Economic Values and the Natural World

Values and the Natural World

The MIT Press
Cambridge, Massachusetts

First MIT Press edition, 1993

This edition was published by arrangement with Earthscan Publications Limited, 120 Pentonville Road, London N1 9JN, England.

Printed and bound in Great Britain.

ISBN 0-262-16138-9 (hc)

ISBN 0-262-66084-9 (pbk)

Library of Congress Catalog Card Number 93-77257

Preface

This brief volume carries forward the analysis and arguments that my colleagues and I presented in *Blueprint for a Green Economy*, *Blueprint 2*, *Valuing the Environment*, and, soon, *Blueprint 3*. Its subject is exclusively the way in which economists seek to 'measure preferences' for improvements in environmental quality and natural assets, or against their deterioration. 'Measuring preferences' is a clumsy phrase, but at least it tells us what economic valuation is. Phrases such as 'valuing the environment' (which I am as guilty of using as the next person) are really very misleading. Economists do not 'value the environment'. They observe that individuals have preferences for improvements in the environment and that those preferences are held with varying degrees of intensity. For over a hundred years there has been a highly developed science within economics for measuring this intensity of preference. Its practice is known as cost-benefit analysis (or, more logically in the USA as benefit-cost analysis, the hyphen also serving as a 'minus' sign). Perhaps because of the confusing terminology, many non-economists get rather upset at this idea of 'valuing' environmental assets in monetary terms. I hope this little book will help persuade them that nothing evil is afoot.

The departures in this volume include a more detailed explanation of why economists engage in preference measurement in the environmental context, how they do it, and how the results might be used. One of the ironies of the criticism of this approach is that the critics seem to have nothing to offer in its place, unless it is the random benevolence of political in-fighting or descriptive and generally unimaginative procedures such as 'environmental impact assessment'. Nor, to be blunt, have the world's environments fared very well under environmental policies which are almost entirely dominated by non-economic considerations of worth and value. Some ecologists espouse an 'energy theory of value' in which, instead of money, units of energy are used. But the problems of monetary valuation of preferences are as nothing compared to the misleading nature of energy theories of value, even though the idea of the fundamental nature of energetics in ecological systems is unchallengeable.

I have also tried to show the relevance of economic values to 'sustainable development' which most people regard as a 'good thing' even if they are not sure what it means or how to achieve it. Defining sustainable development does not seem to me to be very problematic. How to achieve it is far more interesting.

Once the idea of measuring preferences for environmental improvement is accepted, the next issue is how to do it. Rather than taking time out to show how economists elicit monetary values I have confined the technique to Appendix II. Even then, the discussion is brief because there are several good texts now on the procedures for monetary valuation (see the bibliography).

Appendix I is reserved for a survey of another issue that causes politicians and industrialists especially apparent concern: the role which environmental policy might have in slowing the rate of economic growth as conventionally measured (in terms of 'Gross National Product' - GNP). It is unquestionably true that environmental measures *can* impair economic growth. But there are several responses to that observation. First, nine times out of ten, it need not damage economic growth. So much depends on how the environmental policy is formulated. Using pollution taxes rather than 'command and control' techniques (such as technology-based standard setting) at least has the virtue of minimising the cost of the legislation, as a good deal of economics has now demonstrated. But pollution taxes also raise revenues, even though that is not their primary purpose. Those revenues can be 'recycled' back into the economy, displacing taxes on effort and enterprise such as income taxes and corporation taxes. The effect can be to enhance economic activity, not depress it. The truth is that scare stories about the costs of environmental policy are frequently a disguise for the fear of upsetting some special interest group. Governments that protest the effect of environmental policy on the level of employment are generally guilty of an appalling hypocrisy: after all, most of them have shown scant regard for the unemployed in their macroeconomic policies. Blaming environmental policy for its effects on employment, even if there was an effect, is hypocritical. Appendix I shows that, by and large, we cannot find much evidence to support the idea that environmental policy to date has had a negative impact of any significance on economic growth and employment.

Finally, I hope the case studies are useful in illustrating how economic valuation works and the kinds of results that have been obtained.

As always, I am grateful to Sue Pearce for her wisdom and patience in tolerating the time I spend glued to the computer screen and the histrionics when I (frequently) lose my source material; Daniel Pearce for embodying all the artistic values I never had; Corin Pearce for showing me how computers work; and Bluebody and Dillbody for being such objects of affection, even if fax receivers worldwide must be tired of receiving blank faxes sent by a Blue Burmese cat with a fascination for touch dialling. Special thanks are also due to Emily Fripp of CSERGE for the final editing.

DWP
London and Bedford, August 1992

Acknowledgements

An earlier version of this book was prepared as a background paper for the World Bank's *World Development Report 1992: Development and the Natural World*, World Bank, Washington DC. I am indebted to Andrew Steer, Dennis Anderson and the staff of WDR92 for very helpful comments on the previous drafts and to the World Bank for permission to use much of the material in that report. My debt to those whose work I have quoted and summarised will be obvious. The interpretation I have placed on those works is, however, my responsibility alone.

Contents

List of illustrations

FIGURES

TABLES

BOXES

Chapter 1

The context of economic valuation

SCARCITY AND CHOICE

If the Earth's resources were available in infinite quantities, and if they could be deployed at zero cost, there would be no economic problem. Everyone could have everything they wanted without compromising each other's or later generations' wants and needs. It would not be necessary to *choose*. Choice becomes a necessity once it is recognised that resources are finite in terms of their absolute quantity, or in terms of the costs of extracting or using those resources. For example, oceans have a finite capacity to assimilate waste before the process of eutrophication sets in. Going beyond that capacity means that the further benefits of disposing of waste to the ocean have to be weighed against the costs associated with eutrophication – eg the loss of fish stocks. This kind of resource constraint is an instance of 'Malthusian' scarcity, after the Reverend Thomas Malthus. The limit can be exceeded, but only at a cost. The other main form of scarcity is 'Ricardian' scarcity – after David Ricardo. Absolute limits are not breached, but the cost of harvesting, extracting and using a resource rises. The global atmosphere might be an instance of a scarce resource in the Ricardian sense. As its capacity to receive and accommodate gaseous wastes from fossil fuel combustion, land conversion and chlorofluorocarbons (CFCs) is exceeded, so the surface temperature of the Earth may warm up with deleterious effects to human well-being. The 'price' of using the atmosphere as a waste sink is effectively rising through time as greater and greater demands are put on it.

Economist Kenneth Boulding characterised the contrasting views of the environment as a limitless resource with the modern view of its essential finitude as the difference between the 'cowboy' and 'spaceship' view of the Earth (see box). In the cowboy's vision there is always a frontier beyond which there is more space and more resources, all to

COWBOY AND SPACESHIP ECONOMIES

Economist Kenneth Boulding coined the phrases 'cowboy economy' and 'spaceship economy' to characterise the transition in human perception of the natural environment in the twentieth century. The cowboy symbolises man's view of the natural environment as a new domain, a frontier, to be conquered and civilised. The cowboy economy is an open system which is maintained by resource and energy inputs which then become wastes, or outputs of the system. This contrasts starkly with the economy as a closed system, in which inputs are, as far as possible, transformed into outputs which are then returned to the system through recycling and reuse. As mankind perceives the 'limits' of economic activity in terms of the effects on the environment, so economic activity should be reorganised to increase recycling and reuse of materials, and to substitute unlimited energy flows based on solar energy for the embodied solar energy of fossil fuels.

Boulding's vision has done much to influence the nature of environmental thinking. In its most provoking sense it can be taken to imply that the 'throughput' of the economy is not something to be maximised, but something to be minimised. What matters is not throughput (the economic analogue of which is GNP) but the *stock* of wealth, including the stock of knowledge and human well-being and the stock of environmental assets. The idea that it is this stock that needs to be maintained and expanded underlies a good part of the modern thinking about 'sustainable development'. The idea of concentrating on stocks rather than flows may, however, be justified for a rather different reason. It is not necessary to accept the view that stocks rather than flows determine well-being. The stock of wealth determines the *capability* to generate real income. If real income is what creates most human well-being – and in the poorer world it is difficult to see it otherwise – then increasing the capability to secure real income involves increasing the stock of wealth. This is consistent with the World Commission on Environment and Development's view of sustainable development.

Source: Boulding, K (1966) 'The Economics of the Coming Spaceship Earth', in H Jarrett (ed) *Environmental Quality in a Growing Economy* Johns Hopkins University Press, Baltimore

be conquered. In the spaceship view there is only a large but closed ecosystem fed by solar energy but with finite capacities to absorb the waste from the human economy. Environmental scarcity is therefore an ecological fact of life. Whether that scarcity means there are currently 'too many' people, or 'too much' economic output is, however, a

separate issue. Finitude does not itself *necessarily* mean limiting numbers or activity if (a) our obligations to the future are not themselves of infinite duration, and (b) we can expand the benefits of 'growth' without deteriorating the environmental assets upon which we all ultimately depend. Humankind does know how to grow economically without degrading environments. The fact that it has managed to do that with only trivial success arises, in large part, from the fact that there is no level playing field between environment and economic development. Until the economic value of environmental quality is an everyday feature of the way we compute progress and, more importantly, the way we make economic decisions, then this imbalance will not be corrected and the environment will not be given a fair chance. That is why economic valuation is important.

As to population growth, it is very much harder to defend the view that we can afford to continue current rates of population change. In large part this has to be because either there is no real net benefit to families from large family size, or because population growth imposes other costs on the rest of society, not least through the degradation of environmental assets. Thus, while a finite planet will permit economic growth with environmental quality (if we are imaginative enough), it will not permit rapid population growth with environmental quality.

Given that resources are scarce in relation to human demands upon them, choices or 'trade-offs' have to be made. In the market place the individual has fairly clear information on which to base any choice. The product tends to be visible, its characteristics are generally well-known, and it has a market price. The individual's choice is then based on a weighing up of the quantity, quality and price on offer, subject to some uncertainty arising from incomplete information. But when *environmental* assets and services are involved there is often very limited information about the nature of the product in question, and, invariably, there is no price posted in the market place. Pursuing the global warming example, there is extensive uncertainty surrounding the likely impacts of global warming. Hence there is limited information about the nature of the environmental benefit from controlling global warming – the 'product' or 'good' in this case is the damage avoided by undertaking control measures. Moreover, the global atmosphere is not bought or sold in the market place. Its 'price' is not perceived. An additional complication is that many environmental goods do not act like goods in the market place: they are 'public' rather than 'private' goods. Public goods generally have the characteristics of

joint consumption and non-exclusion. What this means is that when the good is consumed by one person it does not diminish the amount consumed by another person. A's consumption of clean air does not diminish B's consumption. Non-exclusion means that A could not prevent ('exclude') B from consuming the resource. This 'publicness' is one of the reasons why markets often do not develop naturally in environmental goods and services. Given that trade-offs have to be made, it is fundamentally important to know what is being traded-off against what. And we cannot know that unless we have some idea of the economic value of environmental assets.

CHOICE AND VALUE

Making choices in the context of environmental quality, therefore, is more complex than making choices in the context of purely private goods and services. What has to be compared is one priced good (the private good) and one unpriced one (the public good) – as when deciding to invest in air pollution control rather than new economic output capacity. Alternatively, the comparison may be between two or more unpriced public goods – air quality versus water quality, for example. To make comparisons involving unpriced goods, it is necessary to *impute a value* to the environmental good or service. The discipline of *environmental economics* has developed techniques whereby such values can be imputed (see Appendix II). In the market place individuals exercise choice by comparing their *willingness to pay* with the price of the product. They purchase the good when their willingness to pay equals or exceeds the price, and not otherwise. Imputing values involves finding some measure of willingness to pay for environmental quality. This is the essence of the process of economic valuation: it involves finding a willingness to pay measure in circumstances where markets fail to reveal that information.

This 'market failure' is important for the allocation of resources within an economy. If the production of specific crops involves using agricultural technologies which give rise to soil erosion, then the damage done by the soil erosion may well not be reflected in the choice of crop or technology. This may be so even where the costs are borne by the farmer growing the crops: future damage to crop productivity through soil erosion may be imperfectly reflected in choices made now. Market failure is more pronounced still when the costs are borne by agents other than the farmer – perhaps in siltation of rivers, ports and

reservoirs for example. Failure to account for these *external costs* gives rise to a misallocation of resources in the economy, in this case through the choice of the wrong agricultural technology. Making choices better informed to avoid this misallocation of resources involves understanding the *value* of the external costs, and then finding a mechanism for integrating those values back into the original decision to choose a technology. Valuation may be imperfect but, invariably, some valuation is better than none.

PROJECTS, PROGRAMMES, POLICIES

The purpose of economic valuation is to reveal the true costs of using up scarce environmental resources. Choosing 'instruments' is the mechanism whereby the resulting values are reflected in decision-making. If the disposal of sewage to inland waters gives rise to loss of well-being then the value of that loss should be reflected in the private costs of disposing of the sewage. This might be achieved by taxing the sewage discharger, by setting some environmental standard for the effluent or the receiving waters, or by requiring the discharger to buy permits for the effluent. In general, the choice of instrument - tax, standard or permit - will not be affected by the value of the damage done, although the size of the tax, the allowable pollution with the permit or the standard will. The virtues of economic instruments - taxes, permits and other incentive systems based on altering market signals - remain even if valuation is not carried out. But valuation is essential if the *scale* of the tax or strength of the regulation is to be determined. In practice, valuation is the exception and not the rule, contrary to what some environmentalists seem to think.

Environmental standards are often set by criteria that incorporate some features of the valuation process. Health criteria, for example, determine many environmental standards in the developed world. Damage to human health would be an integral part of any valuation process - people will be willing to pay to avoid health risks from pollution and waste. But as there are often many other forms of damage besides health effects, using health criteria alone could impose its own distortions on resource allocation. A good deal of environmental policy is based on some idea of 'best available technology' whereby a regulator encourages the polluter to use the cleanest technology available, usually contingent upon some qualification about 'excessive cost'. In many other cases, environmental standards are set without any clear or

detailed rationale. Many regulations, for example, are the outcome of responses to environmental scare stories and misinformed perceptions of hazard and risk. In such circumstances, economic valuation is helpful as a check on the criteria implicitly being used.

Valuation is relevant at all levels of public choice.

- In *project appraisal* the environmental impacts of any investment need to be estimated and compared to the other costs and benefits.
- In *programme appraisal* the value of environmental impacts similarly need to be integrated into the evaluation process;
- In *policy appraisal* environmental factors need to be treated on an equal footing with other costs and benefits so that sectoral priorities are not distorted. This is as important in choosing between marginal expenditures on, say, transport as against energy, as it is in choosing between conservation and development projects. Similarly, as discussed above, the setting of environmental standards should be informed by valuation analysis. In short, environmental valuation should be an integral part of:
  - — sectoral priorities;
  - — the balance between conservation and development; and
  - — the choice of environmental standards.

WHOSE VALUES COUNT?

Economic values reflect individuals' willingness to pay either for benefits or to avoid costs. Typically, the values that count belong to those actually exercising the choice: the current generation. But it is a particular feature of environmental costs and benefits that they often accrue to people in generations yet to come. How are their values to be counted? This is the issue of *intergenerational incidence* of costs and benefits. Counting only the current generation's preferences biases the choice against future generations unless there is some built-in mechanism to ensure that current generations choose on behalf of future generations and take their interests into account. This potential bias arises because future generations are not present to have their votes counted. Whether they are present or not, future gains and losses tend to be played down in economic decision making because of the practice of *discounting the future* (see following box, and Chapter 3). Discounting is the procedure whereby gains and losses to society are valued less the more distant they are in the future, a procedure designed to reflect the

COUNTING ON FUTURE VALUES

Following the approach of the World Commission on Environment and Development (*Our Common Future*), sustainable development implies some general rule about not impairing the capability of future generations to achieve the same level of well-being as the current generation. But this is in fact a particular ethical rule for treating future generations. There are others. Choosing between rules is far from straightforward. Yet which rule is chosen will have potentially major resource allocation implications. Philosophers and economists have analysed the issues in detail. In broadest outline the alternative views might be summarised as follows.

Teleology

Teleology involves weighing up goods and bads and aims to *maximise* what is good. Goods and bads are broadly construed. Equality might be good, so that maximising equality would be a teleological approach. Maximising the economist's notion of 'utility' (preference satisfaction) would be a particular form of teleology – *utilitarianism*. The essence of teleology is that it permits a balancing of goods and bads or of one good against another – equality against utility, for example. The benefit-cost approach is teleological, being a form of utilitarianism based on preference satisfaction as a 'good thing'.

On the teleological approach it would be consistent to adopt a policy that made future generations *worse off* compared to present generations if the gains to the present are deemed to be greater than the costs to the future. Teleology is not therefore consistent with the broad definition of sustainable development entertained by the Brundtland Commission.

Theories of justice

There are several theories of justice. Some have been applied to the issue of how to account for the intergenerational distribution of goods and bads.

Contractualism

Contractualists argue that people will come together to determine rules of social behaviour because it is to their mutual advantage to do so. Laws and their implementation exist for this reason. This doctrine of mutual advantage will arise only in social contexts where the parties to the 'contract' are of roughly equal power. Otherwise the powerful would not secure any advantage from an agreement and they would not allow one to emerge. But future generations not yet born have no power at all, so the requirement of roughly equal power is not met. On the contractarian approach, then, there appears to be no basis for a theory of intergenerational justice. Even if there