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Using resource economics for  
natural resource management:  
Namibia's experience.

by

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## **Abstract**

**This paper is an attempt to examine how resource economics has been applied in Namibia. Specifically, the lessons learned during three and a half years of practical application of resource economics in environmental planning are identified. To assist in achieving the goal of sustainable, efficient and equitable use of natural resources in Namibia a resource economics programme was initiated in the Directorate of Environmental Affairs, Ministry of Environment and Tourism in 1993. The programme aims to value natural resource use, to assess and recommend optimal use, to identify the economic causes of unsustainable use, and to create incentives for optimal use. This involves the application of research and analysis, dissemination, and the development of Namibian capacity. Most activities have addressed a number of these objectives simultaneously. A fundamental activity is the assessment, using cost-benefit analysis, of current and potential financial and economic values for use of land and natural resources. This has led to further activities such as: analysis of individual ventures by communities, assisting communities with planning, identifying economic or policy constraints to development and conservation, determining appropriate policy through economic analysis, analysing the economic aspects of desertification, a project setting up natural resource accounts, and general policy analysis. Focus has been primarily on wildlife and tourism, primarily on communal lands, and has primarily involved direct use values. Resource economics has been useful in demonstrating the viability of wildlife uses and of communal land use initiatives, determining potential incomes from wildlife-based enterprises, highlighting the relative importance in Namibia of non-consumptive wildlife tourism as an income earning activity, providing evidence for analysis/debate on the policy causes of desertification, providing justification for a real increase in the budget of the Ministry of Environment and Tourism, and in assisting communities to negotiate contracts with private sector partners in the use of wildlife. Perhaps most importantly, resource economics has enabled the Ministry of Environment and Tourism to be less defensive and more pro-active. Success was attributed to the power of being able to quantify problems, the fact that the resource economics programme was in an organisation with a broad, multi-disciplinary, policy and planning mandate, and the fact that there was a critical mass of economics expertise on the programme. Weaknesses identified in the programme have been associated with its limited impact on conservation managers, weaknesses in dissemination, and difficulties with retaining Namibian staff. For the application of resource economics to be successful it is concluded that the focus of work must coincide with resource managers priorities, they must accept its value, objectives must embrace both broad and focussed approaches, the institutional setting should embrace policy and planning functions, effective dissemination should be possible, and domestic skills should be developed.**



## PREFACE AND ACKNOWLEDGEMENTS

*This paper is adapted from a presentation made to the southern African regional workshop on Economics, Policy and Natural Resource Management, in Pretoria in September 1996. We thank IUCN-ROSA in Harare and CSIR in Pretoria for organising the workshop and inviting us to participate. Our presentation aimed to assess Namibia's experience of developing and applying resource economics, in order to share lessons learnt with natural resource managers, economists and policy makers from other countries.*

*The original presentation was prepared by the three presenters, Caroline Ashley, Jon Barnes and Brian Jones, and by Dr Chris Brown. Chris Brown is the Head of the Directorate of Environmental Affairs (DEA), in Namibia's Ministry of Environment and Tourism. Brian Jones is a Senior Planner and head of the Community Based Natural Resource Management Programme. Jon Barnes and Caroline Ashley are both resource economists. Jon Barnes is seconded to the DEA by the World Wildlife Fund (US) LIFE Programme through funding from the United States Agency for International Development (USAID) under terms of Agreement No. 623-0251-A-00-3135-00. Caroline Ashley was seconded initially by the Overseas Development Institute (UK) and then by IUCN-ROSA. An adaptation of the Pretoria presentation which she made to a workshop of the Moçambique Government, sponsored by IUCN, on the role of Resource Economics in Environmental Management, further developed the ideas on which this paper is based.*

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## TABLE OF CONTENTS

1.	Introduction	1
2.	Context	1
3.	An Economics Perspective on Environmental Problems	2
4.	Priorities and Activities of Resource Economics	4
4.1	Valuing natural resources	5
4.2	Assessing optimal use	5
4.3	Assessing incentives	6
4.4	Creating Incentives	9
4.5	Research Methods	10
4.6	Dissemination	10
4.7	Training	11
4.8	Examples of key activity areas	12
4.9	Overall Focus	14
5.	Impacts and Strengths of Resource Economics	15
6.	Gaps and weaknesses	17
7.	Conclusions	19
7.1	What is Resource Economics?	19
7.2	How can Resource Economics be Useful to Resource Managers?	19
7.3	Making Good Use of Resource Economics	20
	REFERENCES CITED	22
Table 1:	Economic approaches to addressing environmental problems	4
Box 1:	Efficient use of natural resources: water	7
Box 2:	Efficient use of natural resources: springbok	8
Figure 1:	Activities relating to economic assessment of wildlife uses	13



## I. Introduction

In 1993, when two resource economists joined Namibia's Ministry of Environment and Tourism, the idea of resource economics -- or environmental economics -- was new in Namibia. Most people thought environment was only about ecology and protecting species, economics about profits, budgets and accounts, and that the two had nothing in common. In fact, a key component of environmental management is sustainable use of natural resources, while economics is about making good use of resources -- so the two are closely linked. Since 1993, resource economics has been used for environmental management in Namibia in a variety of ways, and there is broader understanding of its purpose and applications.

Internationally, there is a growing literature on the emerging methodology and theories of resource economics, environmental economics and ecological economics. The results and methods of specific studies are written up in detail, for sharing with others in similar fields. This paper, however, has a different purpose. It does not focus on either the methods or findings of a specific resource economic assessment, but looks more broadly at how resource economics has been applied and used in Namibia. The paper describes what resource economics work has been done in Namibia, what impact it has had, what strengths and weaknesses have been encountered. It aims to identify some lessons learnt about the practical applications of resource economics for environmental planning. It therefore concludes by analysing Namibia's experience to help answer three questions relevant to natural resource managers in Namibia and elsewhere:

What is resource economics?

How can it be useful to natural resource managers?

What is necessary for making good use of resource economics?

## II. Context

Environmental management is shaped by Namibia's ecological, economic and political context, of which the key points are Namibia's aridity, recent Independence and legacy of apartheid, and low status of environmental issues combined with high dependence on renewable natural resources.

*The Namibian environment* is arid to semi-arid. Water is one of the most limiting factors, as rainfall is low and highly variable, and evaporation rates high. Soils are poor, and there is a risk of desertification if land is poorly managed. Most of the land is only suitable for extensive livestock or game production, with small stock dominating in the more arid south, and cattle in the centre and north.

*The socio-economic and political* context is dominated by the legacy of past colonialism and apartheid. Wealth, income, and access to natural resources are still highly skewed. 43% of the land is commercial farms, under private ownership, producing livestock for sale and export. 40% is communal land where the majority live, with rights to use, but not own, the land. Crops are produced on small household plots and grazing is largely in commonly managed or open access areas. Livestock serve many functions, including milk, draught power, store of wealth and status. Poverty and rapid population growth create pressure for unsustainable resource use and loss of habitat and biodiversity.

Environmental and wildlife agencies lack political clout, because conservation has traditionally been seen as a concern of the elite. However, the new constitution contains a commitment to sustainable use of living natural resources for the benefit of all Namibian, current and future.

In the past the government conservation agency was responsible for parks and wildlife, but not for broader environmental management. However, given the reliance of the economy on natural resources, and in recognition of the importance of sustainability, a new Directorate was created after Independence. The Directorate of Environmental Affairs (DEA) within the new Ministry of Environment and Tourism (MET), is mandated with promoting environmental policy, and cross-sectoral planning, to enhance sustainable development. The resource economics programme of the Ministry is housed within this Directorate.

The formal economy is dominated by mining. The three other key economic sectors are marine fisheries, agriculture, and tourism.

### **Environmental Goal**

Given this context, the overall goal of the Government, and of the DEA in particular, is to promote more *sustainable, efficient, and equitable* use of renewable natural resources. It is recognised that in the past, many resources (such as wildlife, fish, and water) have been over-utilised and not used sustainably. Also that some resources are not being used efficiently to get maximum benefit for the nation. And certainly that access to resources and their benefits has been inequitable. Resource economics was introduced as one tool to address sustainability, efficiency, and equity.

## **III. An Economics Perspective on Environmental Problems**

Some key environmental problems in Namibia are: unsustainable use of water resources and degradation of wetlands; unsustainable use of rangeland and arable land and declining productivity; loss of biodiversity and wild habitats; disruption of essential ecological processes; and threats to protected areas (Brown, 1992). The varied causes include bio-physical, socio-political and economic factors, therefore the necessary response must be multi-disciplinary, involving ecology, sociology, and economics. This paper, however, focuses on the economic aspects.

From an economic point of view, the *causes* of these problems can be seen as<sup>1</sup>:

- i) *The value of resources and conservation is not known.*  
This is usually because the resources are unpriced and the benefits are intangible, little understood and are shared across many people. For example: the contribution of protected areas to healthy ecosystems is not known.

Similarly, the *costs* of resource use and degradation are not realised. For example: the cost of water extraction in terms of ecological disruption and downstream impacts is not known.

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<sup>1</sup> Problem (iv) is generally termed "policy failure." The other problems, particularly (ii) and (iii) are generally termed "market failure" meaning that the prices faced by natural resource users do not reflect the real value of the resources, including the "externalities" (positive or negative impacts felt by others or by society at large).

- ii) *Costs of using resources are not paid by the resource user.*  
As a result, costs are ignored and use increases. For example: free grazing land or cheap water are overused because degradation costs are paid by others.
- iii) *Benefits of conservation are not gained by the resource user.*  
This is usually because there is public access to the resource or insecure tenure. This leads to the perfectly rational attitude of, for example, "If I don't chop the tree, somebody else will, so I might as well use it today."
- iv) *Impacts of policies on resources are not understood.*  
Policies such as tenure, livestock subsidies, and price supports can unwittingly provide incentives for degradation. Policies are often designed to meet one government objective (such as supporting farmers' incomes) without taking into account the side-effect on sustainability of resource use.
- v. *Resources are inefficiently used, hence undervalued.*  
If under current use, the benefit gained from resources is low and users do not know how to increase their benefits, the resources will be under-valued. This can lead to under-investment in their conservation (or simply to low use). For example, where wildlife causes high damage costs but generates few local benefits, some people see the solution in disposing of wildlife, rather than making better use of them.

From the economists' perspective, the solution to these problems is therefore clear (if not necessarily easy). What is needed is for natural resources to be *valued*, for costs and benefits to be experienced (*internalised*) by those managing resources so they are taken into account in decisions, for policy makers to know and take account of the environmental *implications of policy*, and for resources to be used in the most efficient, *optimal* way to increase their value. Table 1 summarises what is needed amongst resource users, and what resource economists therefore need to do.

Note that "resource managers" refers to people at all levels, ranging from farmers and community members, to politicians and technical staff in Government, as all are deciding on resource use. Note also that 'value' does not refer only to the cash value to be derived from a resource, but to all values including contribution to local development, national economy, ecological functioning, and human happiness. In short, to human welfare.

**Table 1: Economic approaches to addressing environmental problems.**

<i>For sustainable, efficient use of natural resources...</i>	
<i>Local resource users need to:</i>	<i>Resource economists need to:</i>
know the values of resources	estimate and demonstrate values
bear costs, capture values	help reform policy, develop property rights, markets, & enterprises
know and implement optimal use	compare value of options, recommend optimal uses
<i>Policy makers need to:</i>	
know values of resources	estimate and demonstrate values
know impacts of policy	assess policy impacts
include values & impacts in decisions	develop planning mechanisms
know and implement optimal use	compare value of options, recommend optimal uses

#### **IV. Priorities and Activities of Resource Economics**

This assessment of problems and remedies defines the strategy of the Resource Economics Programme. The overall goal is

*to ensure that environmental decisions mean efficient allocation of scarce resources - i.e. maximise human welfare.*

To achieve this, the priorities of the Programme are:

- i) **Value renewable natural resources:** estimate and demonstrate values.
- ii) **Assess and recommend *optimal* use:** to increase efficiency, sustainability and equity.
- iii) **Identify economic *causes* of unsustainable use:** eg impact of policy, market distortions.
- iv) **Create *incentives* for optimal use:** either by changing the *distribution* of costs and benefits ("internalising" them) or by *increasing* total benefits (through promoting optimal use). Eg. reform of tenure, pricing or planning, development of markets, enterprises, skills, joint ventures.

Three additional objectives underpin each of the above:

- v) **quality research**
- vi) **effective dissemination**
- vii) **development of capacity** among Namibians to do and use resource economics.

The remainder of this section summarises the approach and type of work undertaken by resource economists and their colleagues for each of the seven objectives.

#### **A. Valuing natural resources**

Valuing natural resources is particularly important -- and difficult -- because they are often un-priced or underpriced, and their functions are difficult to quantify. Valuation aims to create awareness that even if there is no price tag, the resource is worth conserving, or investing in. For example, some values of wildlife were estimated by looking at the economic contribution of consumptive and non-consumptive wildlife enterprises on both commercial and communal land, and also at their indirect value in supporting the booming tourism sector. It is estimated that wildlife is contributing at least N\$250 million per year to the national economy (net value added) (Ashley and Barnes, 1996). This total does not include ecological functions of wildlife, nor the values humans place on the continued existence of wildlife and biodiversity. These figures might be rough and incomplete, but they demonstrate that wildlife is not just about cuddly furry feelings, but about jobs and economic development. To strengthen this point, *local economic impact* is assessed -- in terms of wages, earnings and other local revenues gained from resource use -- in addition to the measures of net economic value.

Values lost through degradation can also be assessed. Preliminary estimates were made of the economic costs of desertification (Quan *et al*, 1994). Although the extent of desertification is difficult to quantify, and the long term impact of desertification is difficult to distinguish from short-term fluctuations in output due to drought cycles, estimates were made of production losses due to bush encroachment, deforestation, loss of arable land fertility, and overgrazing in the vicinity of homesteads. This indicated that commercial farmers were losing income of around N\$100 million per year due to bush encroachment of rangeland. The loss suffered by households in communal areas was of a similar magnitude, if the lost output is valued at what it would cost to purchase replacements.

#### **B. Assessing optimal use**

Identifying the optimal uses of a resource in terms of its contribution to human welfare, means weighing up many criteria. Sustainability is necessary but not sufficient for optimal use. Unsustainable use of a resource, giving high benefits now but nothing in the future, is very unlikely to be efficient. eg chopping down all the trees, shooting an entire herd of wildlife. However, amongst various sustainable uses, some will be more efficient. *Efficiency* means getting the maximum output, or benefit, from a limited input of a scarce resource. Boxes 1 and 2 explain this concept through some Namibian examples. However, the most efficient use in terms of generating greatest output on a sustainable basis, is not necessarily the optimal use if the result is inequitable. Therefore the *distribution* of costs and benefits also needs to be taken into account.

Resource economics work has promoted the principle of optimal use of resources in general, and has provided information on optimal uses for specific resources. For example, estimates of economic and financial benefits of alternative wildlife uses (hunting, cropping, tourism etc) are available for communities, commercial farmers, and government to decide on how to use their wildlife and tourism areas (Barnes 1995, Ashley 1995). This work can also

indicate the efficiency of adopting wildlife use as either a complement to, or substitute for, livestock.

Another example is analysis of the efficiency of water use, for informing macro-economic planning. Recent work by the Natural Resource Accounts project estimates the value added to the national economy for each cubic metre of water used in different industries (see the last example in Box 1 (Lange, 1996)). This does not mean that the only criteria for development decisions will, or should, be based water efficiency of the different industries. But in a country where water is one of the most limited resources, and the cost of water at point of supply can vary several fold between regions and towns, this new information will enable water efficiency to be one component of economic planning decisions in future.

### C. Assessing incentives

The use of economics to identify *causes and incentives* rests on some basic assumptions that:

- i) behaviour is generally rational. Decisions to use natural resources in a certain way are generally based on an assessment of costs and benefits ("is it worth the effort?") and a comparison of the trade-offs ("is a different use better?") rather than on stupidity or moral persuasion.
- ii) the costs and benefits resource users face are strongly influenced by government prices and policies. Therefore a change in policies or prices can change resource use.
- iii) sustainable and efficient use is often not in the individual's financial interest, given the existing costs and benefits they face, however it is in the national interest.
- iv) therefore, government should correct distortions and provide incentives so that what is rational for the individual resource user is also in the national interest.

#### ***Rational decisions***

*If people over-fish or overgraze, it is probably because the benefits are worth the cost. Perhaps the value of output today is immense, given poverty. Or the benefit to be gained from conserving it for tomorrow is insignificant, because the resource will simply be used by others. Or the costs of organising collective conservation are simply too high to be worth the effort. But government can change decisions by influencing the costs and benefits.*

## WHAT IS EFFICIENT USE OF WATER?

### a Mrs Mamili and her buckets of water

Mrs Mamili has to collect buckets of water and carry them home. When she chooses between using the precious bucket or two for drinking, cooking, washing the children, washing the clothes, making beer, watering the garden ... she uses common sense to choose the "most efficient" use.

- Because the resource is very "scarce" for her (takes a lot of effort to collect it) she chooses carefully -- drinking and cooking are essential uses (give most value) so take priority.
- When her children are home and collecting water too, she starts using it for secondary uses. This isn't "inefficient." Once immediate drinking needs are met, the most valuable use of the *next* bucketful is a different use. She decides the combination of options that makes the family most happy (maximises value).
- When she has plentiful water from a tap, she doesn't have to choose: needs and wants are all met, water is consumed for high-value and low-value (ie less efficient) uses -- unless water prices are high. i.e. if a resource is not perceived as scarce, it is unlikely to be used most efficiently.

### b 16,500 cubic metres of water

16,500 m<sup>3</sup> of water is the amount used per year by:

- one hectare irrigated for crop production
- 1,000 cattle
- 1,600 rural residents
- evaporation from 40 swimming pools without covers (Ashley *et al*, 1995).

So what is the most efficient use of 16,500 m<sup>3</sup> of water? It depends on

- (i) whether rural people's needs are met: if not, the value of meeting their needs must exceed other values. If they are already met:
- (ii) the value of output of 1 ha of crops compared to the value of output from 1,000 cattle.
- (iii) the value of *not* extracting the water. e.g. to maintain ecological functions.

The *inefficiency* (and high "opportunity cost") of evaporation from swimming pools is clear because that much water could be used for more valuable purposes.

### c National water use in industry

The same principle of comparing alternative outputs of water use applies at the national level.

Comparison of water used & value-added to the economy, for various industries, Namibia 1993

INDUSTRY	Water consumption per year million m <sup>3</sup>	Value added to national income N\$ millions	Value added per million m <sup>3</sup> of water used. N\$
Agriculture	150	560	4
Diamond mining	13.5	608	45
Hotels, restaurants	1	129	113
Meat processing	1.5	70	80
Fish processing	.7	316	451

*The table shows which industries are most "water-efficient" -- produce most output for each m<sup>3</sup> of water used (Lange, 1996). Of course, value added is only one component of the value of water. The full range of benefits and costs to health, subsistence, market output, foreign exchange, jobs and eco-system functions should be assessed in choosing the "optimal" use of water. Nor is water efficiency the only important criteria for economic planning -- availability of budgets, markets, skills ... shape the economy. But at least with information like this, water-efficiency can start to be taken into account in planning economic development.*

### Box 1: Efficient use of resources: water

### WHAT IS "EFFICIENT" USE OF SPRINGBOK?

If, for example, a community knows their springbok population can support a sustainable off-take of 10 animals per year (for simplicity, assume all 10 could be trophy animals), they may consider 3 alternative uses:

- live sale for N\$700 each
- trophy hunting, for a trophy fee of N\$1,200 each
- local hunting for meat distribution, 30 kg each

Assessing the most efficient use depends on:

(i) **comparison of alternative outputs**

Cash, meat, or -- if cash can be used to buy local goat meat -- cash plus purchased goat meat (assumed price of N\$5/kg).

**Comparing alternative outputs from use of 10 springbok**

Alternative Uses	Alternative Outputs				
	Cash	or	Springbok meat	or	Cash + goat meat
Live sale	\$7,000				\$5,500 & 300 kg
Trophy hunting	\$12,000				\$10,500 & 300 kg
Local meat			300kg		

(ii) **how users value the alternative outputs.**

*Cash vs meat:* If the users choose to use the springbok for local meat, it means the 300kg is worth sacrificing N\$12,000. (The *opportunity cost* of the meat is N\$1,200.) i.e. they value each kg at N\$40. If it's not worth this much to them, local meat is an inefficient use.

*Springbok vs goat:* If goat meat is available locally for N\$5 per kg, can it possibly be efficient to sacrifice ("pay") N\$40 per kg for springbok meat instead? Yes, but only if the extra benefit of eating springbok (for taste or culture) is worth an extra cost of N\$35 per kg. This is unlikely on a day-to-day basis, but the cultural importance of eating hunted meat may well exceed N\$35/kg for special events. If meat is needed but the advantages of springbok over goat are not worth an extra N\$35/kg, the most efficient use is to earn N\$12,000 in trophy fees, use N\$1,500 to buy 300 kg of goat, and keep N\$10,500 in cash.

(iii) **comparison of costs and constraints**

The costs of each option must be deducted (ie *net* benefit compared) and constraints taken into account. Eg. trophy hunting requires skills, accommodation, market links, legal rights to trophy fees. So the higher cash benefits may be outweighed by higher costs and difficulties.

*Implications:* the efficient use is the one that gives maximum benefit, taking into account the alternative outputs, their value to users, the potential to trade in the market, and the costs involved.

**BUT**

- an even better option can be to *combine* uses -- e.g. negotiate to keep the meat from trophy hunting in addition to trophy fees;
- other uses may be even more efficient -- eg non-consumptive tourism
- none of these uses are efficient in the longer term if they are not sustainable. Sustainability maintains the resource base for future benefits.

**EFFICIENCY = using a scarce resource in a way that gives output of maximum value.**

**Box 2: Efficient use of resources: springbok**

For example, in commercial areas of Namibia, farmers have been investing in wildlife over the last twenty years, because wildlife use-rights have enabled them to earn a profit and diversify risk through game utilisation. In communal areas, wildlife numbers have decreased, because the costs of wildlife are high (damage to crops and livestock) while the benefits were low because residents had few rights to use wildlife. Therefore, post-Independence, the MET identified the need to devolve wildlife use-right to communal area residents to provide incentives for conservation (Jones 1995, MET 1995a). Economic analysis has helped to analyse and demonstrate the need for resource tenure, while also identifying other conditions needed to improve conservation incentives, such as market access (Ashley and Barnes 1996, Ashley 1996).

Going well beyond wildlife, the most comprehensive work done in Namibia on economic influences on resource use was an analysis of policy factors affecting desertification and sustainable land use (NAPCOD, 1996). This covered water, land, agriculture, and forestry policy, as well as underlying influences such as growth, urbanisation and poverty. Incentives have also been assessed from a quite different perspective recently, looking at the impact of household micro-economics rather than of macro economics and policy. Household livelihood strategies in Caprivi were assessed to identify how they can affect people's adoption of, and benefit from, community based natural resource management (Ashley, 1997).

#### D. Creating Incentives

Incentives for sustainable use can be created by either *expanding* the benefits from resource use (through more efficient use) or *changing the distribution* of benefits and costs, so that they accrue to (are internalised by) the resource user. At local level, the Community Based Natural Resource Management (CBNRM) programme is devolving tenure to communities who form "conservancies"<sup>2</sup> so that they can earn profits from sustainable wildlife use (and hence from conservation). Tenure creates incentives by changing the distribution of profit entitlements. Simultaneously, communities receive training from NGOs and Government, including advice on profitable wildlife use from the economists, to increase benefits earned.

Ensuring that values of natural resources are internalised (taken into account in decisions) by government planners is more difficult, because the profit motive doesn't apply. Simply providing information on resource values is a necessary first step, but not sufficient to ensure it is used, given the sectoral mandates and concerns of different ministries. The Environmental Impact Assessment process is one way to ensure environmental values are considered in plans (MET, 1995). Natural Resource Accounts are a way of providing information on values and opportunity costs of resource use in a way that is likely to be taken into account in national planning decisions, because the compilation involves various ministries and the format mirrors national accounts (Lange, 1996).

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<sup>2</sup> A conservancy is an institution formed by residents of an area, which must have agreed boundaries, defined membership, a Conservancy Committee, and a wildlife management plan. MET will devolve conditional consumptive and non-consumptive wildlife use rights to conservancies. The first conservancies are currently in the process of registration.

## **E. Research Methods**

The methods used in research have been highly varied. There is a need to not only value resources but also gain a clear idea of the link between investment in natural resources and the values they yield. Therefore a cost-benefit approach has predominated, so as to compare investments and returns. Financial and economic cost-benefits models have been built of many different resource use enterprises (eg. Barnes, 1995). These models measure the contribution of the resource-using activity to net national income as well as the financial desirability for investors. They have also been adapted to measure local financial impact (gross earnings). The models form the basic building blocks for cost-benefit models which assess the value of policy options or larger more complex investments in conservation or resource use.

Other research makes use of comprehensive surveys and questionnaires (eg Barnes et al, 1996) which aim to quantify characteristics of demand and the value of resource use through contingent valuation and travel cost analysis. These provide complementary data to that provided by cost-benefit analysis (the assessment of values placed on Namibian resources by overseas visitors has not been aimed simply at valuation, but at assessing how Namibia can capture a greater share of values generated).

At the macro-economic level, input-output modelling is being used to link natural resource accounts with macro-economic information. This environmental economic model for Namibia will be used for policy analysis and planning (Lange, 1996).

The economists also make use of "rough and ready" guesstimates and comparable data from other countries, particularly if the aim is to demonstrate economic principles of resource management or highlight policy implications, rather than providing detailed cost-benefit information. In addition to the core team, specific pieces of research are often carried out by students and consultants.

## **F. Dissemination**

Dissemination is essential, as resource economic analysis is only useful if it is actually used. There are 4 main audiences for the resource economics work, and a variety of dissemination techniques:

### *i Communities, conservancies, enterprises.*

Economic advice and principles are shared through discussions in workshops and planning meetings, or more formally through training courses. An indirect but effective channel is through staff of the non-governmental organisations who work locally with community resource managers. There is limited use of written leaflets and materials, though this is increasing as the number of requests for assistance from the field increase.

### *ii Technical planners, mainly in other ministries*

The economists participate directly inter-ministerial projects, workshops, meetings, committees, such as the National Development Plan, the National Population Policy, and the Desertification Programme. Economic principles and findings are also promoted by colleagues in the DEA who participate in other inter-ministerial activities, such as land-use planning, CBNRM, and environmental impact assessment. In addition, written reports,

publicity, and inputs to training courses provided by the economists, help to reach other technicians.

It should be noted that if the real economic value of natural resources is to be taken into account in government decisions, providing piecemeal information is not enough. A *new approach to planning* is needed that ensures values of resources are internalised by other ministries. The DEA is continually promoting more integrated, cross-sectoral planning, that recognises the interdependence between economic activities, and between economic and environmental changes. Activities such as the Natural Resource Accounting project (described in more detail below) seek to facilitate such changes.

### iii *Politicians*

Resource economic issues are incorporated into Ministerial speeches, press coverage, glossy journals, leaflets, and donor consultations, all of which reach the politicians.

### iv *Conservation managers*

The main dissemination channel is through participation of the economists or DEA colleagues in Ministry activities and committees, such as tourism planning and park planning. Written reports, as well as the lighter DEA newsletter ("The Dreamer") are also circulated.

*It is important to note that the immediate users of economic analysis are generally the economists' own colleagues in the DEA (environmental planners). Within the DEA, economics is integrated with analysis and expertise of other disciplines, including ecology, sociology and law. Those colleagues, in turn, use the information in their meetings with other ministries, in the reports, speeches or policies they draft, in their own project planning ... and so disseminate it to others.*

Experience has also shown that *one-on-one discussion* is the most effective means of dissemination, whether in the tea-room or in project planning. However, compared to production of photocopied reports or presentations at large workshops, this is much more intensive and limited in scope. Therefore it is important to focus on priority audiences.

It is also clear that the most effective information-sharing happens when others *need* the information (rather than when economists want to raise awareness or make a point), whether it is a colleague needing arguments for a policy motivation or a community needing advice on their joint venture negotiation.

## G. Training

### *(i) Training non-economists to use resource economic principles.*

Activities that disseminate economics results, such as collaborative projects, workshop presentations and written reports, can often simultaneously increase non-economists understanding of how to use and apply economic principles. In addition, the resource economists have contributed modules to short training courses for professionals, such as for land-use planners, and natural resource managers. The ability of colleagues to apply economic results and apply the principles of efficiency, profitability and trade-offs, has increased enormously. Some of the work, such as enterprise advice, could be done by non-

economists in future. However, non-economists are unlikely to start doing economic valuation and analysis, given the technical detail needed for distinguishing economic from financial value, net from gross income, discount rates etc.

*(ii) Training economists to do resource economics.*

While trying to raise awareness of natural resource values among "conventional" professional economists (for example in National Planning Commission), the MET does not expect to convert them to resource economics. Efforts to "create" Namibian resource economists have focused at the under-graduate and graduate level through recruitment of recent UNAM economics graduates as "counter-parts" and trainees. These appointments build on a student internship programme, inclusion of resource economics in voluntary evening seminars on practical economic policy issues, and vacation research projects on wild resources, all offered to economics students at the University of Namibia (UNAM). While most training is "on-the-job," correspondence courses and short courses overseas are also used.

## **H. Examples of key activity areas**

The day-to-day work of the Resource Economics Programme does not divide neatly into the objectives listed above. Most activities address a number of objectives simultaneously, build on economic work, and use a range of the methodologies listed above. A few key topics of work include:

*i) Analysis and support of community uses of natural resources in communal areas.*

Initially, various natural resource uses, such a hunting camp, tourism lodge, and timber collection, were modelled to assess costs and benefits to the national economy, entrepreneur and local economy. The current and potential enterprises in 37 zones of communal land were assessed to create a database (Barnes 1995). These building blocks have led to a wide variety of more focused analyses, policy implications, and advisory activities, as illustrated in Figure 1. These can be summarised as:

- *assessing current and potential benefits*

The overall picture of the value of wildlife and wild resources in key communal areas was created by aggregating the results from 37 zones (Barnes, 1995). The difference between potential and current benefits highlighted the need to promote more efficient resource use. More detailed assessment identified key areas and activities of potential.

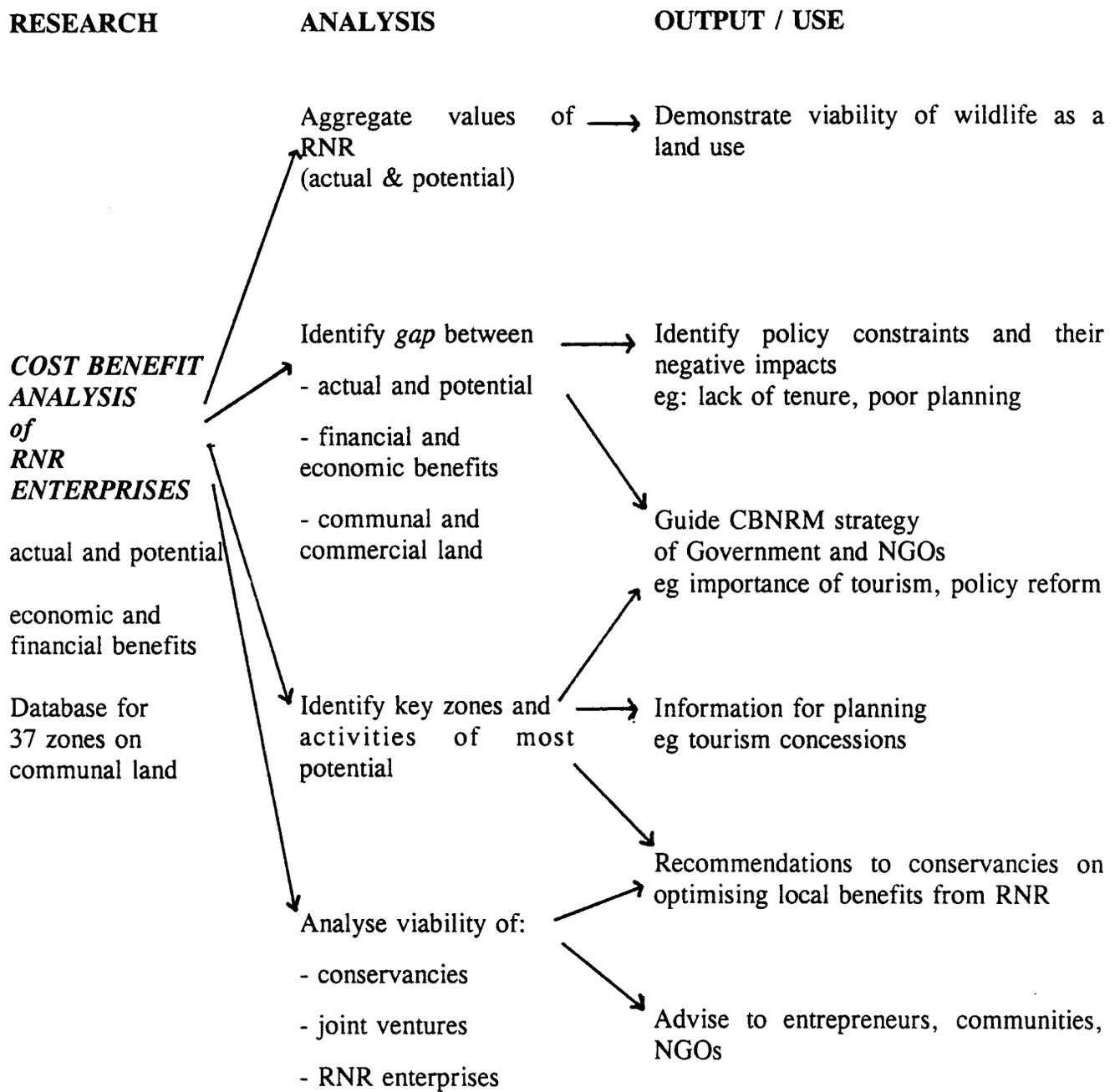
- *identifying economic and policy constraints*

The gap between estimated current and potential benefits, and between economic and financial benefits, highlighted policy constraints to efficient use of wildlife by residents (Ashley and Barnes, 1996). Further comparison of the costs and benefits residents face from using their land for agriculture (mainly livestock) or wildlife and tourism identified several policies that distort land use incentives (Ashley, 1996).

- *addressing constraints, creating incentives*

Economic analysis has been used to strengthen arguments for policy change, such as tenure reform. It is also used more directly to help communities earn greater benefits from their wild resources. The models are developed to provide viability analysis and advice to specific enterprises, some no bigger than a campsite, others more complex joint venture negotiations.

Figure 1: activities relating to economic assessment of wildlife uses



Although these activities focus on wildlife, other natural resources are also covered. The work on communal land has been complemented by economic analysis of wildlife uses in commercial land (Barnes and de Jager, 1995).

ii) *Natural Resource Accounting*

Natural Resource Accounts are being constructed for water, livestock, minerals and fish through collaboration with New York University's Institute for Economic Analysis. The project compiles detailed physical accounts of resources (stocks and flows), and integrates these with economic models (through input-output models), so that the impact of a given policy on natural resources can be shown (see Lange, 1996). The most important function of NRA is to develop better planning systems, and help get resource economic information internalised by other ministries. The accounts provide (for the first time) the essential data that enables sectoral ministries to take the values of natural resources, trade-offs with other sectors (and particularly the concept of *opportunity cost* of resource use) into account in their planning. In addition, the accounts demonstrate values of specific natural resources (eg. resource rents or costs of degradation) and their analysis raises specific policy implications (such as the need for opportunity cost pricing of water).

iii) *Economic aspects of desertification*

When Namibia's Programme to Combat Desertification was founded, a preliminary assessment of economic *costs* of desertification was done (Quan et al, 1994). This was a rough valuation, useful for raising awareness of the seriousness of the issue among non-environmentalists, demonstrating that it is an issue that affects commercial as well as communal land, and affects forest and arable productivity, not just rangeland. Once the Programme was underway and seeking to remedy the situation, a comprehensive analysis of the policy factors affecting desertification was done (NAPCOD, 1996). This identified how resource tenure, drought relief and other subsidies, lack of cross-sectoral planning, and distorted markets are affecting a range of resources including forest, water, land and wildlife. The same report recommended several policy reforms that are needed to create incentives for sustainable use. As the report is a product of the national desertification programme (NAPCOD), which is a joint initiative of the Ministry of Environment and Tourism and the Ministry of Agriculture (in conjunction with other ministries and NGOs), the recommendations carry weight and are now being pursued.

## I. Overall Focus

As the description above illustrates, economic work has mainly focused on *wildlife* and tourism, particularly on *communal* land, because the development of community-run wildlife conservancies has been a priority for the Ministry. However, resource use in protected areas and commercial land is also analysed, and the work is increasingly covering other land-based natural resources, eg subsistence use of trees and wild resources, sustainable management of water resources, rangeland use and broad aspects of desertification.

So far measurement has been of *direct use values* -- mainly production values of marketed or subsistence resources, as this is most immediately relevant to development needs and is most persuasive to non-conservators. There is currently so much potential to use wild

resources more efficiently (particularly on communal land), that the easiest way to make the case for investment in natural resources has been to demonstrate the potential *production* benefits. However, the indirect values of resources in maintaining ecological functions, and their non-use values, also needs to be addressed, particularly in relation to valuation of protected areas, and other resources such as water.

It is also worth noting that the programme has not only focused on values and figures, but on policy issues and resource economic principles.

## V. Impacts and Strengths of Resource Economics

Areas in which specific impacts can be seen from integrating resource economics work into environmental management include the following:

- economic analysis demonstrated the viability of wildlife-based tourism as a land use and of the communal area conservancies. eg: comparing the 1991 and 1995 land conferences, wildlife areas are no longer seen just as "unused" land. The communal conservancies are seen as promoting development and not only conservation.
- economic analysis of potential incomes from wildlife-based enterprises redirected the CBNRM programme from the Zimbabwe model focusing on safari hunting towards non-consumptive tourism, given the larger economic potential of the latter in Namibia.
- the assessment of policy causes of desertification stimulated an on-going debate, and added fuel to arguments for secure tenure, water pricing, reform of drought relief.
- estimates of economic returns from increased expenditure on conservation and tourism led to a budget increase for MET in real terms in 1995, following years of budget cuts in real terms.
- enterprise analysis has been used by communities to negotiate better contracts with private sector partners and develop enterprises.

Some other impacts are less tangible but just as significant. Perhaps most importantly, resource economics has *enabled the Ministry of Environment and Tourism to address sets of issues which ecologists would not normally address* (for example the role of policy, the contribution of parks and wildlife to national and local economic development). And economic results have *enabled the Ministry to switch from being defensive to being pro-active*. They give environmentalists tools and ammunition to compete in the political market place.

There are also less tangible but long-lasting impacts on the way other people work. There is greater awareness of the principles of assessing costs and benefits, comparing trade-offs, assessing distribution, and the concept of "opportunity cost," particularly among DEA colleagues. They also have greater awareness of how to use economists (what to ask them to do) and how to use the results. Other environmental programmes, both inside and outside the DEA, now incorporate economics, such as the Desertification Programme, the

Biodiversity Programme, and the Forestry Strategic Review. The economics work has helped develop new cross-sectoral links, such as with the Auditor General and National Planning Commission for the Natural Resource Accounting project.

### **Reasons for successes**

Before moving on to the weaknesses, some of the factors underlying this progress are worth identifying. Some of these highlight the strengths of resource economics as a discipline, others relate to how it has been applied in Namibia.

*The power of numbers* -- particularly numbers with dollar signs -- explains much of the impact of the Resource Economics programme. Money counts more than words such as "loss of productivity/diversity/habitat ..." Economics enables environmental issues to be discussed with other sectors in a "common currency" and gives MET colleagues information and confidence to argue more strongly. Another strength of economics is that it is fundamentally common sense made more formal. Although the jargon can be impenetrable to non-economists, the basic principles of weighing up costs and benefits to choose options have intuitive appeal. By adding assessments of costs and benefits, incentives and externalities, economics can add weight to common-sense arguments that, for example, cross-sectoral planning, EIAs, and tenure are needed.

The second set of reasons relates to the fact that the *DEA is a particularly appropriate institutional base* for developing resource economics. Although the discipline was completely new in 1993, DEA and NGO colleagues were already working in on-going programmes with a clear purpose, that could use resource economics easily. Through the demonstration effect, others began to see how to it could be used. It is a multi-disciplinary unit, and the economists have educated their colleagues in using resource economic analysis, while colleagues educated them in the conservation priorities and issues. The DEA has a mandate for cross-sectoral and policy work, and already had many links with other ministries and a network of "collaborators." This has been critical for making use of the policy findings of the economics programme. The greatest source of influence isn't written reports, but making points at planning meetings, workshops, commenting on other ministries drafts ... and this has been possible because DEA gets invited to all of these.

Within the economics team, it has proved important to have a critical mass of economists, and a good combination of skills in research, analysis, and dissemination. The Programme has made more rapid progress than the 2-3 core staff could do alone, by using consultants to do time-consuming or specialised research (although this requires core-staff time for coordination if consultancies are to be effective). Planning within the Programme has been flexible: priority needs became more evident once economists got involved and once others saw what could be done. Requests for inputs at short notice can often be met by drawing key findings from previous research, or through "quick and dirty" estimates.

The final reason underlying some successes of the Programme is that the results so far have generally been highlighting potential overlaps between development and conservation, rather than finding conflicts. Analysis is therefore more likely to be welcomed than rejected. Particularly in the case of wildlife on communal land, current use is so inefficient, that economic analysis of optimal use shows benefits to virtually all stake-holders, including the current owner, government. In other cases, such as water, resource economics highlights

some of the costs (negative externalities) of over-use that are usually ignored, and so optimal use implies restrictions. But even in this case, the findings support a general move in the direction of water pricing and demand management that is already underway.

## VI. Gaps and weaknesses

However, weaknesses and the reasons behind them, also need to be explored. There is much that *has not* yet been achieved, in terms of both the coverage of the resource economics analysis, and its impact:

### 1. *Gaps: particularly value of ecological functions, and protected areas.*

The principle that ecological functions have value has been promoted, but quantification is missing (except preliminary estimates of the costs of desertification, which calculated production losses from direct resource use, but arising from disruption of ecological functions (Quan *et al.*, 1994, Richardson, 1996). Given the critical importance of, for example, oshanas, ephemeral rivers<sup>3</sup> and wetlands in maintaining eco-systems and production systems, these benefits need to be valued, incorporated into EIAs and taken into account in decision-making. Analysis of the values and optimal use of protected areas is also urgently needed, both to make the case for parks, and to help Namibia make better use of these national assets.

Other needs that are not yet being addressed include a comparison of the values of wildlife/tourism with existing and alternative land uses, optimal uses of tree and wild plant resources, estimation of tourism leakages and multiplier, and a green audit of the National Development Plan.

There are two different reasons for these gaps. Firstly, there are simply not enough staff to do time-consuming work. Results of economic analysis can be summarised and simplified, but often rest on long and complex research. Secondly, valuation of ecological functions is more complex for economists (methodologies are still evolving, particularly for developing countries) and it must be based on good ecological information, which is often lacking.

### 2 *Training: limited development of Namibian capacity*

Two Namibian economists (counterparts) joined the team in 1996 but one left. An additional three trainees have now joined. Having just completed their Bachelor degrees, they are starting from the very beginning in resource economics. The problem is that there are no existing economists who have received training in environmental economics, because it is a new discipline that is only beginning to appear in academic courses. Therefore the DEA has to take on training responsibility. It can also be difficult to find the right people: effective resource economists need to have both a genuine interest in environmental issues and a sufficiently firm grasp of economic principles to adapt them from classical economics to resource economics, so are quite unusual individuals. Good economists, particularly with

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<sup>3</sup> Oshanas are shallow channels of mild gradients found in the centre of the northern part of Namibian (former Owamboland). They fill with water in the rainy season (due to local and Angolan rain). Several ephemeral rivers cross western Namibia, from the central highlands out to the Atlantic Ocean. They usually only flow for a few days of a year, depending on rainfall, but nevertheless are linear oases, year round.

some work experience, are in high demand, and have a range of options, particularly in the private sector. Many are likely to see environmental work as a low-status/pay option. Given these various constraints, it has yet been possible to attract a sufficient number of staff, and train to them to the necessary level, to meet the many resource economic needs in Namibia without also using overseas technical assistance.

### 3 *Little influence on protected area managers*

Little economics work has been done on protected areas in comparison to the work done on communal areas and national policy issues. What has been done has been less used than other work.

Various different reasons can be identified. The first is purely practical: protected areas have simply been a lower priority for economic analysis, because the most urgent opportunities and threats have been elsewhere. The second highlights some problems of applying resource economics in practice. There is a natural suspicion that economists are about making a profit *at the expense* of conservation (because economists outside MET often are). Environmental management for optimal use is a big change from the past days of protection. Economics based on "what-if" is seen too hypothetical compared to the day-to-day management of resources and crises that is necessary. The need or opportunity for economic input is less, because there is no planning context within which economic principles can be integrated (though the current development of Park Management Plans will change that). Dissemination of results is also more difficult, because there is little day to day contact between the economists and protected area managers (who are in a different building or in the regions). There has not been an "in" person to act as an entry point for sharing ideas.

The final reason is that protected areas pose more of a challenge to the economists. Estimating the benefits of protected areas to assess or prove that they exceed opportunity costs is a long and complex task. There are few benefits in direct revenues (gate fees). Most are indirect economic (multiplier effect in the tourism industry), indirect ecological functions, or non-use values (option and existence value). Therefore complex economic analysis has to be done thoroughly and completed, before it can be useful.

### 4 *Limited impact on other Ministry programmes and policies*

Other ministries still focus on sectoral objectives not broad environmental values. Water use, land policy, national development plans are not making optimal, sustainable use of natural resources. Analysis by the Resource Economics Programme has limited impact, not surprisingly, because there is less direct contact between the resource economists and other ministries -- it is simply impossible to feed into every decision concerning sustainable resource use -- and because there isn't an institutional framework for coordinated planning to make trade-offs between resource uses. Another constraint is that economic implications are politically less-palatable when sustainable/optimal use requires *restricting* current resource use -- for example, reducing water use, introducing grazing fees.

### 5 *Weaknesses in dissemination*

There is now more information available than can be effectively disseminated. Analysis that would be useful to communities or planners is sitting in computers, heads, or consultants'

reports. The main constraint is time: the economists are trying to do both the analysis and the dissemination, whereas other "communicators" probably need to be involved. Written reports are not ideal, but personal contact and oral explanation take time. Consultants add to the body of useful knowledge, but generally do research not dissemination, so core staff time is need for incorporating their findings into other outputs.

#### 6 *Misinterpretation of results: risk of leading to profit without conservation*

Dollar values are eye-catching and often remembered. But the fact that economic values are only a *means*, or incentive, to conservation (at least in MET's perspective), can get forgotten, as can other less concise issues, such as equity, or long-term trends. For example, in conservancies, increased profits from wildlife only lead to improved resource management if they are widely distributed and perceived as derived from wildlife, and if resource management institutions with rights, responsibilities, and skills exist. There is a risk of over-emphasis on profits to the neglect of these other issues.

## VII. Conclusions

### A. What is Resource Economics?

The Namibian experience makes it clear that resource economics is not about accounting, or just maximising profit at the expense of all else, but is about making good use of natural resources: using resources more efficiently, sustainably and equitably, taking into account the many different ways in which resources contribute to human welfare, such as through cash, subsistence production, ecological health, cultural significance, etc. It is also apparent that resource economics is a *tool* -- not an end in itself but a means to improved natural resource management. People use common sense every day to decide how to use their scarce resources, whether it is dollars in their pocket, hours in the day, land around the homestead, or water carried home in heavy buckets. Resource economics is a tool for applying the same principles (assessing costs, benefits and trade-offs) to resource management on a larger scale.

### B. How can Resource Economics be Useful to Resource Managers?

A "tool for improved resource management" is vague. A weather forecast enjoys the same description. More specifically, resource economics assists managers to put into practice some basic principles: that natural resources have value, even if not priced or sold; that natural resources should be used sustainably to provide both development and conservation; that people use resources according to a rational assessment of costs and benefits, and that these costs and benefits can be influenced.

There is no single method for resource economics. The appropriate approach depends on skills, and resources, and whether results are needed for broad awareness-raising of value or detailed resource-use decisions. But given the range of tools and principles within the discipline, economics is generally good at addressing questions such as:

what is the value of resources?

who gains and who loses from a resource use?

how can benefits gained from a resource be increased?

how can incentives (the distribution and scale of costs and benefits) be changed to encourage sustainable use?

Therefore for natural resource management, resource economics is therefore particularly useful for

- i) *putting environmental concerns in monetary terms* to increase awareness of environmental value and hence the importance of sustainable use.
- ii) *using natural resources to promote development* by identifying more efficient resource uses and addressing equity issues.
- iii) *addressing underlying causes (policies, prices) of environmental degradation*, such as policies and prices, and hence improving incentives for sustainable use.
- iv) *finding and expanding the development-conservation overlap* by assessing the economic benefits of conservation and sustainable use.

However, the *weaknesses and limitations* of resource economics must be recognised:

- i) it is difficult to incorporate non-cash values, such as equity, aesthetics, diversity, cultural integrity, in economic estimates. If non-cash values are ignored, analysis is incomplete. If those values are estimated, it is likely to involve slow, complex research and/or rest on tenuous assumptions. Reliable valuation of ecological functions depends on good ecological information, which may not be available.
- ii) dollar concerns can become *too dominant*. Other issues, such as sustainability, distribution, or trends, are less attention-grabbing and memorable.
- iii) analysis and results are only useful if necessary institution, skills, and links exist to integrate it into decisions.
- iv) resource economics is easy and useful when there is potential to promote both conservation & development, but when the two conflict, what can it do apart from highlight the trade-off?

### **C. Making Good Use of Resource Economics**

In the Namibian experience, five issues have emerged as critical in making good use of resource economics.

#### **1. Content**

The focus of work must coincide with resource managers' priorities, and therefore must adapt to changing circumstances. However, at first, it was difficult for resource managers to identify how resource economics could be useful to them. Therefore it takes time for resource economists to interact with managers, start demonstrating economic approaches, and for others to identifying priority economic inputs.

#### **2. Acceptance**

It is not only that resource managers might not know what resource economics can do, but they may well be suspicious of its approach. There is no easy solution to changing attitudes

and disciplines, but it makes it important that resource economists emphasise values other than just profit, and provide material that is useful to resource managers.

### 3. *Balance of Objectives*

Resource economics can be useful in two different ways: broad demonstration of values of resources is good for "making the case" -- raising awareness of environmental value and highlighting policy principles. For this, rough and ready estimates are sufficient, but effort in dissemination is required. Alternatively, specific and more detailed economic assessment is useful for key resource managers in planning decisions to optimise values. This requires more detailed assessment of costs and benefits and trade-offs. This target audience is small and probably already interested in the information. These two approaches are both important, but finding the time and skills to do both can be difficult.

### 4. *Institutional home*

There is no single factor that defines the appropriate institutional home. In Namibia, the DEA has proved appropriate for several reasons. It already has links with other sectors and has a mandate for cross-sectoral work. It had ongoing programmes with an identified need for resource economics. And it combines disciplines and is staffed by people open to new ideas so was able to integrate resource economics into ecology and other aspects of resource management. While it is important to work with various directorates and sectors, it has proved invaluable to have a critical mass of economists in one institution because of the combination of skills and stimulation of ideas that is possible.

### 5. *Dissemination*

Effective dissemination has proved essential for making economic analysis useful. It is a challenge to identify the priority audience, because not all audiences can be reached sufficiently. It has been important to use a combination of three dissemination methods: personal contact, dissemination through DEA colleagues, and written reports.

### 6. *Skills*

If resource economics is to be sustainable, it is essential to develop Namibian capacity to do and to use it. But so far it has been easier to develop skills of non-economists to use resource economics (particularly amongst colleagues in the DEA), than to attract and train young Namibian resource economists. A successful capacity building approach needs to take many issues into account -- the need to find economists with an environmental interest and capacity to adapt economic principles, the relative status of resource economics compared to other economic opportunities, and the need for long term, formal, and on-the-job training, but taking into account the time and skills needed for providing training.

These have proved to be key issues in making good use of resource economics in Namibia so far. However, the resource economics programme is still young, and there is a great deal which needs to be done. So there is no doubt that the content of the work, and the way in which it is used, will continue to evolve over time.

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