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Working Paper No. 7

Environmental and Resource Economics: Its Role in Planning Sustainable Development

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Environmental and Resource Economics: Its Role in Planning Sustainable Development[1]

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Clem Tisdell[2]

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[2] School of Economics, The University of Queensland, St. Lucia Campus, Brisbane QLD 4072, Australia
Email: c.tisdell@economics.uq.edu.au

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Rural nature reserves can have negative as well as positive spillovers to the local region and policies need to be implemented to maximise the net economic benefits obtained locally. Thus an 'open' approach to the management and development of nature conservation (biodiversity) programmes is needed. The purpose of this study is to concentrate on these economic interconnections for Xishuangbanna National Nature Reserve and their implications for its management, and for rural economic development in the Xishuangbanna Dai Prefecture but with some comparative analysis for other parts of Yunnan

The Project will involve the following:

1. A relevant review relating to China and developing countries generally.
2. Cost-benefit evaluation of protection of the Reserve and/or assessment by other social evaluation techniques.
3. An examination of the growth and characteristics of tourism in and nearby the Reserve and economic opportunities generated by this will be examined.
4. The economics of pest control involving the Reserve will be considered. This involves the problem of pests straying from and into the Reserve, e.g., elephants.
5. The possibilities for limited commercial or subsistence use of the Reserve will be researched.
6. Financing the management of the Reserve will be examined. This will involve considering current sources of finance and patterns of outlays, by management of the Reserve, economic methods for increasing income from the Reserve and financial problems and issues such as degree of dependence on central funding.
7. Pressure to use the resources of the Reserve comes from nearby populations, and from villagers settled in the Reserve. Ways of coping with this problem will be considered.
8. The political economy of decision-making affecting the Reserve will be outlined.

Commissioned Organization: University of Queensland

Collaborator: Southwest Forestry College, Kunming, Yunnan, China

For more information write to Professor Clem Tisdell, School of Economics, University of Queensland, St. Lucia Campus, Brisbane 4072, Australia or email c.tisdell@economics.uq.edu.au or in China to Associate Professor Zhu Xiang, World Bank Loan Project Management Centre, Ministry of Forestry, Hepingli, Beijing 100714, People's Republic of China.

Environmental and Resource Economics: Its Role in Planning Sustainable Development

ABSTRACT

Background is provided on the nature of environmental and resource economics and its origins. The main current view of environmental/resource economists about the concept of sustainable development is outlined and the implications of this view for decision-making about optimal resource-use, conservation and development are discussed. On the whole economic ·definitions of sustainable development tend to be more restricted, precise and operational than non-economic ones. However, there is room for disagreement about the values which underlie these definitions.

1. Introduction

With rising public concern about environmental degradation and natural resource depletion, environmental economics and natural resource economics have attained increased prominence in economics and in policy formulation and planning. This is reflected at university level by the widespread introduction of courses in these areas and in government by the rise of new institutions for policy-formulation such as the Australian Resources Commission which partly draws on the theory of environmental and resource economics (ERE) in its decision-making. Existing public policy institutions such as the Industries Commission have also been required to pay increasing attention to ERE. Furthermore, ERE has become important at the international and global level. It is increasingly recognised that many environmental and natural resource problems have international ramifications and that several have global impacts. Therefore, the planning of sustainable development is not only a matter for individual nations but also one that has to be addressed by the international community. Aid giving bodies such as AIDAB are giving greater attention to ERE in providing support for developing countries.

Given the likely impact of ERE in policy formulation and widespread community interest in planning for sustainable development, it is important to have an adequate

appreciation of ERE and particularly the philosophies which underlie it. Furthermore, economic concepts of sustainable development ·and their implications for planning need to be considered.

2. The Nature and Evolution of Environmental and Resource Economics

By the end of the eighteenth century, economists had recognised three factors of production (land, labour ·and capital) as important determinants of the level of production and the wealth of .nations. By the end of the nineteenth century, an additional productive element, entrepreneurship was also recognised. In economics, land refers to all gifts of God or nature not just soil or ·spatial area. In effect, it covers all natural resources - soil, minerals, fish in the ocean, natural forests, water and so on. Hence, the whole of the natural environment can be considered to fall within the subject area covered by land economics or as it now more commonly called natural resource economics.

Environmental economics is also concerned with the natural environment but not exclusively so. For example, man-made and cultural or social environments may ·also be a part of the subject matter of environmental economics. Economic discussions of the relationship between humans and their surroundings seem to be the main focus of environmental economics. It was not until early in this century that the possible economic importance of such relationships, particularly those involving externalities or environmental spillovers became to be recognised. Pigou (1932) was the first economist to give prominence to· such effects, although many economists continued to regard such effects as being of trivial importance. However, many of the examples given by Pigou did not relate to natural resources, for example, the case of sparks from coal-fired trains increasing the risk of fires on properties near the rail line. Today much more emphasis is placed on the importance of externalities and several important externalities have been recognised in relation to natural resources. These externalities arise from both the use of such resources to produce material goods and from their use as sinks and receptors for waste from industry. For example, the use of water in one place say for irrigation may affect its availability and quality elsewhere and give rise to an unfavourable externality in production. The use of the air to dispose .of gases and

wastes from combustion of materials used in industry may give rise to acid rains and to global effects such as those attributed to greenhouse gases. In an increasingly interdependent world; there is a need to ensure that greater account is taken of the real social costs of such activities.

Another area of considerable interest in environmental and natural resource- economics is the subject of limits to growth.·To what extent, if any, do natural resource constraints provide limits to economic growth? It **may** prove to be impossible to sustain economic production because natural resources are depleted by their use in the production process or because these resources (e.g. air and water) are no longer able to absorb wastes from economic production without imposing severe economic penalties. Economic growth may falter for the. same reasons and because of diminishing marginal productivity arising with intensification and extension of natural resource use, a possibility recognised by Ricardo (1817) in extending an clarifying the theory of Malthus (1798). By the early·1970s, three main possible limits to sustaining economic growth were recognised: (1) natural resource depletion; (2) 'pollution' of natural resources and (3) diminishing marginal productivity with intensification and extension of natural resource use.

It was also recognised that two factors have played a major role in enabling economic growth to be achieved despite natural resource constraints. These are

(1) scientific and technological progress and

(2) the accumulation of man-made capital.

The central question then becomes one of whether these factors are likely to continue to reduce natural limits to economic growth. Technological optimists argue that technological progress and capital accumulation are likely to be sufficient to overcome resource constraints. In their view achieving economic sustainability is no problem.

Nevertheless, not all technological optimists suggest· that we can continue with 'business as usual'. Many accept the view that environmental externalities are important in the modem world and that those contributing to adverse environmental effects should pay the full costs involved in their activities. This is for example, highlighted in the polluter-pays principle. The application of such a principle is

likely to assist· in sustaining economic production and/or economic welfare by ensuring that all costs, including environmental costs, are taken into account by responsible parties.

However, the extension of knowledge is not costless nor is the production of man-made capital. Both may be at the expense of .natural resource stocks. To what extent is it desirable to keep adding to·human/man-made capital if this is at the expense of natural capital? This is currently under debate, particularly in relation to the distribution of income between generations.

Environmental and resource economics has many dimensions - growth, equity and allocative efficiency implications. But as it currently stands the sole focus of ERE is on human welfare. It is anthropocentric· (Cf. Cobb, 1990, p.110). Environments and other creatures have value only in so far as they have value to human beings. In operational economic models, it is usually assumed that the net value of retaining an environment can be measured by the difference between the amount of money those favouring this retention would be willing to pay for this and the amount of money needed to compensate those disadvantaged by this retention. But this assumes that those destroying the environment or nature have a right to do so. In reality much can depend on how property rights are assigned. If property rights run in the opposite direction, those destroying or using the environment will need to be able to compensate those who wish to conserve it. This test may result in a net benefit being assigned to conservation whereas a net disadvantage may be suggested by the first test. On the other hand, both tests could give the same result, depending on the circumstances. But no matter which of these tests are adopted, the approach is purely an anthropocentric one.

It should also be observed that this method cannot be applied in relation to future generations since they are not alive to express their preferences. But present generations can act, up to a point, as guardians of the assumed interests of future generations by for example including bequest values in their own preferences.

3. Economic Concepts of Sustainable Development

Several economic concepts of sustainable development exist (see Tisdell, 1991, Ch.11; 1992) but only the most prominent one will be considered here, namely that type of

development which sustains intergenerational economic welfare. Tietenberg (1988, p.33) states that "the sustainability criteria suggests that at a minimum, future generations should be left no worse off than current generations". The World Commission on Environment and .Development (1987, p.43) assumed that "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Tietenberg's definition seems to suggest that the real income per head of future generations or their standard of living should be no lower than that of present generations. It leaves open the question of whether these should be higher. Certainly those in less developed countries' might hope that the incomes or the standards of living of their people would be higher in the future.

The question then arises of how this criteria relates to conservation of natural resources and strategies for economic development. The view may be taken that natural resources are held by current generations on trust for future generations. Depletion of natural resources by current generations can reduce the ability of future generations to meet their needs. Therefore, Pearce et al. (1989, p.3) suggest as a general principle that "future generations should be compensated for reductions in the endowment of resources brought about by the actions of present generations". They suggest, for example, that an increase in man-made capital, especially an increase in scientific and technological knowledge might be used to compensate future generations. The question then is how adequate is man-made capital as a substitute for natural capital or as compensation for a reduction in natural resource stocks? Furthermore, to what extent is this substitution possible without endangering the ability of future generations to sustain income levels in an equitable manner?

4. Implications of the Above Concept for the Nature of Economic Development.

Given the above concept of sustainability, the onus is on those who wish to use natural resources and reduce natural resource stocks to show that future generations will be adequately compensated for the loss of these stocks. On this view, there would be no objection to a less developed country such as Indonesia logging its rainforest

unsustainably if future generations· of Indonesians could be compensated by a larger stock of man-made capital. Similarly, there would be no objection to the elimination of a species by present generations if future generations could be compensated from an increased supply of man-made capital.

Those favouring the traditional economic growth approach might argue that in reality such compensation has taken place in the past. Present generations have benefited from the economic growth in1pulses and sacrifices of previous generations. They may then go on to suggest that this would also be the best strategy for the future.

However, this overlooks the fact that it may no longer be so easy to ensure rising standards of living for future generations (or maintain current income levels) by continuing to substitute man-made capital for natural resource stock. As resource stocks dwindle, the comparative productive value of remaining stocks may rise. Secondly, with greater demands on the natural environment, it is necessary to take stock of the real costs of using natural resources such as air and water for such purposes. The use of these for waste-disposal needs is inadequately priced. Thirdly, it must be recognised that standards of living do set material or marketed goods alone. Unpriced environmental goods of economic value and add to the quality of life. Fourthly, we cannot deny the consequences for future generations of depletion of natural resources in this case Pearce et al. (1989) suggests that it behoves us eager to keep economic options open. This may require greater natural resources e.g. ecological resources, than otherwise.

5. Concluding Comment

The economic criteria of sustainability outlined above does not suggest that conservation of natural resources is a virtue in itself. But rather it suggests that from a practical point of view, greater attention to such conservation is necessary compared to the past if the standard of living of future generations is to be at least as high as that of current generations. One could also add that current generations might in addition obtain a rise in their standard of living as a result of more attention being given to the economic value of conserving environmental and natural resources.

However, it should be observed that some individuals believe that conservation of

special environments and of natural resources, particularly living in resources is a virtue in itself. These views have for example been expressed by Aldo Leopold (1933, 1966). Mankind is seen as having a stewardship role in relation to nature. This suggests that humanity should accept some constraints on man-centred economic growth or development to maintain or sustain natural living systems. This view seems to be more widely accepted now than in the past.

While economic concepts of sustainable development seem more precise and operational than many of the general- concepts which have currency at present, because of uncertainties, conceptual problems and disagreements about appropriate values and ethics, they are not a straightforward means for planning development. They may be too narrow in their focus. (Tisdell, 1990 Ch. 3; 1991 Ch. 11; 1992). Nevertheless they raise important philosophical and other issues that might otherwise be overlooked and seem to be leading to the development of techniques which are likely to enhance their operational value.

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