunity*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Massey, R. and Hamman, R. (2009). *Towards a sustainable livelihoods strategy for the City of Cape Town*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Mills, A. J. and Cowling, R. M. (2006). Rate of carbon sequestration at two thicket restoration sites in the Eastern Cape, South Africa. *Restoration Ecology* Vol. 14 (1): 38-49.
- Munasinghe, M. (2007). Making development more sustainable: Sustainomics framework and practical applications. (Colombo, Sri Lanka, Munasinghe Institute for Development).
- Myrdal, B. (2009). *Table Mountain National Park over ten years - Delivery on the triple bottom line*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Nahman, A., De Lange, W., Wise, R. and Pitso, D. (2009). Environmental and resource economics in South Africa: A review. Report no. CSIR/NRE/RBSD/IR/2007/0092/A. Stellenbosch. Council for Scientific and Industrial Research
- Nahman, A., Wise, R. M. and De Lange, W. J. (forthcoming). Environmental and resource economics in South Africa: Status quo and lessons for developing countries. *South African Journal of Science*.
- National Treasury (2006). A framework for considering market-based instruments to support environmental fiscal reform in South Africa. Pretoria. National Treasury
- OneWorld Sustainable Investments (2008). A climate change strategy and action plan for the Western Cape. Cape Town. Prepared for the Department of Environmental Affairs and Development Planning, Western Cape by OneWorld Sustainable Investments. www.capegateway.gov.za/eadp
- Pagiola, S., Landell-Mills, N. and Bishop, J. (2002). Market-based mechanisms for forest conservation and development. *Selling Forest Environmental Services*. S. Pagiola, N. Landell-Mills and J. Bishop, Earthscan, London.

- Pearce, D. W. (1993). *Economic values and the environment*. (UK, The MIT Press).
- Pearce, D. W. (2002). An intellectual history of environmental economics. *Annual Review of Energy and the Environment*, 27: 57-81.
- Perman, R., Ma, Y., McGilvray, J. and Common, M. (2003). *Natural resource and environmental economics*. (Harlow, Pearson Education).
- Pigou, A. C. (1920). *The economics of welfare*. (London, Macmillan).
- Rademan, M., Veldtman, R. and de Lange, W. J. (2009). *Ecosystem services in the Western Cape bee industry*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Republic of South Africa (1996). The Constitution of the Republic of South Africa (Act No. 108 of 1996). Pretoria. Government Printer
- Republic of South Africa (2004). National Environmental Management: Biodiversity Act. Pretoria. The Presidency
- Republic of South Africa (2006). The Accelerated and Shared Growth Initiative for South Africa (ASGISA). Pretoria. Government of the Republic of South Africa
- Rodriguez, C. M. (2009). *Keynote address: Environmental Services Payments in Costa Rica*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Shisana, O. and Simbayi, L. C. (2002). Nelson Mandela/HSRC Study of HIV/AIDS: Household survey 2002: South African national HIV prevalence, behavioural risks and mass media. Cape Town. Human Sciences Research Council
- Sigwela, A. (2009). *Catchment restoration and maintenance: The potential of catchments for watershed services to contribute to rural economic stability*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Smith, V. K. (1993). Nonmarket valuation of environmental resources: An interpretative appraisal. *Land Economics*, 69(1): 1-26.
- South African Cities Network (2004). State of the Cities Report 2004. Johannesburg. South African Cities Network
- Tessendorf, S. (2009). *Application of the contingent valuation method to estimate the willingness-to-pay for restoring indigenous vegetation in Underberg, KwaZulu-Natal, South Africa*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Turpie, J. K. (2009). *The nature, distribution and value of ecosystem services in South Africa*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Turpie, J. K., Marais, C. and Blignaut, J. N. (2008). The working for water programme: Evolution of a payments for ecosystem services mechanism that addresses both poverty and ecosystem service delivery in South Africa. *Ecological Economics*, 65: 788 - 798.
- United Nations (1993). Agenda 21: Earth Summit - The United Nations Programme of Action. New York. United Nations
- Veldtman, R., de Lange, W. J. and Allsop, M. (2009). *Valuing insect pollination services with cost of replacement*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.
- Wageningen University (2008). Participatory restoration of ecosystem services & natural capital in the Eastern Cape (PRESENCE). www.grs.wur.nl/UK/Projects/PRESENCE.
- Winkler, H., Howells, M. and Baumert, K. (2007). Sustainable development policies and measures: Institutional issues and electrical efficiency in South Africa. *Climate Policy*, 7: 212-229.
- Wise, R. M. and Musango, J. K. (2009). *Assessment of the viability of a 'payment for catchment-protection services' scheme in the Ga-Selati catchment*. Environmental Resource Economics Conference: Environment & Economy: Mind the Gap, The Ritz Hotel and Conference Centre, Sea Point, Cape Town, 21st and 22nd May 2009.

- World Bank (2006). Where is the wealth of nations? Measuring capital for the XXI century. Washington, D.C. World Bank
- World Summit on Sustainable Development (2002). Johannesburg plan of implementation. United Nations
- Wunder, S. (2007). The Efficiency of Payments for Environmental Services in Tropical Conservation. *Conservation Biology*, 21: 48 - 58.