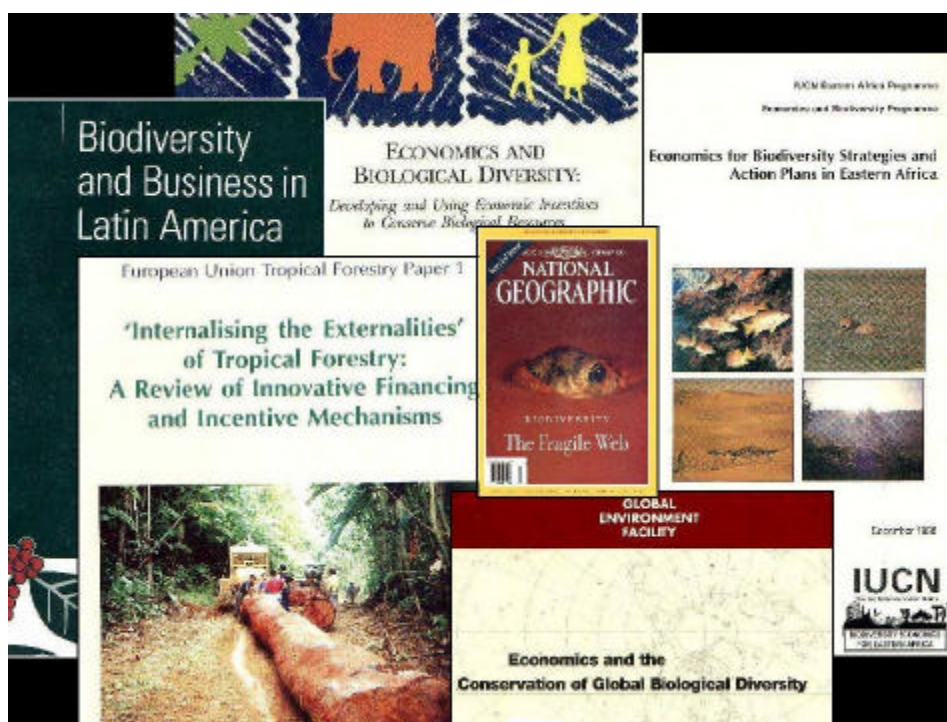


ECONOMIC MEASURES FOR BIODIVERSITY PLANNING: An Annotated Bibliography of Methods, Experiences and Cases

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1 INTRODUCTION

The aim of this document is to review literature on economic measures for biodiversity planning, so as to highlight available economic methods and to document examples of their application to biodiversity. The main focus of the review is on economic valuation and economic incentives. Financial mechanisms for biodiversity conservation form the focus of a separate bibliography, so are not considered in detail here.

Economic concerns are of central importance to biodiversity conservation. Economic forces underlie and explain biodiversity degradation and loss, and economic measures provide a useful set of tools for strengthening biodiversity conservation, sustainable use and equitable benefit sharing.

If biodiversity policies, strategies and plans are to be effective they must be justifiable in economic terms. They also need to make efforts both to overcome the economic causes of biodiversity loss and to ensure that economic incentives are set in place which encourage biodiversity conservation. Equally, the goals and strategies they attempt to attain and use have to be acceptable to (and understood by) other “economic” sectors, decision-makers and planners, if they are to integrate biodiversity concerns into their own strategies, policies and plans.

Documenting experiences and lessons learned in the use of economic measures in biodiversity policies, strategies and plans, and providing guidance on best practices and methods for this, can thus make an important contribution to biodiversity conservation planning and management practice.

The review is focused on published literature on biodiversity economics which can easily be accessed. Although there is a large amount of unpublished “grey material” dealing with economic measures for biodiversity planning (such as project documents, mission reports, notes from verbal presentations, and so on), this material is not widely available, and often has limited access and distribution. All of the literature referred to in this document can be obtained easily from published books and journals, from the internet, or from the organisations who have produced it.

Section 2: Annotated Bibliography of the Literature, presents the references in alphabetical order. Full details of the author, title, publication details and ISBN number are given for each. Indications of the regional and country coverage of the publication, its focus on key ecosystems or sectors, and the main topics it deals with are also summarised.

Section 3: Internet Resources, lists internet sites and web pages that refer to the economics of biodiversity. Many contain information about on-going biodiversity economics activities in particular countries, regions or ecosystems. Others allow documents to be downloaded or ordered.

Section 4: Indexes, provides indexes of the literature by region, country, ecosystem or sector and topic.

This bibliography is not exhaustive, and should be seen as a document in process. The economics of biodiversity is a relatively recent, and dynamic, subject matter. New materials are constantly being added to the existing body of literature. This bibliography is therefore presented in a form that can, and will, be updated periodically, as new literature becomes available or as additional references are found and incorporated.

2 ANNOTATED BIBLIOGRAPHY OF THE LITERATURE

#1. Abala, D. O. (1987). 'A theoretical and empirical investigation of the willingness to pay for recreational services: a case study of Nairobi National Park', *Eastern Africa Economic Review* 3 (2):111-119

This paper examines the factors that influence willingness to pay for park services. Econometric methods are applied to data from 333 Nairobi National Park users. The study shows that factors that may help to explain people's willingness to pay for the park services fall into two categories: the socio-economic characteristics of park users, and the physical attributes of the park itself. However it is probable that non-economic factors also play an important role in the determination of park users' willingness to pay for park services. An interesting result of the study is that human congestion in the park has a significant negative impact on the users' willingness to pay for park services. The study further indicates that animals per se do not seem to be significant in determining the users' willingness to pay for park services. It is also clear that the current gate charges should be raised to reflect the users' willingness to pay for park services, since this will not affect the visitation rates to the park.

Coverage: Africa

Contains examples or case studies from: Kenya

Ecosystem or sector focus: Wildlife, Protected Areas, Tourism

Topics: Valuation, Travel Cost

#2. Acharya, G., (1998), *Capturing the Hidden Values of Wetland Ecosystems as a Mechanism for Financing the Wise Use of Wetlands*. Paper presented at workshop on Mechanisms for Financing Wise Use of Wetlands, Second International Conference on Wetlands Development and Conservation, Dakar, Senegal, 13 November 1998: 15 pp.

This paper focuses on the use of economic valuation as an incentive for wetland conservation. The environment's services are valuable but these values are a) seldom recognised and quantified and b) are often lost through

inappropriate development or used inefficiently. Linkages between use values and ecosystem functions will be stressed in this discussion. The paper emphasises that appropriate incentives can only be developed once the values derived from these ecosystems are recognised. The role of the public and private sectors in initiating valuation studies is discussed.

Coverage: Global

Ecosystem or sector focus: Wetlands, Water

Topics: Financial mechanisms, Economic instruments, Incentive measures, Valuation, Convention on Biological Diversity, Ramsar Convention

#3. Adamowicz, W., & Beckley, T. (1998). 'In search of forest resource values of indigenous peoples: are non-market valuation techniques applicable?', *Society and Natural Resources* 11:51-66

This article examines issues surrounding the potential applicability of non-market valuation techniques to indigenous peoples. A conceptual model examines relationships between natural and conceptual environments and value systems. Problems of valuation identified include eliciting values for individuals, aggregating individual values into measures of social welfare, and comparisons of welfare across culturally different groups. The influence of sacred or taboo goods, the potential for satiation, and variations in property rights are factors to address in assessing individual values. Differences in political and property rights systems, and unique demographic structures are seen as limits to aggregating values for randomly selected individuals. Since valuation is endogenous to specific social environments, aggregations of indigenous and non-indigenous measures of social welfare may be inappropriate.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Valuation

#4. Adger, W. N., & Grohs, F. (1994). 'Aggregate estimate of environmental

degradation for Zimbabwe: does sustainable national income ensure sustainability?', *Ecological Economics* 11:93-104

Standard measures of economic growth do not adequately reflect changes in aggregate welfare over time. Sustainable national income is therefore defined as a Net National Product with adjustments for the degradation of renewable and non-renewable capital. Productivity loss rather than replacement cost is the most theoretically correct way to value resource depletion. Modified net national product is estimated for the agriculture and forestry sectors in Zimbabwe by valuing the loss of forest stock and soil erosion. The results show that traditional measures overstate the value of the agricultural sector's output by approximately 10%. It is argued that indicators of sustainable national income do not ensure sustainable development, nor do they point to mechanisms that would ensure sustainable natural resource management.

Coverage: Africa

Contains examples or case studies from: Zimbabwe

Ecosystem or sector focus: Forests, Agriculture, Industry

Topics: Environmental accounting, Valuation, Soil erosion, Economic policies

#5. Adger, W. N., Brown, K., Cervigni, R., & Moran, D. (1995). 'Total Economic Value of Forests in Mexico', *Ambio* 24 (5):286-296

Failure to account for the numerous functions and economic uses of forests have led to patterns of global forest use with many detrimental environmental consequences. This study demonstrates the economic techniques for estimating the total economic value of forests and applies it to Mexico's forest estate. However, only a proportion of this economic value can feasibly be "captured" within Mexico: much of the benefit of Mexico's forests falls outside the country's borders, and is therefore not considered by forest users or national policymakers.

Contains examples or case studies from: Mexico

Ecosystem or sector focus: Forests

Topics: Valuation, Economic policies, Market valuation, Climate change, Effect on production

#6. Adger, W. N., (1997), *Sustainability and Social Resilience in Coastal Resource Use*. Working Paper GEC 97-23, Centre for Social and Economic Research on the Global Environment: London.

Sustainable development is defined in this paper as a set of necessary constraints in the areas of efficiency, equity and resilience of social and natural systems. This is novel in its emphasis on social resilience which captures many aspects of the institutional architecture required for sustainability. Social resilience can be observed through proxy measures associated with property rights and access to resources, through demographic changes and other measures. In addition, present day equity considerations are incorporated into the framework. The discussion focuses on coastal resources because these are often argued to be the most resilient ecosystems because of their high functional diversity. They are also argued to be socially and economically resilient because of the diversity of economic activities in coastal zones. The paper demonstrates the usefulness of the approach by exploring its implications in two studies. Firstly recent attempts to derive the economic value of ecosystem functions are presented with the limitations of this approach. In particular economic values are often site and culture specific and their influence on resource use is fundamentally determined by the property rights governing entitlements to exchange and endowment. Even if equity is incorporated into resulting values, the relative importance of ecosystems is shown to be different depending on their location. The second study is based on the conversion of mangrove forest in coastal northern Vietnam, showing again the importance of equity considerations in the sustainability of resource use decisions, and the impacts of such conversion on social resilience.

Coverage: Global
Asia

Contains examples or case studies from: Vietnam

Ecosystem or sector focus: Forests, Marine and coastal

Topics: Valuation

#7. Adhikari, A. P., Bhandari, B., & Pyakuryal, B. (Eds.), (1998), *Environmental Economics in Nepal*. Proceedings of the Proceedings of the Workshop on Environmental Economics: Kathmandu, Nepal. 101 pp. ISBN 92-9144-028-0

This document reports on two workshops carried out in Nepal on environmental economics and on green accounting. It includes the papers presented at these workshops, their deliberations and conclusions reached.

Coverage: Asia

Contains examples or case studies from: Nepal

Topics: Valuation, Environmental accounting, Economic instruments

#8. Allaway, J., & Cox, P. (1989). 'Forests and competing land uses in Kenya', *Environmental Management* 13 (2):171-187

Indigenous forests in Kenya are under heavy pressure from competing agricultural land uses and from unsustainable cutting. The problem is compounded by high population growth rates and an agriculturally based economy. The economic and ecological consequences of these pressures need to be considered in land use decision making. A method for combining ecological and economic considerations and for the analysis of forest land-use issues is illustrated using the Kenyan situation. The status of principal forest areas in Kenya is summarised and competing land uses are compared on the basis of ecological functions and economic analysis. Replacement uses did not match the ecological functions of forests, although established stands of tree crops could have roughly comparable effects on soil and water resources. Indigenous forests had economic benefits from tourism and protection of downstream agricultural productivity. Economic returns from competing land uses were very varied, with tea having the highest returns and fuelwood plantations having returns comparable to some annual crops and dairy farming. Combined consideration of economic and ecological factors suggested some trade-offs for improving land allocation decisions and several management opportunities for increasing benefits or reducing costs from particular land uses. A general strategy is proposed for forest land management in Kenya.

Coverage: Africa

Contains examples or case studies from: Kenya

Ecosystem or sector focus: Forests, Agriculture

Topics: Valuation, Causes of biodiversity loss, Economic instruments

#9. Anderson, T., (1996), *Enviro-Capitalists: Why and How to Preserve Their Habitat*.

Paper presented at IUCN Workshop on Economics of Biodiversity Loss, April 1996, Gland, Switzerland. 33 pp.

<http://www.biodiversityeconomics.org>

This paper asks the following question: to what extent should the private sector be left alone to manage biodiversity? The answer presented is that all too often political intervention in the market place either eliminates incentives for entrepreneurs to manage natural resources in a sustainable way or generates other incentives that lead to their actual destruction. Examples of each scenario are given and the demonstration is made that there are cases in which the individual entrepreneur alone has access to the time-specific and place-specific information required for sound biodiversity management. The special contribution of this paper in the context of the Workshop on the Economics of Biodiversity Loss is to show in concrete terms the way in which governmental intervention can be detrimental to biodiversity conservation and the consequent value of market approaches in this respect. This means that in designing a biodiversity impact assessment framework the effects of market processes and of governmental regulations must be taken into account.

Coverage: North America

Contains examples or case studies from: USA

Topics: Private sector, Economic instruments, Financial mechanisms, Incentive measures, Causes of biodiversity loss

#10. Andersson, J. E. C., & Ngazi, Z. (1995). 'Marine resource use and the establishment of a marine park: Mafia Island, Tanzania', *Ambio* 24 (7-8):475-481

This article quantifies the local economic opportunity costs and benefits of setting up a marine protected area. It looks at the market

value of fisheries activities foregone by local communities. The study demonstrates that local involvement can be of great value in finding sustainable viable solutions with regard to issues such as economic incentives, alternatives to destructive activities, education and compensation. In addition it was found that compensation can be a cost efficient and sustainable means of enforcing regulations, but on the condition that it is appropriate and that it stems from the direct involvement of indigenous resource users.

Coverage: Africa

Contains examples or case studies from: Tanzania

Ecosystem or sector focus: Marine and coastal, Fisheries, Protected Areas

Topics: Valuation, Incentive measures

#11. Angelsen, A., & Kaimowitz, D. (1999). 'Rethinking the Causes of Deforestation: Lessons from Economic Models', *The World Bank Research Observer* 14 (1):73-98

This article, which synthesises the results of more than 140 economic models analysing the causes of tropical deforestation, raises significant doubts about many conventional hypotheses in the debate about deforestation. More roads, higher agricultural prices, lower wages, and a shortage of off-farm employment generally lead to more deforestation. How technical change, agricultural input prices, household income levels, and tenure security affect deforestation - if at all - is unknown. The role of macroeconomic factors such as population growth, poverty reduction, national income, economic growth, and foreign debt is also ambiguous. This review, however, finds that policy reforms included in current economic liberalisation and adjustment efforts may increase the pressure on forests. Although the boom in deforestation modelling has yielded new insights, weak methodology and poor-quality data make the results of many models questionable.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Incentive measures, Economic instruments, Economic policies, Causes of biodiversity loss

#12. Arntzen, J., (1997), *Economic Valuation Of Communal Rangelands in Botswana: A Case Study*. CREED Working Paper Series No 17, International Institute for Environment and Development: London. 62 pp.

The literature on rangelands is extensive but very little includes an examination of rangeland valuation. Where it does appear, rangelands tend to be undervalued, mainly due to the fact that most analyses are a) restricted to a specific sector, most commonly livestock production; b) biased towards one marketed product, frequently beef sales or slaughter; and c) limited to use values. Undervaluation of rangelands may contribute to their mismanagement or their transformation to monoculture, such as for livestock or wildlife. Similarly, this may lead to inappropriate policy recommendations and prescriptions, for example that vegetation changes in rangelands are not a problem as long as they do not affect livestock productivity. This paper undertakes a valuation exercise in an effort to address the first two causes of undervaluation mentioned above. The objective is to estimate the annual direct use value of an average hectare of communal rangeland in Botswana, based on an analysis of secondary data. The exercise incorporates the three major direct uses, both marketed and non-marketed, of rangelands - livestock, wildlife and gathering. The valuation clearly shows that each use makes a significant contribution to the direct use value: in the case of hunting and gathering amounts to around one third of the total direct use value during the period under study. Another conclusion is that non-marketed products are very important; milk production and processing represent a considerable, although partly potential, use value which requires further investigation. Considerable discrepancies were found between private and social use values for livestock, mostly as a result of government subsidies to that sector. The use values for wildlife based on hunting quota has dropped significantly. This suggests a trade-off between livestock and wildlife use values. With the observed decline in wildlife numbers, a switch towards game viewing offers opportunities to boost the use values. alternatively hunting values should be raised to net market values. It is critical to ensure that any benefits from wildlife should accrue to the local population. These conclusions raise important policy questions as to the future use of rangelands in Botswana. Total land productivity per hectare should be the key

variable in assessing the significance of e.g., vegetation changes or erosion, as well as the merits of different single or multiple use options, such as livestock expansion, wildlife utilisation and/or gathering. The growing resource scarcity not only raises concerns about efficiency and sustainability but also about the distribution of current and future use values.

Coverage: Africa

Contains examples or case studies from:
Botswana

Ecosystem or sector focus: Agriculture, Drylands, Wildlife, Protected Areas

Topics: Valuation, Markets and charges

#13. Aylward, B., (1991), *The Economic Value of Ecosystems: 3 - Biological Diversity*.

Gatekeeper Series GK 91-03, London
Environmental Economics Centre: London. 10.

This paper looks at the valuation of biodiversity. It argues that biodiversity loss is caused in part by the market, price and policy failures that under-value biodiversity. The paper attempts to clarify the ecological and economic rationale behind drawing a distinction between the values of biodiversity and biological resources. It concludes by proposing an alternative conceptual approach and methodological basis for attaching economic value to biodiversity.

Coverage: Global

Topics: Valuation, Causes of biodiversity loss

#14. Aylward, B., & Barbier, E. B., (1992), *What is Biodiversity Worth to a Developing Country? Capturing the Pharmaceutical Value of Species Information*. LEEC Paper DP 92-05, London Environmental Economics

Centre: London. 17 pp.

There has been a resurgence of interest in the use of biodiversity as a source of novel chemical compounds for the development of new pharmaceuticals. Both commercial companies and developing-country governments are increasingly starting to capture the "pharmaceutical value" of biodiversity. There are however some potential misunderstandings in the view that pharmaceutical prospecting can serve as a mechanism for developing countries to extract

compensation for the conservation of their biodiversity. This paper addresses this question, and looks at the economic relationships involved in pharmaceutical prospecting. It argues that an over-emphasis on the question of how to capture the value of biodiversity misses the key question: that of how to invest in the generation of information about biodiversity. It suggests that in order to capture the pharmaceutical value of biodiversity, developing countries would need to come up with a practical mechanism for controlling access to their biodiversity. They could then move beyond deriving a fair share of the returns from raw materials to information generating activities that add value to the resource itself.

Coverage: Global

Topics: Bioprospecting, Trade, Incentive measures, Financial mechanisms, Valuation, Economic instruments, Markets and charges

#15. Aylward, B., Echeverria, J., & Barbier, E. B., (1995), *Economic Incentives for Watershed Protection: A Report on an On-going Study of Arenal, Costa Rica*. CREED

Working Paper Series No 3, International Institute for Environment and Development: London. 22 pp.

Tropical moist forests provide a range of goods and services to society. Traditionally, decisions regarding tropical forest land use have been made on the basis of major direct uses of forest land that generate local and national benefits. Typically, this has meant timber extraction and the conversion of forest to agricultural or livestock uses. In recent years increasing attention has been given to the important economic role non-market benefits may play in providing incentives for the conservation of tropical forests. A number of studies have explored the local, national and global benefits generated by non-timber forest products, ecotourism, pharmaceutical prospecting and carbon storage. Another important ecological service that is often cited as an economic justification of conservation activities is the watershed protection function provided by tropical forests. Soil and water conservation may yield benefits to land-owners and alleviate damage to downstream economic activities. Nevertheless efforts to conserve watersheds are plagued by the difficult nature of the externalities involved. The off-site nature of

many of the benefits of conservation activities makes both valuation and internalization of these externalities difficult, thereby preventing the development of 'sustainable' watershed protection programs. This is even the case in areas where pristine, mountainous forests provide downstream national benefits to hydroelectricity and irrigation schemes. The establishment of incentive systems that solve market, policy and institutional failures impeding watershed protection in such areas remains a vexing problem for policy-makers, scientists and communities in developing countries. Drawing on the literature and on-going research in Costa Rica, the paper outlines a collaborative research project investigating the potential for economic incentives for watershed protection in the Arenal region of Costa Rica.

Contains examples or case studies from: Costa Rica

Ecosystem or sector focus: Forests, Water, Watersheds

Topics: Economic instruments, Incentive measures, Valuation, Economic policies, Payments for environmental services

#16. Aylward, B., & Porras, I., (1998), *An Analysis of Private and Social Discount Rates in Costa Rica*. CREED Working Paper Series No 21, International Institute for Environment and Development: London.

The application of economic evaluation and valuation methodologies depends heavily on the intertemporal weighting of monetary flows. This is of particular importance in the case of environmental valuation where long-term environmental impacts are traded off against short-term productive benefits. A review of discount rates applied in the literature and by financing agencies in Costa Rica suggests that the methods and the rates employed have little grounding in theory or empirical analysis. In order to explore whether the ad hoc nature of discounting in Costa Rica is likely to be leading to error in economic analysis this paper reviews theoretical and methodological issues in discounting and then proceeds to a calculation of financial and social rates of discount. The results suggest that the best estimate of the private opportunity cost of capital, the consumption rate of interest (CRI) and the social discount rate are all in the 9-10% range. Given that the lack of a

significant difference between the cost of capital and the CRI there is no immediate need to distinguish between the discounting of consumption and investment flows. The observed range of variation in the CRI suggests that discount rate sensitivity analysis should probably employ a range of from 7% to 10%. In other words, current practice may not be terribly inappropriate given this preliminary examination. Further effort should, however, be devoted to the estimation of key parameters involved in the models employed in the paper.

Coverage: Latin America

Contains examples or case studies from: Colombia

Topics: Valuation, Financial mechanisms

#17. Aylward, B., Echeverria, J., Allen, K., Mejias, R., & Porras March, I., (1999), *Market and Policy Incentives for Livestock Production and Watershed Protection in Arenal, Costa Rica*. CREED Working Paper Series No 25, International Institute for Environment and Development: London.

Conventional wisdom amongst environmentalists holds that the cutting of tropical forest for livestock production is not only bad business but also bad for the environment. In particular, it is thought that conversion to pasture leads to rising sedimentation of waterways and reservoirs, an increase in flooding and loss of dry season water supply. In the case of Lake Arenal, Costa Rica this conventional wisdom is stood on its head in an evaluation of the market and policy incentives guiding land use in the Chiquito watershed of the Arenal region of Costa Rica. The study suggests that ranching, dairy and associated downstream hydrological effects represent important values to the Costa Rican economy, values that significantly outweigh expected returns from options for reforestation or forest regeneration. Further, there appear to be no large market or policy incentives subsidizing livestock production or providing incentives for rapid deterioration of soil productivity. Thus non-hydrological externalities associated with changing land use from forests to livestock production, such as carbon fixation, biodiversity, ecotourism and existence values, are likely to be of minimal importance in Chiquito. Therefore the analysis suggests that there is little reason to encourage large-scale reforestation of the watershed or to purchase land for protection.

Instead efforts should focus on how to maximise the complementary returns from livestock and water production.

Coverage: Latin America

Contains examples or case studies from: Costa Rica

Ecosystem or sector focus: Wetlands, Agriculture

Topics: Incentive measures

#18. Bann, C., (1997), *The Economic Valuation of Mangroves: A Manual for Researchers*. International Development Research Centre: Ottawa. 51 pp.

This manual on the economic valuation of mangroves has been developed to aid researchers in South East Asia involved in the evaluation of mangrove ecosystems. Its main components are an introduction to the values to mangroves and threats to them, a theoretical introduction to environmental valuation, a methodology for the economic assessment of mangrove management options, a qualitative discussion of the possible impacts associated with common development options for mangrove ecosystems, and two case study examples from Asia.

Coverage: Global
Asia

Contains examples or case studies from: Cambodia, Indonesia, Vietnam

Ecosystem or sector focus: Marine and coastal, Wetlands, Fisheries, Forests

Topics: Valuation

#19. Barbier, E. B., (1989), *Economics, Natural Resource Scarcity and Development: Conventional and Alternative Views*.

Earthscan Publications Ltd: London. 223 pp. 1-85383-024-0

This book proposes a new economic approach to the use of natural resources and particularly to the problem of environmental degradation. It reviews and criticises traditional approaches to resource economics and instead outlines an alternative view of environmental economics and natural resource scarcity. Examples are given of the application of these economics approaches to environmental problems in Brazil and Indonesia.

Coverage: Global

Contains examples or case studies from: Brazil, Indonesia

Ecosystem or sector focus: Forests, Watersheds

Topics: Pollution, Valuation, Economic instruments

#20. Barbier, E., & Conroy, C. (1989). 'Setting the right economic environment for sub-Saharan Africa', *Appropriate Technology* 16 (2):20-22

Suggests that if the lessons of environmental economics were applied to the problems of sub-Saharan Africa, there would be greater incentives to preserve and enhance natural resources. Looks briefly at: an economic evaluation of the costs and benefits of resource use and degradation at a project-specific or economy-wide level; and the design of incentive packages to improve resource management.

Coverage: Africa

Topics: Incentive measures, Valuation, Causes of biodiversity loss, Economic instruments

#21. Barbier, E. B., Burgess, J. C., Swanson, T., & Pearce, D., (1990), *Elephants, Economics and Ivory*. Earthscan Publishers Ltd: London.

The dramatic decline in elephants numbers in most of Africa has been largely attributed to the illegal harvesting of ivory. The decision to ban all trade in ivory is intended to save the elephant. This book examines the ivory trade, its regulation and its implications for elephant management from an economic perspective. It argues that there should be a very limited trade in ivory, designed to maintain the incentive for sustainable development in southern African countries and to encourage other countries to follow suit.

Coverage: Africa

Ecosystem or sector focus: Protected Areas, Drylands, Forests, Wildlife

Topics: Trade, Causes of biodiversity loss, Incentive measures, Financial mechanisms, International Conventions, Convention on International Trade in Endangered Species

#22. Barbier, E. B., (1991), *The Economic Value of Tropical Ecosystems 2 - Tropical Forests*. Gatekeeper Series 91-01, London Environmental Economics Centre: London. 10 00. This paper presents a broad overview of the different components of the total economic value of tropical forest ecosystems. It looks at methods for the cost-benefit analysis of comparing the economic values associated with forest preservation, conversion and sustainable management, and gives an example from Korup National Park, Cameroon. The paper concludes that calculating the different components of the total economic value of forests is essential for applying cost-benefit analysis to different forest land use options.

Coverage: Africa, Global

Contains examples or case studies from: Cameroon

Ecosystem or sector focus: Forests

Topics: Valuation, Deforestation

#23. Barbier, E. B., Bockstael, N., Burgess, J. C., & Strand, I., (1993), *The Timber Trade and Tropical Deforestation in Indonesia*. LEEC Paper DP 93-01, London Environmental Economics Centre: London. 17 pp.

This paper examines the links between the trade in tropical timber products and deforestation in Indonesia. It briefly reviews evidence suggesting that timber production is a factor in tropical deforestation, and examines the role of timber trade policy in Indonesia in influencing this process by affecting forest-based industrialisation. A partial equilibrium timber trade model of Indonesia is developed in order to analyse the effects of various policy interventions on trade and tropical deforestation. The paper concludes by summarising the results of the policy analysis and discussed policy options open to the government and importing countries.

Coverage: Asia

Contains examples or case studies from: Indonesia

Topics: Trade, Causes of biodiversity loss, Incentive measures, Economic policies

#24. Barbier, E. B., Burgess, J. C., & Folke, C., (1994), *Paradise Lost? The Ecological Economics of Biodiversity*. Earthscan Publications Ltd: London. 267 pp. ISBN 1-85383-181-6

This book shows how an interdisciplinary approach can understand and tackle issues relating to biodiversity conservation. It provides an overview of the causes of biodiversity loss and of previous approaches to dealing with them, and examines the effects of biodiversity loss on specific natural systems. It then looks at the policy implications of what we know, discussing the ecological limits to economic activity and the management institutions needed to make an integrated approach effective. Conclusions are presented on the future research needed and policy challenges that have to be confronted.

Coverage: Global, Latin America, Caribbean, Africa, Asia

Contains examples or case studies from: Madagascar
Nigeria, Sweden, India, Australia, Korea, Kenya, Cyprus, Indonesia, Botswana

Ecosystem or sector focus: Forests, Fisheries, Wetlands, Marine and coastal, Drylands

Topics: Valuation, Economic instruments, Economic policies, Incentive measures, Disincentives, Causes of biodiversity loss

#25. Barbier, E. B. (1994). 'Valuing environmental functions: tropical wetlands', *Land Economics* 70 (2):155-173

Recent studies have suggested that tropical wetlands may have a crucial economic role to play in development. This paper provides an overview of these benefits, using a general framework of cost-benefit analysis as the methodological approach to assessing wetland values. An analysis of the trade-offs between conserving or converting tropical wetlands demonstrates that taking into account the opportunity costs of wetland loss leads to a lower level of conversion than would otherwise be the case. Finally, the paper discusses the extensions and limitations of the production function approach as applied to valuing non-marketed wetland benefits.

Coverage: Global

Ecosystem or sector focus: Wetlands, Water

Topics: Valuation

#26. Barbier, E. B., Acreman, M., & Knowler, D., (1997), *Economic Valuation of Wetlands: A Guide for Policy Makers and Planners*. Ramsar Convention Bureau: Gland. 127 pp. ISBN 2-940073-21-X

Many planning and development decisions are made on economic grounds. While this paradigm has its limitations, it is unrealistic to ignore it. Hence wetland goods and services must be given a quantitative value if their conservation is to be chosen over alternative uses of the land itself or the water that feeds the wetlands. This book sets out to provide guidance to policy makers and planners on what the potential is for economic valuation of wetlands and how valuation studies can be undertaken. A basic overview of different valuation methods is given, illustrated with case studies from around the world, guidance on planning a study and model terms of reference for technical consultants are also provided.

Coverage: Global, Africa, Europe, North America

Contains examples or case studies from: Nigeria, USA, UK, Sweden, Indonesia

Ecosystem or sector focus: Wetlands, Water

Topics: Valuation, Market valuation, Effect on production, Contingent valuation, Travel cost, Mitigative and avertive expenditures, Ramsar Convention

#27. Barret, S., (1989), *Deforestation, Biological Conservation and the Optimal Provision of Wildlife Reserves*. LEEC Paper DP 89-06, London Environmental Economics Centre: London. 36 pp.

This paper uses the species-area relation to characterise the optimal deforestation program and to determine the optimal provision of wildlife reserves for tropical rain forest countries. These decisions, it is shown, must be taken jointly. The model constructed in this paper is more general than those used previously for analysis of the economics of environmental preservation. Provided a very simple inequality is satisfied, it will be optimal to set aside a greater quantity of wildlife reserves and to choose a slower rate of

deforestation, even if the marginal returns to deforestation increase over time. Implications for policy are also discussed.

Coverage: Global

Ecosystem or sector focus: Forests, Wildlife, Protected Areas

Topics: Causes of biodiversity loss, Valuation, Incentive measures, Economic policies

#28. Barret, S., (1992), *Some Economics of the Convention on Biological Diversity*. Working Paper GEC 92-33, Centre for Social and Economic Research on the Global Environment: London.

This paper considers two aspects of the Convention on Biological Diversity. The first is how developing countries should pursue a programme for the conservation of biodiversity within a wider programme of development. The second is how developed countries can sustain a co-operative agreement to compensate developing countries for additional conservation, when the agreement must be self-enforcing.

Coverage: Global

Topics: Convention on Biological Diversity

#29. Bartelmus, P., Lutz, E., & Shweinfest, S., (1992), *Integrated Environmental and Economic Accounting: A Case Study for Papua New Guinea*. Environment Working Paper 54, Environment Department, World Bank: Washington DC. 57 pp.

This document presents a case study of the application of environmental accounting to Papua New Guinea using the integrated environmental and economic accounting framework developed by the United Nations Statistical Office. Environmental expenditures by government are low. Depreciation of produced assets was calculated at between 9-11% of GDP resulting in a NDP of between 89-91% of GDP. Environmental impacts in the agriculture, forestry, energy and mining sectors amounted to an average of 2.1% of NDP over the period 1986-90. The resulting environmentally adjusted NDP was estimated to range from 90-97% of NDP.

Coverage: Pacific

Contains examples or case studies from: Papua New Guinea

Ecosystem or sector focus: Agriculture, Forests, Industry

Topics: Environmental accounting, Valuation

#30. Bartelmus, P., & van Tongeren, J., (1994), *Environmental Accounting: An Operational Perspective*. Department for Economic and Social Information and Policy Analysis, Working Paper No 1, United Nations: New York. 25 pp.

Economic growth has been overemphasised in the past. As a consequence distributional and environmental aspects have been neglected. Sustainable development aims to incorporate these dimensions in comprehensive broad-based development planning. Integrated environmental and economic accounting focuses on a number of the more obvious deficiencies of conventional national accounts with regard to the environment. This paper summarises practical recommendations on integrated environmental and economic accounting and presents an overview of the methodologies involved.

Coverage: Global

Topics: Environmental accounting, Valuation

#31. Batagoda, B. M. S., Turner, R. K., Tinch, R., & Brown, K., (2000), *Towards Policy Relevant Ecosystem Services and Natural Capital Values: Rainforest Non-Timber Products*. Working Paper GEC 2000-06, Centre for Social and Economic Research on the Global Environment: London.

Logbook and survey data relating to the extraction of non-timber forest products in the Singharaja Forest has been used to calculate total non-timber forest product (NTFP) value flows, and the estimation of the production and labour supply functions of resource users. The results indicate that the forest yields significant benefits, however the value of these NTFPs is insufficient on its own to economically and politically justify the conservation of rainforest biodiversity. Other land uses involving forest clearance seem to generate higher financial returns. However there are external costs such as soil erosion, sedimentation, and habitat loss associated with

alternative uses such as tea plantations. It can also be argued that the conservation strategy encourages other beneficial impacts such as the effect that NTFP harvesting income has on overall income distribution in local communities. Overall, forest biodiversity conservation will have to be justified by a full total economic value (use and non-use values) appraisal, together with other scientific and ethical reasoning, and cannot be promoted solely on the basis of non-timber extraction value, as some commentators have in the past claimed.

Coverage: Asia

Contains examples or case studies from: India

Ecosystem or sector focus: Forests

Topics: Valuation

#32. Bateman, I. J., (1993), *Evaluation of the Environment: A Survey of Revealed Preference Techniques*. Working Paper GEC 93-06, Centre for Social and Economic Research on the Global Environment: London.

This paper sets out to examine in detail the theoretical and methodological basis underpinning two revealed preference methods for valuing environmental preferences namely the travel cost method (TCM) and the hedonic pricing method (HPM). A guide to empirical application is provided together with analysis of relevant specific economic theory. Considerable emphasis is given to discussions of methodological problems arising from such application. A general conclusion is that both methods require a number of strong assumptions to hold if they are to produce valid welfare estimates. Individuals' preference for and evaluations of environmental goods can, in some circumstances, be revealed via their purchases of certain marketed goods associated with the consumption of those environmental goods. Both the travel cost method (TCM) and hedonic pricing method (HPM) discussed in this paper adopt revealed preference approaches to environmental evaluation. The TCM estimates the recreational value of a recreation site by analysing the travel expenditures (petrol, etc.) of visitors to that site, while the HPM often uses variation in house prices to estimate the value of local environmental quality. Both techniques only capture use values and thereby omit any passive-use values associated with the environmental

goods under investigation. As such these techniques may underestimate the total economic value of such goods. However use values will often be of prime importance (and acceptability) to decisionmakers and both of these evaluation techniques have been widely applied.

Coverage: Global

Topics: Valuation, Travel cost

#33. Bayon, R., & Deere, C., (1998), *Financing Biodiversity Conservation: The Potential of Environmental Funds*. Paper presented at a workshop on Financial Innovations for Biodiversity, 10th Global Biodiversity Forum, Bratislava, Slovakia, 1-3 May 1998. 30 pp.

<http://www.biodiversityeconomics.org>

In the 1990s, Environmental Funds (EFs) have emerged as promising long-term mechanisms for providing financial support to biodiversity conservation and sustainable development activities. Environmental Funds, however, vary widely depending on the source, management and distribution of their funds. This paper responds to frequently asked questions about the operation and performance of Environmental Funds. It provides several case studies to highlight why they are attractive mechanisms for funding biodiversity protection and seeks to draw some of the many lessons that have been learned as Environmental Funds have matured and gained experience at managing assets and grant programs (particularly in Latin America). Finally, the paper offers several recommendations for the Fourth Conference of the Parties to the Biodiversity Convention. In particular, it advises that Environmental Funds are a good way to finance biodiversity conservation and for the Global Environment Facility (GEF) to leverage its funds. It recommends that the GEF be called upon to explore Environmental Funds as preferred financial mechanisms for investment in biodiversity projects. Environmental Funds vary greatly in terms of their funding, governance, structure, purpose and funding priorities. They operate at the local, national and sometimes, regional level. Yet, there are some common threads, both in terms of lessons learned and features contributing to success. For instance, the most successful funds tend to operate like independent foundations, investing their assets and using the interest to fund programs. They

tend to be governed by mixed public-private sector boards, often with NGOs often as "majority stakeholders", helping manage the capital, invest the funds, and determine which projects will receive funding. This paper looks at issues involved in Environmental Funds, and makes a number of recommendations to the CBD.

Coverage: Global

Topics: Financial mechanisms, Trust Funds, Debt conversion, Convention on Biological Diversity

#34. Bayon, R., Deere, C., Norris, R., & Smith, S. E., (1999), *Environmental Funds Lessons Learned and Future Prospects*. IUCN - The World Conservation Union. 26 pp.

<http://www.biodiversityeconomics.org>

Environmental organisations have long realised that sustainable finance is a pre-requisite for sustainable development. One mechanism advocated as a means of achieving sustainable finance is the "Environmental Fund" (EF) (also known as conservation trust fund, and national environment fund). Over the past ten years, a number of EFs have been created in developing countries by national governments, conservation organisations and donors. They vary widely depending on local actors and circumstances. Their record has been mixed: although some have been extremely effective at beginning to accomplish the goals they have set, others have not. While EFs have some impressive accomplishments, their long term success and impact on conservation and sustainable development remain difficult to ascertain. In 1998, the Global Environment Facility (GEF), an important contributor to EFs world-wide, carried out an evaluation of experience with Environmental Funds. This article draws on the GEF study and over five years experience with EFs to review the lessons learned. It describes how EFs are structured and the kinds of activities they have supported. It examines the key conditions that influence their success or failure. It discusses factors that should be taken into consideration when deciding whether EFs may be an appropriate mechanism for supporting conservation activities in a particular setting. Finally, the article looks to the future and outlines important trends that are likely to affect the financing and future development of EFs.

Coverage: Global

Topics: Financial mechanisms, Trust Funds, Debt conversion

#35. Bayon, R., Lovink, J. S., & Veening, W. J., (2000), *Financing Biodiversity Conservation*. Sustainable Development Department Technical Papers Series, Inter-American Development Bank: Washington DC. 42 pp.

Financing the conservation and sustainable use of biodiversity has been called one of the greatest challenges. At the heart of this challenge lies the low financial and political value which is often assigned to biodiversity and the resulting lack of financial mechanisms for conservation and sustainable use. The biological diversity of Latin America and the Caribbean is among the world's richest. This provides the region with a unique "comparative advantage", including potential business opportunities based on the sustainable use of biodiversity. This report provides an overview of existing and experimental financing mechanisms that can be used to encourage the conservation and sustainable use of biodiversity. To help to better understand these mechanisms, it proposes a taxonomy that divides the mechanisms into three categories: (i) those that protect biodiversity as a public good, (ii) those that require correcting so-called "negative externalities" that hamper biodiversity conservation, and (iii) those that can be used to support biodiversity-based businesses. The document ends with recommendations on how the Bank can support financing mechanisms that promote the conservation of biodiversity and its sustainable use.

Coverage: Latin America, Caribbean

Contains examples or case studies from: Mexico, Brazil, Ecuador, Costa Rica

Ecosystem or sector focus: Forests, Wildlife, Protected Areas

Topics: Financial mechanisms, Private sector, Trust Funds, Economic instruments, Carbon offsets, Payments for environmental services, Taxes, Incentive measures

#36. Bellu, L. G., & Cistulli, V., (1997), *Economic Valuation of Forest Recreation Facilities in the Liguria Region (Italy)*. Working Paper GEC 97-08, Centre for Social

and Economic Research on the Global Environment: London.

This study is part of a broader research aimed at providing decision-makers with data and information which would allow them to design more appropriate land use policies. Specific objectives were the inventory of forest resources and the economic assessment of the multiple services of forests in the Liguria Region (Italy). The following pages address the issue of the measurement of the economic value of open access recreation. Since open access recreation in forest areas belongs to the category of public goods for which market prices do not exist, Individual Travel Cost Method (ITCM) and Dichotomous Choice Contingent Valuation Method (CVMD) were used for their economic valuation. This study analyses seven forest areas selected on the basis of three main criteria: (i) the suitability of the area for tourism; (ii) the actual flow of tourism; (iii) the regional plans for the creation of new parks. The following important insights emerged: (i) overall, the values obtained with the ITCM and CVMD methods are very closed and consistent with the underlying economic theory; (ii) the value of forest recreational services in Liguria is second only to soil protection services and much greater than timber production income; (iii) forest recreation income would significantly contribute to the regional GDP if it were accounted for in regional economic accounts; (iv) the development of forest recreational activities in the internal areas of Liguria would also contribute to the solution of the three major problems of the region, namely: unemployment, abandonment of internal areas, and excessive pressure of tourism in the coastal areas.

Coverage: Europe

Contains examples or case studies from: Italy

Ecosystem or sector focus: Forests, Tourism

Topics: Valuation, Contingent valuation, Travel cost

#37. Berg, H., Ohman, M. C., Troeng, S., & Linden, O. (1998). 'Environmental economics of coral reef destruction in Sri Lanka', *Ambio* 27 (8):627-634

Coral reefs are a resource of immense importance for a large number of people, especially coastal populations in the developing world. Available

information on coral reefs in Sri Lanka and South East Asia has been used to evaluate the ecological services provided by coral reefs and to assess the long-term economic benefits derived from some of the ecosystem functions. The minimum estimate of economic value of coral reefs in Sri Lanka is US\$ 140,000-US\$ 750,000 per square kilometre over a 20 year period. The economic consequences of coral mining were also investigated and economic costs (US\$ 110,000-7,360,000) were found to exceed net benefits (US\$ 750,000-1,670,000) when analysed over 20 years in tourism areas. The highest costs were associated with decreased tourism and increased erosion. However in rural areas there is still a strong incentive for coral mining, because it provides a more profitable business than fishing or agriculture in the short-term. The results have implications for management and show that Sri Lankan legislation banning coral mining in the coastal zone is beneficial to the country's economic development.

Coverage: Asia

Contains examples or case studies from: Sri Lanka

Ecosystem or sector focus: Marine and coastal, Fisheries, Tourism

Topics: Valuation, Contingent valuation, Effect on production, Mitigative and avertive expenditures, Replacement costs, Causes of biodiversity loss

#38. Bishop, J., Aylward, B., & Barbier, E. B., (1991), *Guidelines for Applying Environmental Economics in Developing Countries*. LEEC Paper DP 91-02, London Environmental Economics Centre: London. 14 pp.

These guidelines are intended to support the use of economic analysis in assessing environmental problems in developing countries. They have been written for an audience familiar with the language of economics as a practical introduction to applied environmental economics. The first section deals with the assessment of natural resource endowments, trends and potential problems, with a focus on defining economy-environment links and the valuation of environmental degradation. The second section reviews the market failures underlying many environmental problems including causes,

consequences and alternative policy responses. The final section reviews the impact of public policy on the environment including the effects of regulation, economic policy, public investment and institutions.

Coverage: Global

Topics: Environmental accounting, Causes of biodiversity loss, Economic policies, Economic instruments, Incentive measures, Disincentives, Valuation

#39. Bishop, J., (1995), *The Economics of Soil Degradation: An Illustration to the Change in Productivity Approach to Valuation in Mali and Malawi*. LEEC Paper DP 95-02, London Environmental Economics Centre: London. 80 pp.

This paper looks at the economic costs of land degradation and soil erosion. It begins by reviewing basic concepts and techniques used in the economic analysis of soil degradation. The impacts of soil degradation on agriculture is discussed in terms of productivity, farmer response and technological change. A review of various economic techniques for the valuation and an overview of the various policy failures and market distortions that give rise to soil degradation are presented. Results from case studies of the economic valuation of soil degradation in Mali and Malawi are presented.

Coverage: Africa

Contains examples or case studies from: Malawi, Mali

Ecosystem or sector focus: Agriculture, Forests

Topics: Soil erosion, Land degradation, Valuation, Incentive measures

#40. Blackman, A., & Harrington, W., (1999), *The Use of Economic Incentives in Developing Countries: Lessons from International Experience with Industrial Air Pollution*. Discussion Paper 99-39, Resources for the Future: Washington DC. 37 pp.

To what extent should developing countries eschew conventional command and control environmental regulation that is increasingly seen as inefficient and rely instead on economic incentives? This paper addresses this question as

it pertains to industrial air pollution. The paper discusses the advantages and disadvantages of various economic incentive instruments, presents in-depth case studies of their application in Sweden, the United States, China, and Poland, and proposes a number of policy guidelines. We argue that both design deficiencies and pervasive constraints on monitoring and enforcement impede the effectiveness of economic instruments in developing countries. The latter are difficult to rectify, at least in the medium term. As a result, tradable permits are generally not practical. Suitably modified however, emissions fee policies probably are appropriate. They can provide a foundation for a transition to an effective economic incentive system, and can raise much needed revenue for environmental projects and programs. In addition, if political opposition can be overcome, environmental taxes constitute a second-best but potentially effective pollution control instrument.

Coverage: Global, North America, Asia, Europe

Contains examples or case studies from: USA, Sweden, China, Poland

Ecosystem or sector focus: Industry, Infrastructure, Urban settlements

Topics: Incentive measures, Pollution, Taxes, Markets and charges

#41. Blockhus, J., Bagri, A., & Vorhies, F., (1999), *Perverse Subsidies and Biodiversity Loss*. IUCN - The World Conservation Union. 48 pp. <http://www.biodiversityeconomics.org>

This paper examines one aspect of the interaction between biodiversity, the economy and society - the impact of public subsidies on biodiversity. Subsidies are actually a type of incentive measure designed to encourage certain behaviour. The CBD in Article 11 calls on governments to design economically and socially sound measures which provide incentives for conservation and sustainable use. Subsequent deliberations of the CBD Conference of the Parties have further emphasised the need to address perverse incentives. (See in particular COP decisions III/18 and IV/10a). Perverse incentives undermine conservation and sustainable use.

Coverage: Global

Ecosystem or sector focus: Drylands, Forests, Marine and coastal, Agriculture, Wetlands, Mountains, Industry, Infrastructure, Fisheries

Topics: Subsidies, Causes of biodiversity loss, Incentive measures, Disincentives, Convention on Biological Diversity

#42. Bojo, J. (1991). 'Economics and land degradation', *Ambio* 20 (2):75-79

This article analyses the problem of land degradation from an economic viewpoint, with particular attention to the situation in developing countries. It also discusses how economic analysis can contribute to efficient land rehabilitation. A brief review of available evidence of land degradation, physical as well as economic assessments, is presented. The driving forces behind land degradation are discussed in terms of market failure and policy failure that contribute to land degradation or hamper effective counter measures. There is a brief discussion about attempts made to remedy the situation. In general, soil conservation appears to have been unsuccessful. New ideas are emerging that set a challenging agenda for the future. It is argued that economics can play a positive role at the project level and at the level of national and international planning in improving land management.

Coverage: Global

Ecosystem or sector focus: Forests, Agriculture

Topics: Valuation, Economic policies, Causes of biodiversity loss, Economic instruments, Soil erosion, Land degradation

#43. Bojo, J., (1996), *The Economics of Wildlife: Case Studies from Ghana, Kenya, Namibia and Zimbabwe*. AFTES Working Paper No 19, Environmental Policy and Planning, World Bank: Washington DC. 145 pp.

This report documents a study on wildlife economics in four African countries. It aims to provide experiences to help shape policy and project interventions. The report looks at wildlife policies and legislation, and attempts to assess the relative profitability of wildlife management.

Coverage: Africa

Contains examples or case studies from: Ghana, Kenya, Namibia, Zimbabwe

Ecosystem or sector focus: Wildlife, Protected Areas

Topics: Valuation

Economic policies
Causes of biodiversity loss
Incentive measures

#44. Bostedt, G., & Mattsson, L. (1995). 'The value of forests for tourism in Sweden', *Annals of Tourism Research* 22 (3):671-680

Sweden has a vast quantity of forests, and the right of common access allows tourists to freely enter any forests no matter who owns it. An economic valuation study was carried out in two tourism areas, one in the southern part of the country and one in the northern part. It was shown that a considerable portion of the value to tourists can be attributed to forest characteristics. Furthermore the results show that this value can be increased by modifying forest management practices: for example by making clearcuts smaller, even if there were more of them, and by increasing the proportion of broad leafed trees in forest stands.

Coverage: Europe

Contains examples or case studies from: Sweden

Ecosystem or sector focus: Forests, Tourism, Protected Areas

Topics: Valuation, Contingent valuation

#45. Bowles, I. A., Clark, D., Downes, D., & Guerin-McManus, M., (1996), *Encouraging Private Sector Support for Biodiversity Conservation: The Use of Economic Incentives and Legal Tools*. Policy Papers Volume I 1996, Conservation International: Washington DC. 12 pp.

This report summarises some of the key approaches to designing economic incentives for private sector participation in biodiversity conservation. It introduces the reader to some of the fundamental reasons why business cannot ignore conservation. It also explores how economic incentives can often accomplish major conservation objectives at a lower cost than traditional approaches.

Coverage: Global

Topics: Incentive measures, Taxes, Financial mechanisms, Private sector

#46. Boyd, J., Caballero, K., & Simpson, D. R., (1999), *The Law and Economics of Habitat Conservation: Lessons from an Analysis of Easement Acquisitions*. Discussion Paper 99-32, Resources for the Future: Washington DC. 45 pp.

There is a growing interest in incentive-based policies to motivate conservation by landowners. These policies include full- and partial-interest land purchases, tax-based incentives, and tradable or bankable development rights. Using legal and economic analysis, the paper explores potential pitfalls associated with the use of such policies. Incentive-based policies promise to improve the cost effectiveness of habitat preservation, but only if long-run implementation issues are meaningfully addressed. While we compare conservation policies, particular attention is devoted to the use of conservation easements and in particular a set of easement contracts and transactions in the state of Florida. The easement analysis highlights the importance of conservation policies' interactions with property markets, land management practices, and bureaucratic incentives. Specific challenges include difficulties associated with the long-term enforcement and monitoring of land use restrictions, the lack of market prices as indicators of value for appraisal, and the way in which incentives target specific properties for protection.

Coverage: North America

Contains examples or case studies from: USA

Topics: Economic instruments, Taxes

#47. Brouwer, R., Langford, I. H., Bateman, I. J., Crowards, T. C., & Turner, R. K., (1997), *A Meta-Analysis of Wetland Contingent Valuation Studies*. Working Paper GEC 97-20, Centre for Social and Economic Research on the Global Environment: London.

Recent years have seen a growing interest, both from academics and policy makers, in the potential for producing generally applicable models for the valuation of non-market environmental goods and services which do not rely upon expensive and time consuming original survey work but rather extrapolate results from previous studies of similar assets. This paper presents such a meta-analysis for the use and non-use values generated by wetlands across Europe

and North America. This study directly addresses two fundamental methodological issues: (i) whereas previous analyses have tended to examine valuation differences between various environmental goods, the present study focuses down a further level to assess the values attributable to the individual use and non-use values associated with the ecological, biogeochemical and hydrological functions provided by a given complex environmental asset; (ii) previous meta-analyses have been criticised for insufficiently addressing the potential problem of clustering within the multiple values derived from single valuation studies; this issue was examined through the application of advanced, multi-level modelling methods which allow for the hierarchical structure of data implicit in such clustering. The study opens with a qualitative descriptive analysis of wetland functions. This is used as the basis of the subsequent quantitative meta-analysis of evaluations derived from a large number of contingent valuation (CV) studies of wetlands. These studies yield over 100 value estimates which our meta-analysis relates to the previously defined function variables and various CV design parameters. Results from the meta analysis identify a number of distinct values for wetland functions. Interestingly, use values such as flood control, water generation and water quality attributes were found to exert a stronger influence over willingness to pay (WTP) than non-use elements such as the biodiversity functions of wetlands, a result which accords with the findings of recent mixed revealed and expressed preference studies of non-market goods. A number of standard CV design effects were also shown to have a significant impact upon WTP including the choice of payment vehicle and elicitation method (the previously observed discrepancy between dichotomous choice and open ended formats being particularly noticeable). Routine considerations of issues such as inter-country effects were also conducted yielding interesting results. The analysis also included a number of novel elements such as a scope test, an assessment of study quality and the aforementioned investigation of potential evaluation clustering due to identical survey design or sample population. Tests showed that this approach afforded a significant improvement in modelling of the data over that achieved by more conventional meta-analyses. Although considerable effort has been put into specifying the characteristics of the environmental functions and correspondingly the environmental goods and services involved, many sample population

characteristics remain unevaluated. Typically, in meta-analysis inferences are made on the basis of information on global statistics, such as the mean and standard deviations of parameter estimates. These may or may not describe individual behaviour adequately. In order to overcome this problem, a next step is to analyse individual data supplied by authors of the studies included in the meta-analysis. This provides an important test of the appropriateness of meta-analysis as an instrument to synthesise CV outcomes, for example for the purpose of benefits transfer.

Coverage: Global, Europe, North America

Ecosystem or sector focus: Wetlands, Water

Topics: Valuation, Contingent valuation

#48. Brown, G., & Henry, W., (1989), *The Economic Value of Elephants*. LEEC Paper 89-12, London Environmental Economics Centre: London. 18 pp.

This paper reports on a valuation study used to estimate the value of Kenya's elephants to tourists through a survey administered to visitors to major National Parks and lodges. It highlights the decline of African elephant populations in the last decades, mainly due to poaching, and assesses how this affects the value that wildlife viewing holds for tourists. Using contingent valuation and travel cost techniques, the annual viewing value of elephants was calculated at between US\$ 25-30 million. The paper recommends that more money should be invested in protecting elephants from poachers, which in the long run will generate more income through sustained tourist earnings.

Coverage: Africa

Contains examples or case studies from: Kenya

Ecosystem or sector focus: Wildlife, Protected Areas, Tourism

Topics: Valuation, Contingent valuation, Travel cost, Financial mechanisms, Markets and charges

#49. Brown, K., Pearce, D., Perrings, C., & Swanson, T., (1993), *Economics and the Conservation of Global Biodiversity*. Working Paper No 2, The Global Environment Facility: Washington DC. 75. 1-884122-01-9

This paper explores the relationship between economics and biodiversity conservation. It deals

with the concepts of costs and benefits as they apply to biodiversity, assesses what is currently known about extinction rates and species loss, and looks at efforts to place a value on biodiversity. It also investigates the economic causes of biodiversity loss. Finally, the paper considers ways in which the GEF might alleviate the problem of under-investment in biodiversity.

Coverage: Global

Topics: Convention on Biological Diversity, Valuation, Economic instruments, Causes of biodiversity loss, Deforestation

#50. Brown, K., & Adger, W. N., (1993), *Forests for International Offsets: Economic and Political Issues of Carbon Sequestration*. Working Paper GEC 93-15, Centre for Social and Economic Research on the Global Environment: London.

Forests are important in the global carbon cycle, forming a major sink for carbon. Deforestation is a significant source of carbon dioxide emitted to the atmosphere. There is some scope to enhance natural carbon sinks, and therefore reduce net emissions of greenhouse gases, through afforestation and conservation of existing forests. Such initiatives may be implemented to "offset" emissions of greenhouse gases from other sources. This may be undertaken by private companies, or by governments as part of bi-lateral agreements or multi-lateral arrangements. International carbon offsets may be cost effective in terms of reduction of carbon emissions achieved, and may also be one way to mobilise private capital to fund forest conservation. It is argued here that theoretically the international offset of emissions may lead to a resource saving, and that forest conservation, as opposed to afforestation, may bring about many other benefits. However, such international contracts are unlikely to be feasible or make a major contribution to the control of greenhouse gases. The reasons for this are monitoring, enforcement and scientific uncertainties, and the implicit change in property rights involved in "selling" carbon sequestration rights.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Climate change, Carbon offsets, Financial mechanisms

#51. Brown, K., & Moran, D., (1993), *Valuing Biodiversity: The Scope and Limitations of Economic Analysis*. Centre for Social and Economic Research on the Global Environment: London. 30 pp.

The Biodiversity Convention recognises both the intrinsic value of biodiversity and its components, but also the need for greater understanding of valuation of these resources from an anthropocentric viewpoint. This paper discusses economic and other approaches to the valuation of biodiversity. Economic valuation is essentially a utilitarian approach which distinguishes use and non-use values of the assets involved. It is argued that these approaches have shortcomings, especially in the cultural, intrinsic and primary aspects of value. For example, cultural values of medicinal plants tend not to be included in demonstrative economic valuation, yet in many areas fundamentally determine the resource management of species rich areas and context of habitat conversion. Recognising its limitations, economic analysis does have a role in conservation policy. It is therefore vital that practitioners and protagonists converge in order to develop an enhanced understanding of the values of biodiversity.

Coverage: Global

Topics: Valuation
Convention on Biological Diversity

#52. Brown, P., (1998), *Economic and Legal Tools to Support Ecosystem Management in the United States*. World Resources Institute: Washington DC. 50 pp.

This document is intended to serve as a resource for landowners, policy makers from local to national levels, as well as public and private land managers who would like to improve the environmental management of their lands and are seeking information and financial resources to do so. It describes a range of economic and legal instruments, their advantages and disadvantages, and illustrates these with case studies from the USA. Actions required to implement each tool are also outlined.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Forests, Wetlands, Marine and coastal, Agriculture, Drylands

Topics: Financial mechanisms, Incentive measures, Causes of biodiversity loss, Economic instruments

#53. Brown, K., Adger, W. N., Tompkins, E., Bacon, P., Shim, D., & Young, K., (2000), *Trade-Off Analysis for Marine Protected Area Management*. Working Paper GEC 2000-02, Centre for Social and Economic Research on the Global Environment: London.

This paper outlines an approach to natural resource management that incorporates multiple objectives for protected area management within a decision-making framework. Both regulators and other major stakeholders are directly incorporated into the approach to enhance decision-making processes. We call this approach trade-off analysis. The approach uses a framework based on multi-criteria analysis but involves stakeholders at all stages. This holistic approach is appropriate for multiple use, complex systems such as coastal resources, where many different users are apparently in conflict and where linkages and feedbacks between different aspects of the ecosystem and economy exist. The paper applies trade off analysis to the case of Buccoo Reef Marine Park in Tobago. Stakeholder analysis is undertaken, and social, economic and ecological criteria identified. The impacts of four different development scenarios are evaluated for these criteria. Stakeholders are asked to weight different criteria and then the outcomes of different stakeholder weightings in the multi-criteria analysis used to explore different management options. The approach has been used effectively to enhance stakeholder involvement in decision-making and develop consensus-based approaches to management of the marine protected area.

Coverage: Caribbean

Contains examples or case studies from: Trinidad and Tobago

Ecosystem or sector focus: Marine and coastal, Tourism, Fisheries

Topics: Property rights

#54. Cabrera, M. A., Seijo, J. C., Euan, J., & Perez, E. (1998). 'Economic values of ecological services from a mangrove ecosystem', *Intercoast Network* 32:1-2

This article reports on a valuation study carried out to assess the Terminos Lagoon. It quantifies the value of destructive harvesting practices and economic activities, and also looks at the value of different mangrove goods and services.

Coverage: Latin America

Contains examples or case studies from: Mexico

Ecosystem or sector focus: Marine and coastal, Wetland, Fisheries

Topics: Valuation

#55. Carson, R. T. (1998). 'Valuation of tropical rainforests: philosophical and practical issues in the use of contingent valuation', *Ecological Economics* 24 (1):15-29

This paper explores the possibility of using a large-scale multi-country contingent valuation study for making decisions concerning global resources in the specific context of valuing a large set of tropical rainforests. Before considering the practical issues involved in implementing such a study, the paper addresses philosophical issues related to the use of contingent valuation including the role of passive use motives such as altruism and the role of information. The implications of empirically based criticisms which argue that contingent valuation results are unreliable are also considered. The main portion of the paper sketches the practical difficulties likely to be encountered in actually implementing a large contingent valuation study in multiple countries which seeks to value a common set of tropical rainforests.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Valuation, Contingent valuation

#56. Casellini, N., Foster, K., & Hien, B. T. T., (1999), *The "White Gold" of the Sea: A Case Study of Sustainable Harvesting of Swiftlet Nest in Coastal Vietnam*. IUCN - The World

Conservation Union, Vietnam Country Office:
Hanoi. 63 pp.

The sustainable exploitation of wild natural resources, such as the nest from the edible-nest swiftlets, has been achieved in Vietnam without external aid or expertise. This study examines economic aspects of this trade and argues that this is an importance source of sustainable revenue for Vietnam. It also documents attempts made by a private company to invest in scientific research and monitoring of harvesting, and to their human and financial management procedures.

Coverage: Asia

Contains examples or case studies from:
Vietnam

Ecosystem or sector focus: Wildlife, Marine and coastal

Topics: Trade, Valuation, Incentive measures

Other: Also published in Vietnamese

#57. Cervigni, R., (1993), *Biodiversity, Incentives to Deforest and Tradeable Development Rights*. Working Paper GEC 93-07, Centre for Social and Economic Research on the Global Environment: London.

This paper addresses the main economic aspects of habitat conversion in biodiversity rich areas. Land use changes are taking place as a result of demographic pressure (population growth and/or migration) and because local resource users are not able to capture the global benefits of biological resources; the particular case of Amazon's "peasant cycle" is illustrated with the aid of the notion of bid-rent function. A mechanism to capture the global benefits of conservation is to trade rights in land uses between tropical countries and the international community. Based on the idea of International Franchise Agreements (IFAs), a simplified framework is then formulated, to analyse under which conditions such a trade would be effective in modifying local incentives. A significant element of this problem is the choice of a contractual structure capable of minimizing conflicts of interest among the different parties involved in the scheme. Finally, it is argued that introducing a market in land uses may have

general equilibrium effects whose final impact on conservation is worthwhile investigating.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Trade, Markets and charges, Incentive measures, Financial mechanisms

#58. Cervigni, R., (1995a), *Incremental Cost and the Convention on Biological Diversity: A Simple Model*. Working Paper GEC 95-32, Centre for Social and Economic Research on the Global Environment: London.

The Convention on Biological Diversity stipulates the principle of incremental cost for the international financing of biodiversity conservation. There is little agreement in the international arena about the exact meaning of the concept, and about its practical application. This paper uses some standard tools of demand theory to analyze the notion of incremental cost in a partial equilibrium setting. The resulting allocation of resources is compared with a "domestic optimum", where no collective action is undertaken to improve conservation, with a hypothetical "global optimum", and with alternative financing schemes. In connection to the conduct of the country hosting biodiversity in the negotiations on incremental cost, a distinction is proposed between "quantity-" and "transfer-" taking behavior. The issue of price distortions in the baseline is also addressed. The conservation level prevailing under the global optimum is only forthcoming when the host country is a quantity taker, and is willing to accept a domestic benefits clawback factor of 1, which implies payment of net incremental cost, and an unchanged welfare for the host. A number of more detailed results are also derived and illustrated diagrammatically by imposing a particular multiplicative functional form on the utility of both host and ROW.

Coverage: Global

Topics: Convention on Biological Diversity, Financial mechanisms

#59. Cervigni, R., (1995b), *North-South Transfers, Incremental Cost and the Rio Environment Conventions*. Working Paper GEC 95-33, Centre for Social and Economic Research on the Global Environment: London.

Under the Framework Convention on Climate Change and the Convention on Biological Diversity, the developed world agrees to bear the 'incremental' costs that developing countries will face when implementing actions to secure global environmental benefits. In this paper, we review the origin of the concept of incremental cost, analyze its characterizing elements, and produce algebraic, graphical and verbal illustrations of incremental cost calculations. Two main set of problems complicate the determination of incremental cost. First, there is the treatment of concurrent domestic benefits generated by projects addressing global environmental concerns. Second, in order to estimate increments, there ought to be agreement on a baseline development plan, where the globally beneficial action would not be taken. The process of establishing baselines is likely to be made controversial by imperfect information, perverse incentives and distortions in the pricing system. Both on domestic incremental benefits and on baselines, we highlight the relevant trade-off. The need for providing incentives to developing countries to comply with the convention should be balanced off with cost-effectiveness criteria in protecting the global environment. We argue that baselines should not incorporate policy measures which are clearly inconsistent with the fundamental purpose of the Conventions. Often some of those policies may be reformed at zero or minimal costs.

Coverage: Global

Topics: UN Framework Convention on Climate Change, Convention on Biological Diversity, Financial mechanisms

#60. Cesar, H., (1996), *The Economic Value of Indonesian Coral Reefs*. Agriculture Operations Division and Environment Department, World Bank: Washington DC. 9 pp.

This paper looks at the economic value of the benefits associated with coral reefs in Indonesia. It also addresses the economic threats to reef biodiversity. It investigates the private and social economic trade offs involved in reef conservation, and concludes that the private benefits associated economic activities that lead to reef destruction are often great, but the social costs are also high. Government action is required to stop these threats.

Coverage: Asia

Contains examples or case studies from: Indonesia

Ecosystem or sector focus: Marine and coastal, Fisheries

Topics: Valuation, Economic policies, Causes of biodiversity loss

#61. Cesar, H., Lundin, C. G., Bettencourt, S., & Dixon, J. (1997). 'Indonesian coral reefs - an economic analysis of a precious but threatened resource', *Ambio* 26 (6):345-545

Indonesia's coral reefs are currently undergoing rapid destruction from human activities such as poison fishing, blast fishing, coral mining, sedimentation, pollution and over-fishing. These destructive activities are described and their private gains valued. It is shown that the social costs by far outweigh private gains. The paper concludes with a discussion on designing appropriate policy responses to these problems.

Coverage: Asia

Contains examples or case studies from: Indonesia

Ecosystem or sector focus: Marine and coastal, Fisheries

Topics: Valuation, Economic instruments, Incentive measures, Market valuation, Disincentives, Causes of biodiversity loss, Economic policies

#62. Chomitz, K. M., & Kumari, K. (1998). 'The domestic benefits of tropical forests: a critical review', *The World Bank Research Observer* 13 (1):13-35

Protecting tropical forests yields domestic economic benefits. This paper reviews attempts at the valuation and quantification of such benefits. It finds that the quantifiable benefits of forest preservation in providing hydrological services and nontimber forest products are highly variable. Locally important in some situations, these classes of domestic benefits may in general be smaller than popularly supposed. This underscores the need for financing conservation from the Global Environment Facility or other global sources rather than placing the burden entirely on domestic resources.

Coverage: Global

Contains examples or case studies from: Philippines, Thailand, China, Malaysia, Brazil, Mexico

Ecosystem or sector focus: Forests, Water, Watersheds

Topics: Land degradation, Soil erosion, Causes of biodiversity loss, Valuation, Economic instruments, Financial mechanisms

#63. Chomitz, K. M., Brenes, E., & Constantino, L., (1998), *Financing environmental services: the Costa Rica experience and its implications*. Development Research Group and Environmentally and Socially Sustainable Development, Latin America and Caribbean Region, World Bank: Washington DC.

This paper describes an on-going initiative in Costa Rica - attempts to achieve environmental goals by creating markets for the environmental benefit of forests. This initiative takes a proposition from theoretical economics - that forests would be better maintained if forest owners were compensated for all the services they provide - and puts it to work in the real world. The paper describes both the theory of this initiative, the practical problems that Costa Rica has faced, and also identifies the issues and challenges that remain in the future implementation of this initiative.

Contains examples or case studies from: Costa Rica

Ecosystem or sector focus: Forests, Water, Watersheds

Topics: Economic instruments, Financial mechanisms, Incentive measures, Markets and charges, Payments for environmental services

#64. Clark, R., (1996), *The Economic Analysis of Soil Erosion and Soil Conservation: A Literature Review of Methodology*. Working Paper GEC 96-13, Centre for Social and Economic Research on the Global Environment: London.

Land degradation caused by soil erosion is a major threat to the sustainability of agriculture. The costs of erosion can be used to prioritise

implementation of soil conservation, and economic analysis of alternative conservation technologies can be used to identify courses of action that efficiently employ available resources. A number of different approaches are currently used for the valuation and economic analysis of erosion and conservation. This paper reviews the approaches used for the on-site and off-site effects of erosion and conservation, primarily in developing countries. The on-site effects of erosion can be valued in terms of the impacts on soil properties, using the replacement cost, or the impacts on crop production. Valuation of conservation technologies requires additional considerations: the effectiveness of the technology in reducing erosion; and valuation of additional benefits of the technology such as animal fodder production. The off-site effects of soil erosion are numerous but are excluded from many studies. Valuation is generally limited to the effects of reservoir sedimentation on hydro-electricity generation and water supplies for irrigation. Economic appraisals of soil erosion and conservation generally use financial and/or cost benefit analysis. These appraisals are plagued with problems concerning the availability and accuracy of data, making sensitivity analysis a necessary accompaniment. The studies reviewed vary widely in the discount rates and time periods used, and the extent of sensitivity analysis. It is therefore essential that the findings of studies are accompanied by explicit details of the assumptions and any necessary cautions about the quality and reliability of data.

Coverage: Global

Ecosystem or sector focus: Agriculture, Water, Infrastructure

Topics: Land degradation, Soil erosion, Valuation

#65. Clayton, C., & Mendelsohn, R. (1993). 'The value of watchable wildlife: a case study of McNeil River', *Journal of Environmental Management* 39:101-106

This study measures the user value of McNeil River, a bear watching game sanctuary. The results of contingent valuation questions using both open-ended and discrete choice formats are compared. Adjusting for outliers in all models reveals the users are willing to pay an average of between US\$228 and US\$277 per person to visit this unique site.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife, Protected Areas, Tourism

Topics: Valuation, Contingent valuation

#66. Commission on National Parks and Protected Areas, (1995), *Economic Assessment of Protected Areas: Guidelines for their Assessment*. Commission on National Parks and Protected Areas, IUCN - The World Conservation Union: Gland. 142 pp.

This document proposes an economic evaluation framework for protected areas. It illustrates this framework for economic assessment with various case studies from around the world.

Coverage: Global, Latin America, North America, Pacific, Australia and New Zealand

Contains examples or case studies from: Belize, Fiji, USA, Australia, Canada

Ecosystem or sector focus: Protected Areas, Wildlife, Forests, Marine and coastal, Tourism

Topics: Valuation

#67. Conservation International, (1997), *The Economics of Biodiversity Conservation in the Brazilian Atlantic Forest*. Project Profile Number 1, Conservation International: Washington DC. 12 pp.

The Brazilian Atlantic forest is perhaps the most striking example of a conservation "hotspot"-rich in biodiversity, already heavily fragmented and under continued threat. In 1993, CI made a new investment in the area to test a question that has challenged conservationists for decades: how can we articulate the value of biodiversity? We know biodiversity has many values. Intact forests protect watersheds. They provide the genetic clues for many pharmaceuticals. They buffer the climatic system against change. They are the storehouse for traditional medicines. But in Southern Bahia, Brazil, these values often mean little to the individual landowner. The recent shift of international markets away from Bahian cocoa, the region's main agricultural product, has caused landowners to reconsider their traditional conservation of the forest and to begin logging it

and converting it to cattle pasture. Against this background, we set out to assess the economics of conservation around the Una Biological Reserve in Southern Bahia. We wanted to increase our understanding of economic choices in order to articulate the value of biodiversity at the level of the individual landowner. Our assessments produced striking results. For individual landowners, investments in livestock proved marginal at best and logging was profitable only for the very short term, while certain forms of conservation investments showed promise of producing higher returns. CI has used these research results to design a strategic set of conservation actions for the forest fragments that border the Una Reserve. For CI, our understanding of the economics of biodiversity is increased. Not all of our questions have been answered yet, but I believe our findings here in Bahia will be critically important for conservationists world-wide.

Coverage: Latin America

Contains examples or case studies from: Brazil

Ecosystem or sector focus: Forests, Protected Areas, Agriculture

Topics: Incentive measures, Valuation, Causes of biodiversity loss, Bioprospecting

#68. Convery, F. J., (1995), *Applying environmental economics in Africa*. World Bank Technical Paper, 277(157): Washington DC.

The paper intends to show how environmental economics could and should be used to improve the quality of decision making in the process of drawing up National Environmental Action Plans. After an introduction, there are 11 chapters, covering: a theoretical review; environmental management as development strategy; identifying perverse and positive incentives to environmental degradation; non-price incentives; property rights and tenure systems; general cost issues; estimating gross costs - a Ghana case study; evaluation of benefits; comparing benefits and costs; and institutional development and cultural dimensions. Two appendices cover the key literature and data sources and a hypothetical case study of the choices facing an African farmer.

Coverage: Africa

Contains examples or case studies from: Ghana

Ecosystem or sector focus: Forests, Protected Areas, Agriculture

Topics: Causes of biodiversity loss, Economic instruments, Economic policies, Valuation, Incentive measures

#69. Conway, T., (1998), *A Framework for Assessing the Relationship Between Trade Liberalization and Biodiversity Conservation*.

United Nations Environment Programme and International Institute for Sustainable Development Working Paper: Nairobi. 72 pp.

This paper develops a framework for assessing the impacts on biodiversity of trade policies such as tariffs, non-tariff barriers and international liberalization agreements. The framework is described, and applied to two case studies: Papua New Guinea and Indonesia. The framework is worth applying: the effects of trade in any context are difficult to isolate and quantify, yet governments and international organisations regularly undertake to do so anyway. For a number of reasons, even a partial picture is better than none.

Coverage: Global, Asia, Pacific

Contains examples or case studies from: Indonesia, Papua New Guinea

Topics: Trade, Economic instruments, Economic policies, Taxes, Subsidies

#70. Costa, R., & Kennedy, E. T., (1996), *Safe Harbor for Endangered Species on Private Lands in the United States*. Paper presented at workshop on Incentives for Biodiversity: Sharing Experiences, 4th Global Biodiversity Forum, Montreal, Canada 30 August - 1 September 1996. 6 pp.

<http://www.biodiversityeconomics.org>

This paper outlines efforts in North Carolina to provide incentives for the preservation of habitat for the endangered Red-cockaded woodpecker. The programme entails the establishment of 'safe harbours' for the woodpecker on private lands through a transferable certificate system which reserves land for sustainable development and use. The paper outlines the benefits of the programme on local and state wide levels, outlines several lessons from the project, and highlights

recommendations for encouraging private sector involvement in conservation efforts.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife

Topics: Economic instruments, Private sector, Incentive measures, Markets and charges

#71. Costa, P. M., Salmi, J., Simula, M., & Wilson, C., (1999), *Financial Mechanisms for Sustainable Forestry*. Programme on Forests, United Nations Development Programme: New York. 122 pp.

This document outlines a comprehensive global financing strategy for the implementation of sustainable forest management. The core components of this strategy include the development of enabling conditions including appropriate policy frameworks, the targeted use of concessionary finance in leveraging private investment, and the co-ordinated development of widely applicable instruments for sustainable forest management financing.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Financial mechanisms, Economic instruments, Private sector, Trust Funds, Carbon offsets, Debt conversion

#72. Costanza, R., Farber, S., & Maxwell, J. (1989). 'Valuation and management of wetland ecosystems', *Ecological Economics* 1:335-361

This article reports on a study of wetland values in coastal Louisiana that employed both willingness to pay and energy analysis based methodologies and were able to bracket a range of values within which the authors are confident that the true value lies. However there remains a large amount of uncertainty. The current estimate for the total present value of an average acre of natural wetlands in Louisiana are US\$ 2,429-US\$ 6,400 per acre (assuming an 8% discount rate) to US\$ 8,977-17,000 per acre (assuming a 3% discount rate). At the lowest value, the current annual rate of loss of Louisiana wetlands (50 square miles per year) is worth about US\$ 77 million. At the largest value it is worth about US\$ 544 million. This paper discusses the fundamental

theoretical and practical problems underlying natural resource valuation, summarises the methods and findings for the case of Louisiana and elaborates on some of the more recalcitrant problems attending applied natural resource valuation, including discounting and dealing with uncertainty and imprecision. The discount rate makes more difference in the final result than any other factor, and yet there is much disagreement about the appropriate approach to discounting natural resources. This problem is discussed, and an argument made for lower discount rates to be applied to the valuation of renewable natural resources.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wetlands, Water, Fisheries, Tourism

Topics: Valuation, Contingent valuation, Effect on production, Replacement costs

#73. Costanza, R. (Ed.), (1991), *Ecological Economics: the Science and Management of Sustainability*. Columbia University Press: New York. 525 pp. ISBN 0-231-07562-6

This book brings together different aspects of ecological economics including accounting, modelling and analysis of ecological economic systems, and necessary institutional changes and case studies.

Coverage: Global

Topics: Valuation, Incentive measures, Economic policies, Trade, Disincentives, Causes of biodiversity loss, Taxes, Subsidies

#74. Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R. O., Paruelo, J., Raskin, R. G., Sutton, P., & van den Belt, M. (1997). 'The value of the world's ecosystem services and natural capital', *Nature* 387 (May):253-260

The services of ecological systems and the natural capital stocks that produce them are critical to the functioning of the Earth's life support systems. They represent part of the economic value of the planet. This article presents the findings of a study which estimates the current economic value

of 17 ecosystem services for 16 biomes, based on published studies and original calculations.

Coverage: Global

Ecosystem or sector focus: Marine and coastal, Forests, Savannahs, Drylands, Wetlands, Agriculture

Topics: Valuation

#75. Council for Agricultural Science and Technology (Ed.), (1999), *Benefits of Biodiversity*. Task Force Report No. 133, Council for Agricultural Science and Technology: USA. 33. 0194-4088

This document argues that productive and efficient agriculture, which is the foundation of modern successful societies, has depended on biodiversity and will be even more dependent on it in the centuries ahead. Yet expanding human activities are threatening this biodiversity, and thus compromising the long-term sustainability, productivity and stability of agriculture and society. The document looks at the economic benefits of biodiversity, focusing on agricultural systems and agrobiodiversity. It presents a number of examples of the value of agrobiodiversity, and makes recommendations about the need to conserve biodiversity, preserve natural areas, preserve plant and animal germplasm, and increase the effective use of diversity in agriculture.

Contains examples or case studies from: USA, Costa Rica, Kenya

Ecosystem or sector focus: Agriculture

Topics: Valuation

#76. Crowards, T., (1995), *Non-Use Values and Economic Valuation of the Environment: A Review*. Working Paper GEC 95-26, Centre for Social and Economic Research on the Global Environment: London.

Nonuse value is a potentially very important but controversial aspect of economic valuation of the environment. In order to derive such value, an individual need not ever make use of the resource, but may enjoy the satisfaction of simply knowing that it exists. The number of individuals to which such values can be attributed could conceivably therefore be very large, so that in the

aggregate, nonuse values could make up a substantial proportion of the total value of an environmental resource. Much of the controversy surrounding nonuse values is focused upon their measurement and in particular the contingent valuation method. This paper focuses instead upon the issues underlying the economic theory of non-use motivations for attributing value to the environment. Some fundamental aspects of defining and measuring nonuse values are considered, before analysing the normative assumptions that economics makes concerning individuals' preferences and motivations, especially with regard to altruism and the satisfaction of others. A clear distinction is made between 'selfish' altruism and 'selfless' altruism, which has important implications for economic valuation and willingness to pay analyses. The relevance of this distinction for policy formulation is considered, and the concept of safe minimum standards is introduced as one possible means of extending and improving purely economic approaches to environmental resource valuation and allocation.

Coverage: Global

Topics: Valuation

#77. Crowards, T. (1996). 'Natural Resource Accounting: a case study of Zimbabwe', *Environmental and Resource Economics* 7:213-241

There is as yet no consensus on the most appropriate way to incorporate the degradation of natural capital into national income accounting procedures. The net price method is used to adjust the national accounts of Zimbabwe for the depletion of forests, soils and mineral resources for the period 1980-89. The results suggest that the economic depreciation of natural resources represents approximately 2% of GDP. The implications for integrating natural resource depletion into policy making, within the current policy climate, are then addressed.

Coverage: Africa

Contains examples or case studies from: Zimbabwe

Ecosystem or sector focus: Agriculture, Forests, Industry

Topics: Environmental accounting, Valuation, Economic policies, Soil erosion

#78. Czech, B. (2000). 'Economic growth as the limiting factor for wildlife conservation', *Wildlife Society Bulletin* 28 (1):4-15

The concept of limiting factor includes the lack of welfare factors and the presence of decimating factors. Originally applied to populations and species, the concept may also be applied to wildlife in the aggregate. Because the decimating factor of economic growth eliminates welfare factors for virtually all imperiled species via the principle of competitive exclusion, economic growth may be classified as the limiting factor for wildlife conservation. The wildlife profession has been virtually silent about this limiting factor, suggesting that the profession has been laboring in futility. The public, exhorted by neoclassical economists and political leaders, supports economic growth as a national goal. To address the limiting factor for wildlife conservation, wildlife professionals need to become versed in the history of economic growth theory, neoclassical economic growth theory, and the alternative growth paradigm provided by ecological economics. The Wildlife Society should lead the natural resources professions in developing a position on economic growth.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife

Topics: Causes of biodiversity loss

#79. Davies, J., & Richards, M., (1999), *The Use of Economics to Assess Stakeholder Incentives in Participatory Forest Management: A Review*. European Tropical Forestry Paper 5, Overseas Development Institute: London. 55 pp.

The environmental impacts of tropical forest loss and its consequences on people dependent in some way upon those forest resources have been a significant rationale for development assistance to the sector in the past 20 years. In general, however, deforestation rates have not slowed significantly, and forest policies and programmes have not had their desired effect. In part, this is due to an inadequate understanding of the real costs and benefits, and how these are shared between forest stakeholders, and in part because of a perceived lack of economic methods and experience in their application in project design

and implementation. Although economics provides a powerful body of theory and evidence for explaining and predicting human behaviour, few studies have focussed on the incentives of the different stakeholders within the forest sector, or considered the impact of non-forest sectoral influences on stakeholder livelihoods and land use decision-making options. The main objective of this review is to explain and critically examine existing and emerging economic methodologies in terms of their potential and limitations to assess stakeholder incentives in participatory forest management (PFM). Five hypotheses are proposed to explain why more economic analysis has not been carried out. First, it is often felt that economic tools tend to be reductionist and so are not useful for understanding the complex reality of PFM; second, many of the tools are too complex to be accessible to potential users (in particular, the non-economist); third, they are not accessible because the methodologies are not clearly explained; fourth, economics is seen to have lost credibility among professional PFM practitioners, and fifth, as a result of perceptions linked to the earlier hypotheses, donors have tended not to provide resources for exploring local economic incentives.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Incentive measures, Valuation

#80. Day, B., (2000), *A Recreational Demand Model of Wildlife-Viewing Visits to the Game Reserves of Kwazulu-Natal Province of South Africa*. Working Paper GEC 2000-08, Centre for Social and Economic Research on the Global Environment: London.

In recent years, random utility models (RUMs) have become an increasingly popular approach to estimating the welfare benefits derived by visitors to recreational sites. Researchers using such models have tended to concentrate on the choice between sites; explaining a visitor's decision by means of the different qualities of the available sites and the different costs of travelling to those sites. This is all well and good for 'day trips' but for recreational trips characterized by visits lasting a number of days, concentrating solely on the choice between sites may be a gross oversimplification. For such 'away-breaks', a visitor's choice of accommodation and length of stay may be just as important as the qualities of

the site and the length of the journey in determining the costs and benefits that result from the trip. This paper describes the application of a RUM known as a nested multinomial logit model (NMNL), which distinguishes the three dimensions of choice that characterise away-breaks; duration of stay, choice of recreational site and choice of accommodation type. Four costs are important in determining choice for such trips; the cost of travel to the recreational site, the cost of accommodation at the site, the cost of time whilst travelling and the cost of time whilst on-site. Previous applications have frequently assumed that travel time can be valued at some exogenously determined proportion of the wage rate, whilst at the same time ignoring the value of time spent on site. The specification of the indirect utility function in the model presented here, allows for the value of time to be inferred from the data by estimating the proportion of the wage rate that most appropriately values a unit of time spent in different activities. The model is applied to a unique dataset that records details of trips made by domestic households to the game reserves of the KwaZulu-Natal province of South Africa. These trips are typical of away-breaks, since visitors tend to travel fairly large distances to visit the reserves and typically stay one or more nights on site. Each of the game reserves affords visitors different wildlife-viewing opportunities and provides a variety of accommodation facilities that vary greatly in their quality and price. Geographical information system (GIS) techniques have been used to establish exact door to gate distances and provide accurate estimates of travel costs and travel times that take account of assumed road speeds. GIS techniques have also been employed to garner socio-economic data on the households in the dataset. One further novel feature of the data is the use of complex computer algorithms to accurately establish the choice sets faced by individual households. The three-level NMNL model is estimated using full information maximum likelihood (FIML). The results of the analysis support the work of De Serpa (1971) in that they suggest that recreationists have a positive willingness to pay to save time in travelling to a reserve, but as would be expected, are not willing to pay anything to save time spent on site. The model is used to calculate welfare estimates for continued access to the different game reserves. Average per-trip estimates of the consumer surplus enjoyed by domestic visitors range from around \$15 for one reserve, up to almost \$50 for another. Boot-strapping techniques have been

employed to calculate standard errors for these benefit estimates. The model can also be used to predict the change in revenues that might be realised following increases in entrance and/or accommodation charges. The model allows for the possibility that households will substitute between options following price changes, and hence, could provide valuable information to game reserve managers deciding upon pricing policies.

Coverage: Africa

Contains examples or case studies from: South Africa

Ecosystem or sector focus: Wildlife, Protected Areas, Tourism

Topics: Valuation, Contingent valuation, Markets and charges

#81. de Alessi, M., (1996), *Oysters in the Willapa Bay*. Paper presented at a workshop on Incentives for Biodiversity: Sharing Experiences, 4th Global Biodiversity Forum, Montreal, Canada 30 August - 1 September 1996. 3 pp.
<http://www.biodiversityeconomics.org>

This paper outlines the importance of the private ownership of tidelands to the conservation of the coastal waters. A long tradition of ownership of tidal waters by oyster-men who farmed these waters has created a strong impetus for private stewardship and resource enhancement which is now threatened by a desire to regulate the resource by the Washington State Government. This paper argues for continued local management of coastal resources.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Marine and coastal, Fisheries

Topics: Incentive measures, Private sector

#82. des Clers, B., (1998), *Financial Innovations for Biodiversity: Financing Emergency Actions for Biodiversity Conservation*. Paper presented at a workshop on Financial Innovations for Biodiversity, 10th Global Biodiversity Forum, Bratislava, Slovakia,

1-3 May 1998. 10.

<http://www.biodiversityeconomics.org>

The authors wish to highlight the roots of the problems which lead to loss of biodiversity on this planet and suggest some financial mechanisms to provide the very large recurrent income necessary to stop present trends in biodiversity loss. The preservation of tens of millions of hectares requires recurrent financial resources of tens of billions of dollars each year in order to secure the integrity of those ecosystems by compensating governments and local stakeholders for the loss of income and opportunities for alternative development which this preservation requires. Furthermore, the inventories of the planet's biological diversity will take time, possibly 50 or 100 years or more, and therefore the expenditures for preservation during such extended periods must be made on an ongoing, recurrent basis, during which resources could be submitted to "soft" use, monitoring, research and adaptive management. Various emergency actions are needed. Cultural and social values as well as economical systems tend, in many cases, to favour individual gains rather than collective benefits (prisoner's dilemma). In such cases, regulations, taxes, incentives or artificial market mechanisms are the best way to prevent the collective goods subject to degradation coming from destructive activities serving individual interests. There are certainly many different ways to finance emergency actions for biodiversity, some of which are more equitable than others. Here again, our proposal does not pretend to be the best or only one. It is rather to find an efficient mechanism, readily operational, which will enable countries to both take national measures and to do so participating in an international effort. A significant excise tax (10% or more) should be levied by each country on natural products (flora and fauna), to raise the multi billion dollars per year required. Most natural products traded internationally should be able to bear the weight of an additional tax at such a level. The income from such a tax to remain in the country of origin and be earmarked for national programs of biodiversity conservation. An international body such as GEF or other donor agencies, might additionally support those countries which exports of natural goods are much lower than their conservation needs.

Coverage: Global

Topics: Financial mechanisms, Economic instruments

#83. Dixon, J. A., Carpenter, R. A., Fallon, L. A., Sherman, P. B., & Manipomoke, S., (1986), *Economic Analysis of the Environmental Impacts of Development Projects*. Earthscan Publications Ltd: London. 134 pp. ISBN 1-85383-015-1

It has always been thought that some degree of pollution and waste is unavoidable in development projects. But no one has made much effort to quantify and assess the extent of this sort of damage. In this book a means of constructing useful economic evaluations of the impacts of development projects on the environment is proposed. It demands the systematic evaluation of all intentional and unintentional consequences of development initiatives before they are determined upon. Various case studies from Asia are provided to illustrate valuation methods and environmental impacts of development projects.

Coverage: Global
Asia

Contains examples or case studies from: Nepal, Philippines, Thailand, Indonesia

Ecosystem or sector focus: Agriculture, Infrastructure, Fisheries, Industry

Topics: Valuation, Economic instruments, Economic policies, Soil erosion, Land degradation, Pollution

#84. Dixon, J., & Hufschmidt, M. M. (Eds.), (1990), *Economic Valuation Techniques for the Environment: A Case Study Workbook*. John Hopkins University Press: Baltimore and London. 203 pp. ISBN 0-8018-3308-6

Environmental impact is one of the most significant considerations in the evaluation of economic development projects, but it is also an extremely difficult factor to measure. This book presents detailed case studies of the economic evaluation of the environmental impacts of development projects, from various parts of Asia. Three introductory chapters examine general aspects of environmental valuation techniques, including the identification, quantification and

analysis of environmental effects. A hypothetical case study illustrates important differences between financial and economic evaluations, and between market and shadow prices.

Coverage: Global, Asia

Contains examples or case studies from: Korea, Philippines, Japan, Thailand, China

Ecosystem or sector focus: Agriculture, Fisheries, Infrastructure, Marine and coastal, Urban settlements, Protected Areas, Forests, Wildlife, Water

Topics: Valuation, Economic policies, Economic instruments, Pollution, Markets and charges

#85. Dixon, J. A., & Sherman, P. B., (1990), *Economics of Protected Areas: A New Look at Benefits and Costs*. Earthscan Publications Ltd: London. 234 pp. ISBN 1-85383-097-6

The true economic value of protected areas, including national parks, scientific reserves, wildlife sanctuaries, natural monuments and landmarks, is often difficult to measure. They may be the repository of unique or very valuable natural assets, yet the short-term gains from exploiting their natural resources can often appear more attractive than the long-term benefits of conservation. This book helps government and non-governmental agencies to assess the costs and benefits associated with maintaining protected areas. It also provides methodologies for valuing these benefits and costs in monetary terms. Case studies are presented of the valuation of protected areas from Asia, Africa, Latin America and the Caribbean.

Coverage: Global, Africa, Asia, Latin America, Caribbean

Contains examples or case studies from: Thailand, British Virgin Islands, Australia, Cameroon, Netherlands Antilles, St Vincent, Kenya, Indonesia

Ecosystem or sector focus: Protected Areas, Wildlife, Forests, Water, Tourism

Topics: Valuation, Economic instruments, Economic policies, Incentive measures, Causes of biodiversity loss

#86. Dyer, G., & Belausteguigoitia, J. C., (1996), *Structural Adjustment, Market and*

Policy Failures: The Case of Maize. Paper presented at IUCN Workshop on Economics of Biodiversity Loss, April 1996, Gland, Switzerland. 14 pp.
<http://www.biodiversityeconomics.org>

This paper analyses the effects of structural adjustment policies in agriculture on crop diversity. The specific case of maize in Mexico is studied. The Mexican government has introduced high yielding varieties (HYVs) of maize into the agricultural sector in an attempt to increase productivity. In terms of biodiversity impact, the result has been a shift from traditional varieties of maize to HYVs and consequently a loss of maize diversity. The main problem is that the benefits from crop diversity are not internalised in the market system and they are therefore not taken into account by national policy-makers. The suggestion made in the paper is that policy-making must take place more at the local level and be conducted in consultation with local peasants. Structural adjustment policies in agriculture too often fail to consider effects at the micro-economic level. One of these effects can be, as in the case of maize in Mexico, biodiversity loss.

Coverage: Latin America

Contains examples or case studies from: Mexico

Ecosystem or sector focus: Agriculture

Topics: Causes of biodiversity loss, Incentive measures, Economic policies, Taxes, Subsidies

#87. Earthwatch Institute, (1999), *Business and Biodiversity*. Earthwatch Institute(Europe): Oxford. 19 pp. ISBN 0-9538179-2-X

This booklet provides a framework for involving the private sector in biodiversity conservation. It has been produced as a guide for all businesses who wish to support the UK's National Biodiversity Strategy and Action Plan.

Coverage: Europe

Contains examples or case studies from: UK

Ecosystem or sector focus: Industry, Infrastructure, Urban settlements

Topics: Private sector, Economic instruments, Financial mechanisms

#88. Earthwatch Institute, (2000), *Case Studies in Business and Biodiversity*. Earthwatch Institute(Europe): Oxford. 31 pp. ISBN 0-9538179-2-X

This booklet has been produced to encourage businesses to support the UK National Biodiversity Strategy and Action Plan. It provides examples of best practice in biodiversity engagement, and uses case studies of a water utility, leisure industry, airport, oil company and financial institution.

Coverage: Europe

Contains examples or case studies from: UK

Ecosystem or sector focus: Industry, Infrastructure, Urban settlements

Topics: Private sector, Economic instruments, Financial mechanisms

#89. Eaton, D., & Sarch, M.-T., (1997), *The Economic Importance of Wild Resources in the Hadejia-Nguru Wetlands, Nigeria*. CREED Working Paper No 13, International Institute for Environment and Development: London. 41 pp.

The Hadejia-Nguru wetlands play a major role in the regional economy of northern Nigeria. This paper goes beyond attempts have been made to value the production of most of the major sub-systems in the floodplain, and looks at the economic value of wild resources. The aim of this study was to provide new information for development planning in the region by increasing the understanding of local economic activities. A variety of values including financial and economic values, and returns to labour, are presented.

Coverage: Africa

Contains examples or case studies from: Nicaragua

Ecosystem or sector focus: Wetlands

Topics: Valuation

#90. Eltringham, K. (1994). 'Can wildlife pay its way?', *Oryx* 28 (3):163-168

This article describes several ways that wildlife can be used economically, indicating both their advantages and drawbacks. It concludes that a number of schemes are profitable and that they

can thus be used to support the conservation of wildlife. However, the article also points out that there will always be wildlife that cannot be made to pay but should still be conserved. In these cases it must be accepted that the costs of conservation needs to be covered, but not by those who are unable to pay.

Coverage: Africa

Ecosystem or sector focus: Wildlife, Protected Areas, Drylands

Topics: Valuation, Financial mechanisms, Private sector

#91. Emerton, L. A., (1998a), *Economic Tools for Valuing Wetlands in Eastern Africa*.

Biodiversity and Economics Programme, IUCN - The World Conservation Union Eastern Africa Regional Office: Nairobi. 15 pp.

This manual provides a set of methods for valuing the economic benefits of wetlands. The application of these methods is illustrated with case studies from the Eastern Africa region.

Coverage: Africa

Contains examples or case studies from: Zambia, Uganda, Kenya, Seychelles

Ecosystem or sector focus: Wetlands, Water

Topics: Valuation, Contingent valuation, Travel cost, Market valuation, Effect on production, Replacement costs, Mitigative and avertive expenditures

#92. Emerton, L. A., (1998b), *Using Economics for Biodiversity Strategies and Action Plans in Eastern Africa*. Biodiversity and Economics Programme, IUCN - The World Conservation Union, Eastern Africa Regional Office: Nairobi. 44 pp.

This manual provides a framework and methodology for integrating economic concerns into NBSAPs, including economic policy analysis, valuation, cost and benefit distribution, incentive measures and financing mechanisms. The application of these methods is illustrated with case studies from the Eastern Africa region.

Coverage: Africa

Contains examples or case studies from: Seychelles, Uganda, Eritrea, Djibouti, Sudan, Kenya, Tanzania

Ecosystem or sector focus: Marine and coastal, Protected Areas, Water, Wetlands, Wildlife, Forests, Agriculture

Topics: National Biodiversity Strategies and Action Plans, Valuation, Incentive measures, Economic planning, Economic policies, Convention on Biological Diversity, International Conventions, Economic instruments, Financial mechanisms

#93. Emerton, L. A., (1999a), *Balancing the Opportunity Costs of Wildlife Conservation for Communities Living Around Lake Mburo National Park, Uganda*. International Institute for Environment and Development: London. 27 pp. ISBN 15618382

This study values the economic benefits and costs of Lake Mburo National Park for the park's managing authorities and for local communities. It finds that the opportunity costs incurred by the park effectively outweigh local benefits generated, and that revenues are inadequate to cover the park's management costs. It is concluded, to address these problems, that there must be an increasing emphasis placed on more innovative financing mechanisms to cover these gaps between costs and benefits.

Coverage: Africa

Contains examples or case studies from: Uganda

Ecosystem or sector focus: Wildlife, Wetlands, Protected Areas

Topics: Valuation, Causes of biodiversity loss, Incentive measures, Disincentives, Economic instruments, Financial mechanisms

#94. Emerton, L. A., (1999b), *Building economics into National Biodiversity Strategies and Action Plans*. Paper presented at workshop on Building Biodiversity into Sectoral Strategies and Action Plans, 14th Global Biodiversity Forum, 18-20 June 1999, Montreal. 11 pp.
<http://www.biodiversityeconomics.org>

This paper looks at lessons learned and best practices in the use of economics for Biodiversity Strategies and Action Plans. It is illustrated with examples from Eastern Africa.

Coverage: Global
Africa

Contains examples or case studies from:
Djibouti, Eritrea, Seychelles
Uganda

Topics: Economic instruments, Incentive measures, Causes of biodiversity loss, Valuation, Financial mechanisms

#95. Emerton, L. A., (1999c), *Community Economic Incentives for Nature Conservation*. IUCN - The World Conservation Union: 41 pp.

This manual provides a framework for identifying, using and applying economic incentives measures to community based conservation. It also includes a list of relevant literature and a series of detailed case studies of the use of economic incentive measures for community nature conservation.

Contains examples or case studies from: Kenya, Tanzania, Uganda

Ecosystem or sector focus: Forests, Wetlands, Water, Wildlife, Protected Areas

Topics: Community-based management, Economic instruments, Incentive measures, Financial mechanisms, Causes of biodiversity loss, Economic planning

#96. Emerton, L. A., (1999d), *Economics Tools for Environmental Planning and Management in Eastern Africa*. Biodiversity and Economics Programme, IUCN - The World Conservation Union, Eastern Africa Regional Office: Nairobi. 43 pp.

This manual provides a framework and methodology for integrating economic concerns into environmental planning and management, including economic policy analysis, valuation, cost and benefit distribution, incentive measures and financing mechanisms. The application of these methods is illustrated with case studies from the Eastern Africa region.

Coverage: Africa

Contains examples or case studies from:
Djibouti, Eritrea, Kenya, Seychelles, Sudan, Tanzania, Uganda, Zambia

Ecosystem or sector focus: Marine and coastal, Water, Wetlands, Fisheries, Forests, Wildlife, Agriculture, Protected Areas

Topics: Valuation, Incentive measures, Economic policies, Economic instruments, Financial mechanisms, Causes of biodiversity loss

#97. Emerton, L. A., (1999e), *Economics Tools for the Management of Marine Protected Areas in Eastern Africa*. Biodiversity and Economics Programme, IUCN - The World Conservation Union, Eastern Africa Regional Office: Nairobi. 24 pp.

This manual provides a framework and methodology for using economic tools for the management of marine protected areas. The application of these methods is illustrated with case studies from the Eastern Africa region.

Coverage: Africa

Contains examples or case studies from:
Djibouti, Eritrea, Kenya, Seychelles, Sudan, Tanzania, Uganda

Ecosystem or sector focus: Marine and coastal, Wetlands, Forests, Agriculture, Protected Areas

Topics: Valuation, Incentive measures, Economic policies, Economic instruments, Financial mechanisms, Causes of biodiversity loss

#98. Emerton, L. A., & Mfunda, I., (1999), *Making Wildlife Economically Viable for Communities Living Around the Western Serengeti, Tanzania*. International Institute for Environment and Development: London. 31 pp. ISBN 15618382

This study analyses the economic costs and benefits of wildlife for local landholders, and explains why the high opportunity costs of wildlife, coupled with low economic benefits from the Serengeti National Park, have failed to present local economic incentives for conservation. It documents a number of innovations that have recently taken place in business partnerships between local villages and

the private sector, and argues that these arrangements may have the potential to redress current imbalances in wildlife economic costs and benefits.

Coverage: Africa

Contains examples or case studies from: Tanzania

Ecosystem or sector focus: Wildlife, Agriculture, Protected Areas

Topics: Valuation, Causes of biodiversity loss, Incentive measures, Disincentives, Economic instruments, Financial mechanisms

#99. Emerton, L. A., (1999f), *Mount Kenya: the Economics of Community Conservation*.

International Institute for Environment and Development: London. 20 pp. ISBN 15618382

This study illustrates how traditionally exclusionist approaches to forest conservation can lead to a situation where local communities are economically marginalised. Simultaneously a range of policy and market failures discriminate against sustainable forest management as an economically viable land use option in Mount Kenya. The paper proposes a number of economic and financial mechanisms which may better capture the forest's economic benefits and provide economic incentives for forest conservation.

Coverage: Africa

Contains examples or case studies from: Kenya

Ecosystem or sector focus: Forests, Watersheds, Wildlife, Protected Areas

Topics: Valuation, Causes of biodiversity loss, Incentive measures, Disincentives, Economic instruments, Financial mechanisms

#100. Emerton, L. A., (1999g), *The Nature of Benefits and the Benefits of Nature: Why Wildlife Conservation Has Not Economically Benefited Communities in Africa*.

Community Conservation Research in Africa: Principles and Comparative Practice, Paper No 9, Institute for Development Policy and Management, University of Manchester: Manchester. 20 pp. ISBN 1 900728931

Community-oriented approaches to wildlife conservation usually have a strong economic rationale. They are typically based on the premise that if local people participate in wildlife management and economically benefit from this participation, then a "win-win" situation will arise whereby wildlife is conserved at the same time as community welfare improves. This paper describes how the economic rationale behind such benefit-based approaches to community conservation - that communities must benefit from wildlife if they are to be willing and able to conserve it - is sound. It constitutes a major advance from traditional exclusionist approaches to wildlife conservation which were largely based on denying community access and gain from wildlife, and has undoubtedly resulted in the more equitable distribution of wildlife benefits. The paper however argues that such benefit-based models are based on an incomplete understanding of the economics of community conservation and of the nature of wildlife benefits. Over the long term they may lead neither to community welfare improvement nor contribute to wildlife conservation. Benefit distribution is a necessary, but in itself may not be a sufficient, condition for communities to engage in wildlife conservation. Whether or not communities have economic incentives to conserve wildlife, and whether or not they are economically better off in the presence of wildlife, goes far beyond ensuring that a proportion of wildlife revenues are returned to them as broad development or social infrastructure benefits. It also depends on the economic costs that wildlife incurs, on the form in which wildlife benefits are received, on the costs and benefits of other economic activities which compete with wildlife and on a range of external factors which all limit the extent to which communities are able to appropriate wildlife benefits as real livelihood gains. Community incentives to conserve wildlife, and the conditions they depend on, vary at different times for different people. Additional economic considerations need to be incorporated into community approaches to wildlife conservation, and form a part of whether such approaches can be judged to have been successful in development and conservation terms.

Coverage: Africa

Contains examples or case studies from: Kenya, Tanzania, Uganda, South Africa, Zimbabwe, Zambia, Namibia

Ecosystem or sector focus: Wildlife, Forests, Protected Areas

Topics: Causes of biodiversity loss, Economic instruments, Economic policies, Incentive measures, Valuation

#101. Emerton, L. A., (2000a), *Economics and the Convention on Biological Diversity*. IUCN - The World Conservation Union: Nairobi. 5 pp.

This short paper outlines the links between economics and the CBD, focusing on economic valuation, incentive measures, assessment and financing mechanisms. It provides a framework for integrating economic concerns into biodiversity planning.

Coverage: Global

Topics: Valuation, Convention on Biological Diversity, Economic instruments, Economic policies, Financial mechanisms, Incentive measures, Disincentives, Causes of biodiversity loss, National Biodiversity Strategies and Action Plans

#102. Emerton, L. A., & Ferrin, R., (2000c), *Usando la Economía para las Estrategias de Biodiversidad y Planes de Acción en América Latina*. IUCN - The World Conservation Union, South America Regional Office: Quito. 55 pp.

This manual provides a framework and methodology for integrating economic concerns into NBSAPs, including economic policy analysis, valuation, cost and benefit distribution, incentive measures and financing mechanisms. The application of these methods is illustrated with case studies from the Latin America region.

Coverage: Latin America, Caribbean

Contains examples or case studies from: Honduras, Bolivia, Brazil, Mexico, Peru, El Salvador, Venezuela, Costa Rica, Nicaragua, Ecuador, Netherlands Antilles, Chile, Colombia, Guatemala, Jamaica, Paraguay, Panama

Ecosystem or sector focus: Marine and coastal, Protected Areas, Water, Fisheries, Wetlands, Wildlife, Forests, Agriculture

Topics: National Biodiversity Strategies and Action Plans, Valuation, Incentive measures, Economic instruments, Economic policies, Financial mechanisms, Causes of biodiversity loss,

International Conventions, Convention on Biological Diversity

Other: Spanish language publication

#103. Emerton, L. A., (2000b), *Using Economic Incentives for Biodiversity*. IUCN - The World Conservation Union: Nairobi. 26 pp.

This document looks at the role of economic incentive measures in the CBD. It provides an overview of different types of incentive measures for biodiversity, illustrating each with case studies from around the world.

Coverage: Global

Contains examples or case studies from: South Africa, St Lucia, Nepal, Kenya, New Zealand, Cyprus, USA, Eritrea, Brazil, Canada, DR Congo, Seychelles, Malawi, Philippines, Tanzania, Uganda, Zambia, Ghana, Madagascar, Nigeria, Jamaica, Zimbabwe

Ecosystem or sector focus: Forests, Protected Areas, Agriculture, Wildlife, Marine and coastal, Drylands, Savannahs, Fisheries

Topics: Valuation, Incentive measures, Convention on Biological Diversity, Causes of biodiversity loss, Economic instruments, Economic policies, Financial mechanisms, Economic instruments, Disincentives, Property rights, Private sector, Markets and charges, Taxes, Subsidies, Bonds and deposits

#104. Englin, J., & Mendelsohn, R. (1991). 'A hedonic travel cost analysis for valuation of multiple components of site quality: the recreation value of forest management', *Journal of Environmental Economics and Management* 21:275-290

One benefit of managing forests is that one can alter the qualities of sites. The value of changing site qualities, however, is generally not known. This paper develops a formal hedonic travel cost model which can be used to estimate the value of both marginal and non-marginal changes to sites. This approach accommodates multiple simultaneous changes in site characteristics. Estimating this model using a set of permits from wilderness areas leads to revealed preference estimates of the recreational value of clear-cuts, old-growth, and nine other wilderness attributes.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife, Protected Areas

Topics: Valuation, Travel cost

#105. Erickson, J. D. (2000). 'Endangering the economics of extinction', *Wildlife Society Bulletin* 28 (1):34-41

Species and ecosystems have been assigned dollar values through methods developed by economists. Their value is then measured in financial terms and becomes comparable to any good or service traded in markets. This assignment of economic value to biodiversity and species will not guarantee their protection. In fact, pricing these nonmarket values allows for their direct comparison with market goods on a common metric, allowing for the possibility of optimal economic extinction of a species. In contrast to a market model of choice, I propose a decision framework that incorporates complexity, uncertainty, and limits to substitution between biodiversity and monetized goods and allows for critical valuation decisions outside the market model.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife

Topics: Valuation

#106. European Environment Agency, (1996), *Environmental Taxes: Implementation and Environmental Effectiveness*. European Environment Agency, Environmental Issues Series No 1.: Copenhagen. 62. ISBN 92-9167-000-6

This report intends to feed policy debates with the best available information. This report focuses on the environmental effectiveness of green taxes and on political barriers and solutions to their implementation. It also tries to emphasise the value of non-energy taxes and to be accessible to non-experts. One of the key advantages of environmental taxes is that they correct false price signals in the market place by incorporating the costs of pollution and other environmental costs into prices - a process both of "getting the prices

right" and implementing the "polluter pays" principle. Over recent years there has been an increase in the use of environmental taxes, but there is still considerable scope for their wider use. This report looks at the rationale for using environmental taxes, the different types available, who is using them, whether they work, and barriers and solutions to their implementation.

Coverage: Europe

Ecosystem or sector focus: Industry, Infrastructure, Urban settlements

Topics: Economic instruments, Economic policies, Incentive measures, Taxes, Subsidies, Pollution

#107. Fankhauser, S., (1993), *Global Warming Economics: Issues and State of the Art*. Working Paper GEC 93-28, Centre for Social and Economic Research on the Global Environment: London.

The paper presents an overview on the current state of the art of global warming economics. It deals with carbon abatement modelling as well as with the question of greenhouse damage estimation. On the question of the optimal policy response it advocates a cost-benefit approach, but also acknowledges the potential shortcomings of this method in particular with respect to its treatment of the uncertainty issue. The paper also calls for a more comprehensive approach which incorporates all greenhouse gases as well as other, connected externalities, e.g. from air pollution and the distortions from governmental revenue raising.

Coverage: Global

Ecosystem or sector focus: Forests, Industry

Topics: Climate change, Carbon offsets

#108. Fankhauser, S., & Tol, R., (1995), *Recent Advancements in the Economic Assessment of Climate Change Costs*. Working Paper GEC 95-31, Centre for Social and Economic Research on the Global Environment: London.

Climate change is unique among the consequences of fossil fuel burning in its far-reaching impact, both spatially and temporally. Earlier studies estimate the aggregated monetised

damage due to climate change at 1.5 to 2.0 percent of World GNP; the OECD would lose 1.0 to 1.5 percent of GDP; the developing countries 2.0 to 9.0 percent, according to these estimates. These figures are not comprehensive and highly uncertain. More recent studies increasingly emphasise adaptation, variability, extreme events, other (non-climate change) stress factors, and the need for integrated assessment of damages. As a result, differences in estimated impacts between regions and sectors have increased, the market impacts in developed countries tended to fall, and non-market impacts have become increasingly important. Marginal damages are more interesting from a policy point of view. Earlier estimates range from about \$5 to \$125 per tonne of carbon, with most estimates at the lower end of this range. These figures are based on polynomial functions in the level of climate change, but the rate of change may be equally important, as are the speed of adaptation, restoration and value adjustment. Furthermore, future vulnerability to climate change will be different from current vulnerability. On the whole, the market impacts fall (relatively) with economic growth while the non-market impacts rise (relatively) with growth.

Coverage: Global

Topics: Climate change, Carbon offsets

#109. Feather, P., Hellerstein, D., & Hansen, L., (1999), *Economic Valuation of Environmental Benefits and the Targeting of Conservation Programs: The Case of the CRP*. Resource Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 778: Washington DC.

The range of environmental problems confronting agriculture has expanded in recent years. As the largest program designed to mitigate the negative environmental effects of agriculture, the Conservation Reserve Program (CRP) has broadened its initial focus on reductions in soil erosion to consider other landscape factors that may also be beneficial. For example, preserving habitats can help protect wildlife, thus leading to more nature-viewing opportunities. This report demonstrates how non-market valuation models can be used in targeting conservation programs such as the CRP.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Protected Areas, Wildlife, Forests, Agriculture

Topics: Valuation

#110. Ferraro, P. J., & Simpson, D. R., (2000), *The Cost-Effectiveness of Conservation Payments*. Discussion Paper 00-31, Resources for the Future: Washington DC. 29 pp.

Intact ecosystems provide important global services. Many valuable ecosystems are located in low-income countries in which citizens are not in a position to provide global public goods gratis. To address this problem, international conservation and development donors have been making substantial investments in habitat conservation. Among the more common conservation schemes are interventions aimed at encouraging commercial activities that produce ecosystem services as joint products. We argue that it would be more cost-effective to pay for conservation performance directly. We use a simple yet general model to establish three conclusions. First, the overall cost of conservation is least when direct payments are employed. Second, the donor will generally find direct payments more cost-effective. Third, the preferences of donors and eco-entrepreneurs are opposed: when the donor prefers direct payments, the eco-entrepreneur prefers indirect subsidies. There are a number of reasons why direct incentive programs may be difficult to implement. We argue, however, that any approach to conservation will face similar challenges. Furthermore, we demonstrate with an empirical example that direct payment initiatives can offer spectacular cost-savings relative to less direct approaches. We therefore believe that continued experimentation with direct conservation incentives in the developing world is warranted and will prove successful.

Coverage: Global

Topics: Incentive measures, Financial mechanisms

#111. Fischer, C., & Toman, M., (2000), *Environmentally and Economically Damaging Subsidies: Concepts and*

Illustrations. Climate Change Issues Brief No. 14, Resources for the Future: Washington DC. 17 pp.

A common adage in environmental policy discussions is that there are substantial opportunities for improving the environment and the economy through elimination of various subsidies that distort the decisions made by producers and consumers. Energy subsidy reduction has become an important component of the debate over the economic burden of greenhouse gas (GHG) emissions and the policies that should be pursued to reduce these emissions. If there are substantial subsidies that excessively encourage the use of fossil energy, then reduction of these subsidies would generate GHG savings at a negative cost – society as a whole would benefit in terms of improved allocation of scarce resources and in terms of reduced local environmental burdens. If there is one thing on which economists agree, it is on the elimination of subsidies that reduce economic efficiency. However, economists view both subsidies and economic efficiency from a perspective that is a little different from the common usage of these terms. For example, the failure to address environmental spillovers in energy pricing is a source of inefficiency from an economic perspective; yet it does not necessarily follow that elimination of this implicit subsidy would increase economic performance as conventionally defined. In other words, elimination of economically inefficient subsidies may still involve tradeoffs between environmental values (including climate change mitigation) and conventional goods in many cases. Identifying subsidies that harm both the environment and the economy also gives rise to several tricky methodological questions. These issues are addressed in this paper. It first discusses the definition of subsidy in somewhat more detail. It then discusses some challenges that arise in measuring environmentally and economically damaging subsidies. The paper provides several illustrations of energy-related subsidies that seem clearly to be economically inefficient, but notes that in several cases the environmental benefits and GHG implications of their removal are unclear at best. It also discusses subsidies intended to promote environmentally desirable outcomes.

Coverage: Global

Ecosystem or sector focus: Industry

Topics: Subsidies, Taxes, Economic instruments, Economic policies, Climate change, Pollution

#112. Foley, M.-E., Moussa, J., & Verolme, H. J. H. (Eds.), (1999), *Addressing the Underlying Causes of Deforestation and Forest Degradation - Case Studies, Analysis and Policy Recommendations*. Biodiversity Action Network: Washington DC. 141. 0-9669599-0-6

This reports on a global workshop looking at the underlying causes of forest degradation. It identifies the actions that are required to halt forest loss, and presents a number of regional and country case studies from Africa, Asia, CIS, Europe, Latin America, North America and Oceania.

Coverage: Global, Africa, Asia, Commonwealth of Independent States, Europe, Latin America, North America, Pacific, Australia and New Zealand

Ecosystem or sector focus: Forests

Topics: Deforestation, Economic policies, Causes of biodiversity loss, Incentive measures, Disincentives

#113. Freese, C. H., & Trauger, D. L. (2000). 'Wildlife markets and biodiversity conservation in North America', *Wildlife Society Bulletin* 28 (1):42-51

Commercial markets for wildlife and other components of biodiversity are large, growing, and diversifying in North America. These markets are a double-edged sword for biodiversity conservation: If well managed, they can be a tool to conserve biodiversity; if poorly managed, they can lead to biodiversity loss. This paper reviews recent trends in some consumptive-use and nonconsumptive-use markets for wildlife and, more broadly, for biodiversity and their implications for biodiversity conservation in North America.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife

Topics: Valuation, Private sector, Markets and charges

#114. Fullerton, D., & Stavins, R. N., (1998), *How Do Economists Really Think About the Environment?* Discussion Paper 98-29, Resources for the Future: Washington DC. 10 pp.

On a topic like the environment, communication among scholars from different disciplines in the natural and social sciences is both important and difficult, but such communication has been far from perfect. Economists themselves may have contributed to some rather fundamental misunderstandings about how economists think about the environment, perhaps through our enthusiasm for market solutions, perhaps by neglecting to make explicit all of the necessary qualifications, and perhaps simply by the use of jargon that has specific meaning only to other economists. In this brief essay, we seek to clarify some of these misunderstandings and thus to improve future interdisciplinary communication. We hope that natural scientists and other non-economists will take economic analysis and prescriptions more seriously when they see tempered enthusiasm, explicit qualifications, and better definitions. Our method is to posit a series of prevalent myths regarding how economists think about the natural environment. We then explain how each myth might have originated from statements by economists that were meant to summarize a more qualified analysis. In this way, we hope to explain how economists really do think about the natural environment.

Coverage: Global

Topics: Economic instruments, Causes of biodiversity loss, Economic policies

#115. Furst, E., (1996), *Environmental and Natural Resource Valuation Methodologies in Latin America and the Caribbean: An Assessment of Five Case Studies.* Centro Internacional en Política Económica Para El Desarrollo Sostenible, Universidad Nacional de Costa Rica: San Jose. 12 pp.

This paper contains a summary of the analysis of five case studies that were chosen from a preselection of about 25 pieces of work on the economic valuation of natural resources and environmental quality in Latin America and the

Caribbean. These include valuations of air pollution in Chile, Coral reef degradation in the Netherlands Antilles, rural water supply in Haiti, rainforest conservation in Mexico and mangrove deforestation in Nicaragua. Conclusions drawn include that although these studies present important policy recommendations, it is questionable how much this information will actually be used and applied by policy makers and decision makers. It is also apparent that there are large differences in access to research resources and information, and that the accuracy and reliability of results are also highly variable. Differences also exist in the way that authors deal with different economic and environmental issues, and the importance they accord to them.

Coverage: Global, Latin America, Caribbean

Contains examples or case studies from: Mexico, Nicaragua, Haiti, Netherlands Antilles, Chile

Ecosystem or sector focus: Marine and coastal, Forests, Water, Protected Areas, Urban settlements, Infrastructure, Industry

Topics: Valuation, Pollution

#116. Gammage, S., (1997), *Estimating the Returns to Mangrove Conversion: Sustainable Management or Short Term Gain?* Environmental Economics Programme Discussion Paper 97-02, International Institute for Environment and Development: London. 81 pp.

This study was carried out to make an economic comparison of different management options for mangroves in Gulf of Fonseca, El Salvador. It involved the valuation of a range of different mangrove products, using a range of different methods. Timber and fuelwood were valued using actual market prices, input costs and volumes harvested. These values were cross-checked with values generated using surrogate prices for timber and fuelwood of the next most likely available substitute. Thus fuelwood was also valued using the price of propane gas as a substitute, and other types of imported timber. In order to assess the value of resource use associated with different management scenarios, estimates were made of the effects of mangrove conservation and degradation on the yields and values of products.

Coverage: Latin America

Contains examples or case studies from: El Salvador

Ecosystem or sector focus: Marine and coastal, Fisheries, Forests

Topics: Valuation, Market valuation

#117. Gilbert, A., & Janssen, R., (1997), *The Use of Environmental Functions to Evaluate Management Strategies for the Pagbilao Mangrove Forest*. CREED Working Paper Series No 15, International Institute for Environment and Development: London.

Mangroves are part of rich ecosystems providing a variety of environmental goods and services. Underestimation of their value and of the impacts of human activities is a major factor contributing to the widespread loss and degradation of ecosystems. Economists frequently receive the blame for such environmental ills, but it may also be argued that ecologists inadequately communicate their knowledge to decision makers and therefore have limited influence. This article links information supplied by ecologists to the information required for effective and efficient mangrove management. A key problem faced by ecologists is the high degree of interconnectedness within and between ecosystems. This makes it difficult to predict what is going to happen let alone understand what is going on. The concept of 'environmental function' is used in combination with systems diagrams to address this problem. System diagrams are used to identify and assess goods and services produced by the ecosystem under different management regimes. These goods and services are then valued to facilitate an assessment of the economic efficiency of the management regimes.

Coverage: Asia

Contains examples or case studies from: Philippines

Ecosystem or sector focus: Forests, Marine and coastal, Fisheries

Topics: Valuation

#118. Godoy, R., Lubowski, R., & Markandya, A. (1993). 'A method for the economic valuation of non-timber tropical forest products', *Economic Botany* 47 (3):220-233

By drawing on quantitative studies in social anthropology, zoology, ethnobotany and economics, this article presents a method for conducting a valuation of non-timber forest products. A review of 24 studies, conducted in various countries, suggests that the median value for non-timber forest products is about US\$50/ha/year. The article discusses problems with past studies and suggests ways to get better estimates of output quantities, marginal costs and prices.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Valuation, Market valuation, Contingent valuation

#119. Gowdy, J. M. (2000). 'Terms and concepts in ecological economics', *Wildlife Society Bulletin* 28 (1):26-33

The meaning of sustainability is the subject of intense debate among economists. The dominant school of economics in the United States, neoclassical economics, equates human welfare with the level of consumption of market goods and sees the natural world merely as an input into the economic process. To neoclassical economists, sustainability means sustaining economic output. Ecological economists take a broader view of sustainability by recognizing that essential features of the earth's life-supporting systems also must be sustained. The sustainability debate currently focuses on the ability of the economy to substitute human-created infrastructure for the services of the environment. The neoclassical concept is called "weak" sustainability, and the ecological economics concept is called "strong" sustainability. The motivation for weak sustainability is preserving an economy's capital stock, which produces economic output. Capital stock consists of human-made or "manufactured capital," the services of the environment or "natural capital," and the level of technology and training or "human capital." Weak sustainability assumes that these kinds of capital are substitutable for one another. The motivation for strong sustainability is recognizing that substitution possibilities among these different kinds of capital are limited. This paper discusses some of the terms and concepts behind the sustainability debate between neoclassical and ecological economics.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife

Topics: Valuation

#120. Gray, J. A. (1997). 'Underpricing and overexploitation of tropical forests: forest pricing in the management, conservation, and preservation of tropical forests', *Journal of Sustainable Forestry* 4:1-2

Forest pricing policies for tropical timber and forest concessions can play an important role in the management, conservation, and preservation of tropical forests. The paper draws on regional studies by the author and others of forest revenue systems and forest concession arrangements, country case studies, and studies in individual countries of West and Central Africa and South East Asia. Forest pricing and concession management policies, problems, and experiences in individual countries are examined, common problems and experiences highlighted, and alternatives identified. From these, the elements of a forest pricing and concession management system which supports sustainable management, efficient utilisation, and forest renewal are developed.

Coverage: Global, Africa, Asia

Ecosystem or sector focus: Forests

Topics: Valuation, Incentive measures, Markets and charges, Causes of biodiversity loss

#121. Green, C. H., & Tunstall, S. M. (1991). 'Is the economic evaluation of environmental resources possible?', *Journal of Environmental Management* 22:123-141

The meaningful economic evaluation of environmental goods depends both upon economic theory adequate and a congruence between economic and environmental theories of value. While the evaluation of user, and particularly the recreational and amenity aspects of environmental goods, is proving relatively straightforward, it is argued that there remain a number of theoretical as well as methodological problems before valid and reliable measurement of non-use values of environmental goods can be achieved. In particular, while individual preferences and willingness-to-pay for

environmental goods may be for the continued existence of the good in general terms, values have to be associated with individual sites. Second, there is as yet little empirical evidence as to the motivations which underlie any such non-use values, although economists have speculated about bequest and existence values. Third, the population which benefits through such non-use values is unknown. A number of survey studies are reported that have attempted to address these questions.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Valuation, Contingent valuation

#122. Gren, I.-M., & Soderquist, T., (1994), *Economic Valuation of Wetlands: A Survey*. Beijer Discussion Paper No 54, Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences: Stockholm. 41 pp. ISBN 1102-4941

There is world-wide growing concern about the conversion of wetlands into other land uses. One reason for this is that the total costs of wetland conversion are not taken into account. This paper presents a framework for the economic valuation of wetland services, which serves as the basis for a survey of 30 valuation studies in different regions. According to the survey there is a difference between regions in the focus of the wetland services subjected to valuation, and a minor variation in the choice of methods used for estimating values.

Coverage: Global, North America, Europe, Asia, Africa, Caribbean, Australia and New Zealand

Contains examples or case studies from: USA, Sweden, UK, Australia, Italy

Ecosystem or sector focus: Water, Wetlands

Topics: Valuation

#123. Gren, I.-M., Folke, C., Turner, R. K., & Bateman, I. (1994). 'Primary and secondary values of wetland ecosystems', *Environmental and Resource Economics* 4:55-74

Wetlands are continuously degraded in many parts of the world. One reason is the lack of appropriate valuation of the multifunctionality of wetlands. This paper discussed methods for

valuing the primary and secondary values of wetlands. It presents three case studies of different valuation methods which to different degrees capture primary and secondary values. It is concluded that only part of the total economic value of wetlands can be captured in monetary terms.

Coverage: Europe

Contains examples or case studies from: UK, Sweden

Ecosystem or sector focus: Wetlands, Water

Topics: Valuation, Contingent valuation, Replacement costs, Mitigative and avertive expenditures

#124. Gren, I.-M. (1995). 'The value of investing in wetlands for nitrogen abatement', *European Review of Agricultural Economics* 22:157-172

The values of nitrogen abatement through measures involving investment in wetlands, sewage treatment plans and agriculture are calculated and compared. The analytical results show that the marginal value of investment in wetlands, including current and future utility, is likely to exceed that of other measures. This is due to two factors: the joint production of several environmental services and the net natural growth in the capacity to produce these services. The multifunctionality implies that, in addition to nitrogen abatement, other outputs such as buffering of water and biodiversity are produced jointly and the growth in wetlands, or the self organising capacity, implies an increase in the supply of future outputs. Examples are given for the case of Gotland, an area with a high concentration of nitrate in the groundwater, which suggest that the value of investment in wetlands could significantly exceed that of sewage treatment plants.

Coverage: Europe

Contains examples or case studies from: Sweden

Ecosystem or sector focus: Wetlands, Water, Agriculture

Topics: Pollution, Valuation

#125. Grey, F., (1998), *Estimating Values for Australia's Native Forests*. Environmental

Economics Research Paper No 4, Department of the Environment, Sport and Territories: Canberra. 68 pp. ISBN 0 642 24863 X

This document describes how various reports have suggested that non-financial values should be given weight alongside financial values, and describes the process by which forest values can be given full consideration.

Coverage: Australia and New Zealand

Contains examples or case studies from: Australia

Ecosystem or sector focus: Forests

Topics: Valuation

#126. Grigalunas, T. A., & Congar, R. (Eds.), (1995), *Environmental Economics for Integrated Coastal Area Management: Valuation Methods and Policy Instruments*. Regional Seas Reports and Studies No. 164, United Nations Environment Programme: Nairobi. 165. 92-807-1488-0

The importance of environmental issues in development has received increased international recognition over recent years. In environmental economics major efforts are underway to integrate environmental costs and benefits into economic analysis. This document provides a series of background reference materials on the application of environmental economics tools to marine and coastal environments. It defines economic concepts and looks at the economic analysis of environmental degradation. The document also describes key economic valuation methods and works through their application. It describes a number of economic policy instruments that can be used to improve environmental management in marine and coastal areas.

Coverage: Global

Ecosystem or sector focus: Marine and coastal

Topics: Valuation, Economic instruments, Incentive measures, Economic policies, Economic planning, Causes of biodiversity loss, Travel cost, Contingent valuation, Effect on production, Mitigative and avertive expenditures

#127. Grimes, A., Loomis, S., Jahnige, P., Burnham, M., Onthank, K., Alarcon, R., Cuenca, W. P., Martinez, C. C., Neill, D., Balick, M., Bennet, B., & Mendelsohn, R. (1994). 'Valuing the Rainforest: The Economic Value of Nontimber Forest Products in Ecuador', *Ambio* 23 (7):405-410

This paper reports on a study carried out to calculate the economic value of 3 hectares of primary forest in the Upper Napo region of Amazonian Ecuador, based on the potential extraction of nontimber forest products. Through ethnobotanical and market surveys, the annual harvested levels, market prices and extraction costs of seven fruits, three medicinal barks and one resin are measured. These values are significantly higher than the returns from alternative land uses in this area.

Contains examples or case studies from: Ecuador

Ecosystem or sector focus: Forests

Topics: Valuation, Market valuation

#128. Gullison, R., Westbrook, T., Nissan, S., Grieg-Gran, M., Hocking, D., EcoSecurities Ltd., & Cannon, J., (1998), *The Potential For UK Portfolio Investors To Finance Sustainable Tropical Forestry*. Environmental Economics Programme, CREED Discussion Paper DP 98-03, International Institute for Environment and Development: London. 33 pp.

Sustainable forestry, which aims to produce sustained yields of timber while simultaneously maintaining the environmental and social benefits of forests, is being promoted as an alternative to destructive land uses such as unregulated logging and unplanned conversion to agriculture of tropical forests. In part because of the newness of the concept of sustainable forestry, there has been little implementation to date. The availability of public sector funds from developed countries that could be used to help implement sustainable forestry in developing countries is declining. However, private capital flows (portfolio investment and foreign direct investment) have been increasing rapidly. The objective of this study is to determine whether portfolio investment, a major component of private capital flows, is likely to fund sustainable forestry in

tropical countries. The approach of the study was to survey UK fund managers of emerging markets 1 and green/ethical 2 funds to establish investment preferences and requirements. This information was then compared to what is currently known about the structure and performance of sustainable forestry investments in the tropics and subtropics. Two sources provided information on financial returns. First, a review of the scientific and development literature was conducted to form a database on the profitability of both plantations and natural forest management. The literature review was then supplemented by a survey of existing certified forest products companies. However, because there are so few certified producers, and responding companies were unwilling to part with much commercially sensitive financial information, this study relies mainly on the results of the literature survey. The commercial nature of the information sought, and the relative youth of sustainable forestry, meant that sample sizes were quite small for some aspects of this study. This is a general problem of studies in this field. Nevertheless, the findings are robust enough to come to the following conclusions: From the limited studies available, the financial returns from both industrial plantations and vertically integrated natural forest management companies appear to meet or exceed fund manager requirements. This conclusion is tentative as it is not clear that all case studies would meet all the criteria for sustainable forestry as defined by organisations such as the Forest Stewardship Council (FSC). The major risk associated with investing in forest products companies, as perceived by fund managers, is the cyclical nature of commodity prices. Although fund managers perceive some reduction in investment risk due to the fact that a company has met the criteria for sustainable forestry, this is not sufficient for them to accept a lower return on their investment compared to investing in a conventional, non-certified forest products company. The most likely way that certification could address the concerns of investors is if it could be shown that certified forest products are less susceptible to price cycles than uncertified products. UK fund managers overwhelmingly prefer to invest in relatively large, publicly listed companies. The minimum market capitalisation to attract investment is \$180m for emerging markets funds, and \$33m for green/ethical funds. Certified forestry companies, particularly those in developing countries, are generally small and under private ownership, and thus are not

attractive to UK portfolio investors. The geographic location of an investment can be an important factor for UK fund managers. Green/ethical funds rarely invest outside of North America and Europe. Thus, they are unlikely to invest in tropical sustainable forestry companies under any conditions. Emerging market fund managers will invest in tropical and subtropical countries, but there are large differences in preference. Africa is the least favoured, and (at the time the survey was undertaken), South East Asia the most, with Latin America intermediate. Thus, the location of a sustainable forestry company would appear to have a significant bearing on its ability to attract investment from UK investors. The findings suggest that the greatest obstacles for sustainable tropical forestry companies to obtain investment from UK portfolio investors are their small size and the fact that they are not listed on a stock exchange. Perhaps the best way to overcome this problem is through the creation of a forestry fund, which would take on the ownership and management of many smaller companies, but would be large enough itself to be publicly listed. Until this or some other appropriate action is taken, it seems unlikely that significant investments in sustainable tropical forestry will be made by UK fund managers.

Coverage: Europe, Asia, Africa, Latin America, Global

Contains examples or case studies from: UK

Ecosystem or sector focus: Forests

Topics: Financial mechanisms, Private sector, Markets and charges

#129. Gupta, A. K., (1996), *Incentives, Institutions and Innovations: Golden Triangle of Sustainable Conservation*. Paper presented at a workshop on Incentives for Biodiversity: Sharing Experiences, 4th Global Biodiversity Forum, Montreal, Canada 30 August - 1 September 1996. 6 pp.

<http://www.biodiversityeconomics.org>

Based on information from the Honey Bee Network in India, this paper advocates the development of institutional support for incentives to meet the objectives of sustainable conservation. It divides various kinds of incentives under the following four categories: 1) Material - individual: The incentives for

conserving such biodiversity could be in material form and for individual use. The author gives examples such as A) Patent information system at decentralised level to promote participation of small scale sector in new ventures; B) To develop low cost decentralised system of registration of innovations/ inventions; C) Public watchdog committees to monitor and ensure sustainable extraction of biodiversity. 2) Material - collective: Here the author identifies four kinds of incentives which could be designed to promote creativity and innovation in conservation of biodiversity such as: a) venture capital support, b) risk cover through insurance, guarantee and risk funds, c) trust funds with or without individual leadership, and d) infrastructural development in the economically disadvantaged biodiversity rich regions. 3) Non-material - individual: Under this heading the author discusses incentives such as respect and recognition. 4) Non-material collective: The changes in curriculum and pedagogy are one of the most important candidates for consideration. Moreover policy changes in the regulatory as well as managerial systems is another way in which incentives can be generated for various local communities.

Coverage: Asia

Contains examples or case studies from: India

Topics: Incentive measures, Financial mechanisms, Trust Funds

#130. Hall, C. A. S., Jones, P. W., Donovan, T. M., & Gibbs, J. P. (2000). 'The implications of mainstream economics for wildlife conservation', *Wildlife Society Bulletin* 28 (1):16-25

The most important problems facing wildlife conservation are the growing human population and its affluence, and the concomitant requirement for resources to accommodate this growth. A pressing question is how to maintain wildlife numbers and diversity when prime wildlife habitat is needed for agriculture, resource extraction, or urban expansion. Solutions to this problem may not be forthcoming because mainstream (generally meaning neoclassical) economic logic and policies are often in direct conflict with the goals of wildlife science. There is a great need for wildlife scientists to broaden their view and sophistication of economics and also to expand the wildlife field to encompass the larger social forces that are changing the well-being of wildlife species. In what follows we elaborate on

1) what we perceive to be the underlying problem of wildlife conservation; 2) why our current system of economic valuation will, in the long term, undercut the goal of wildlife conservation; and 3) how to incorporate these concepts into wildlife curricula and the wildlife profession.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife

Topics: Valuation, Causes of biodiversity loss

#131. Hamilton, K. (1994). 'Green adjustments to GDP', *Resources Policy* 20 (3):155-168

A review of the green national accounts literature shows that there is little agreement on whether to adjust gross or net product, or on the size of some of the adjustments proposed. A series of models is presented to examine the treatment in national accounts of living resources, heterogeneous resource deposits, resource discoveries, environmental services, carbon emissions and defensive expenditures by households. A key conclusion is that expanding the accounts to include non-market environmental services result in a measure of welfare rather than product, and that the level of environmental services is an integral component of this welfare measure. These results are compared with standard national accounts. Greener measures of wealth per capita and savings rates will have more policy relevance on gauging progress towards sustainable development than adjustments to national product.

Coverage: Global

Topics: Environmental accounting, Valuation

#132. Hamilton, K., Pearce, D., Atkinson, G., Gomez-Lobo, A., & Young, C., (1994), *The Policy Implications of Natural Resource and Environmental Accounting*. Working Paper GEC 94-18, Centre for Social and Economic Research on the Global Environment: London.

Increasing concern about environmental degradation, resource depletion and the sustainability of economic activity have made the development of natural resource and environmental accounts an area of significant

activity. Yet, little attention has been devoted to asking exactly what ends do these accounts ultimately serve. The primary goal of this paper is to examine, through a series of country case studies, the linkages between the development of these new elements of national accounts (broadly conceived) and the proposed or actual policy used that these accounts are designed to meet. The case studies reveal a variety of motivations which underlie attempts by governmental departments or national statistical offices to incorporate environmental concerns into national accounting practice. This is followed by an assessment of the empirical experience obtained from a number of existing studies. The paper concludes with some general inferences regarding the lessons to be learnt regarding future green accounting efforts in both the developed and the developing world.

Coverage: Global

Topics: Environmental accounting, Valuation, Economic policies

#133. Hamilton, K., & Lutz, E., (1996), *Green National Accounts: Policy Uses and Empirical Experience*. Environment Department Papers No 039, Environmental Economics Series, World Bank: Washington DC. 48 pp.

Over the past 25 years the breadth of environmental and natural resources policy-making has expanded, and governments everywhere have committed themselves to new sustainable development goals. As a result, policy makers need new measures of progress. There have been corresponding innovations in information systems to guide resource and environmental policies. One is the "greening" of national income accounts. This has highlighted the critical role that policy and market failures play in the degradation of the environment. The United Nations recently published interim guidelines on an integrated System of Environmental and Economic Accounts. This system aims to provide a common framework within which greener national accounting aggregates, natural resource accounts and pollution flow accounts have their appointed places. One of the goals of this report is to critically examine the potential policy uses of the different varieties of accounts. The second goal is to describe and assess the range of experience that has been published for both developed and

developing countries. The paper also provides a general background to the theory and practice of integrated Systems of Environmental and Economic Accounts.

Coverage: Global, Asia, Latin America, North America

Contains examples or case studies from: Costa Rica, Indonesia, Japan, Mexico, Pakistan, USA

Topics: Environmental accounting, Valuation, Economic policies

#134. Hecht, J. E., & Orlando, B. (1998). 'Can the Kyoto Protocol Support Biodiversity Conservation? Legal and Financial Challenges', *Environmental Law Reporter* September:20

This paper addresses the use of terrestrial ecosystems to absorb carbon. It questions whether this will create incentives and financial mechanisms for more effective and sustainable management of forests and associated biodiversity, and looks at legal and financial issues that need to be resolved in this context. It provides background on the place of forests in the carbon cycle, and the forest-related provisions of the Kyoto Protocol. It then considers five issues that will arise regarding the impacts of the Protocol - (1) unresolved issues among the forest provisions of the Protocol, (2) externalities (such as biodiversity and watershed protection) that may be associated with the implementation of forest provisions of the Protocol, (3) risks associated with carbon sequestration projects, (4) financial mechanisms that may help to reduce those risks, (5) the possible role of forests in emissions permits trading systems.

Coverage: Global

Ecosystem or sector focus: Forests, Agriculture

Topics: Climate change, Financial mechanisms, Convention on Biological Diversity, UN Framework Convention on Climate Change, Economic instruments, Land degradation, Deforestation, Incentive measures, Markets and charges

#135. Hecht, J. E. (1999). 'Environmental Accounting: Where We Are Now, Where We Are Heading?', *Resources* Spring 1999 (Issue 135):14-17

The field of environmental accounting has made great strides in the past two decades, moving from a rather arcane endeavor to one tested in dozens of countries and well established in a few. But the idea that nations might integrate the economic role of the environment into their income accounts is neither a quick sell nor a quick process; it has been under discussion since the 1960s. Despite the difficulties and controversies described in this article, however, interest is growing in modifying national income accounting systems to promote understanding of the links between economy and environment.

Topics: Environmental accounting

#136. Higgins, S. I., Turpie, J., Costanza, R., Cowling, R. M., Le Maitre, D. C., Marais, C., & Midgeley, G. F. (1997). 'An ecological economic simulation model of mountain fynbos ecosystems: dynamics, valuation and management', *Ecological Economics* 22 (2):155-169

Mountain fynbos ecosystems in South Africa are threatened by alien plant invasions and by a lack of funding for effective management of these invasions. This paper develops an ecological-economic argument for the effective management of plant invasions in mountain fynbos ecosystems. This is done by building a dynamic ecological economic model which values the ecosystem services that fynbos ecosystems provide under different management systems. It is proposed that the services that mountain fynbos ecosystems provide fall into six components: water production, wildflower harvest, hiker visitation, ecotourist visitation, endemic species and genetic storage. A scenario analysis based on a hypothetical 4 square kilometre mountain fynbos ecosystem in the western part of the fynbos biome estimated that the ecosystem's value varies from R19 million to R300 million (R4.50=US\$1). Water production and genetic storage were the most valuable ecosystem services. The model showed that the cost of clearing alien plants was a tiny (0.5-5%) proportion of the value of mountain fynbos ecosystems. This result motivates an injection of funds for clearing alien plants from mountain fynbos ecosystems.

Coverage: Africa

Contains examples or case studies from: South Africa

Ecosystem or sector focus: Protected Areas, Mountains, Water, Tourism

Topics: Valuation

#137. Howard, P., (1996), *The Opportunity Costs of Protected Areas in Uganda*. Paper presented at IUCN Workshop on Economics of Biodiversity Loss, April 1996, Gland, Switzerland. 14 pp.

<http://www.biodiversityeconomics.org>

This paper's aim is to assess in financial terms the opportunity cost of excluding human settlement, cultivation and pastoral activities from Uganda's National Parks, Game Reserves and Forest Reserves. These protected areas represent 16.7% of the country's land area. Increasing demographic, economic and associated political pressures are pushing for the opening of these lands for agro-pastoral use. The analysis of the opportunity cost is composed of six stages: first, the assessment of the land under cultivation; second, the assessment of the land area under protection; third, assessment of the land area available for livestock; fourth, the estimation of land values under cultivation; fifth, the estimation of land values under livestock; and finally, calculation of the potential value of protected area land under agro-pastoral development. The result of the analysis is that the total opportunity cost of maintaining Uganda's protected areas amounts to an estimated US\$110 million/yr. This number exceeds the gross revenues of the protected area system by 100 times. Thus, the conversion to agro-pastoral use would be financially preferable to maintaining the status quo. The lesson in terms of biodiversity conservation is that incentive measures are necessary to make such preservation worthwhile in economic terms.

Coverage: Africa

Contains examples or case studies from: Uganda

Ecosystem or sector focus: Forests, Wildlife, Protected Areas

Topics: Valuation, Economic instruments, Causes of biodiversity loss

#138. Huber, R. M., Ruitenbeek, J., & Seroa da Motta, R., (1998), *Market Based Instruments*

for Environmental Policymaking in Latin America and the Caribbean: Lessons from Eleven Countries. Work in Progress for Public Discussion, Discussion Paper No. 381, World Bank: Washington DC. 79 pp.

One of the greatest challenges facing developing countries is to enhance growth while finding the most cost-effective way to reduce negative environmental impacts. This document shows how traditional "command and control" approaches can be improved upon by the use of broad-based market instruments that provide economic incentives for changed behaviour. It reports on a study of market-based instruments carried out in 11 countries in Latin America and the Caribbean.

Coverage: Latin America, Caribbean

Contains examples or case studies from: Bolivia, Brazil, Chile, Colombia, Ecuador, Jamaica, Mexico, Peru, Venezuela

Topics: Economic instruments, Economic policies, Causes of biodiversity loss, Taxes, Pollution, Subsidies, Incentive measures, Financial mechanisms

#139. Hunt, C., (1997), *Economic Instruments for Environmental and Natural Resource Conservation and Management in the South Pacific*. Working Paper in Ecological Economics No 9706, Centre for Resource and Environmental Studies, Australian National University: Canberra. 57 pp.

Trends in natural resource exploitation and consumption patterns have increased the need for resource conservation and pollution control in the South Pacific. The need for greater government resources, implied by the intensification of environmental management, has coincided with budgetary restraints in the South Pacific that have often been severe. Economic (as opposed to command and control) instruments are of increasing interest because they possess the potential to shift from government to producers or consumers the onus to comply with environmental measures. In this paper, argument about the applicability of economic instruments in conservation and management in developing countries in general and the South Pacific in particular, is prefaced by a brief exposition of the theory and a description of the types of

instruments. An analysis of some twenty case studies in the South Pacific enables some conclusions to be drawn about the conditions necessary for the application of economic instruments and enables some recommendations to be made about their adoption.

Coverage: Pacific, Australia and New Zealand

Contains examples or case studies from:

Australia, Fiji, Papua New Guinea, Kiribati, Solomon Islands, Tuvalu, Micronesia, Vanuatu, New Zealand

Ecosystem or sector focus: Marine and coastal, Urban settlements, Industry, Infrastructure, Fisheries

Topics: Economic instruments, Bonds and deposits, Markets and charges, Property rights, Financial mechanisms, Trust Funds

#140. Hussain, A., & Arif, T., (1998), *Local Examples of Financial Innovation*. Paper presented at a workshop on Financial Innovations to Combat Desertification 12th Global Biodiversity Forum, Dakar, Senegal, 4-6 December 1998. 3 pp.

<http://www.biodiversityeconomics.org>

The UN Convention on Combating Desertification provides a good opportunity for development in the marginal drylands to address problems of drought, land degradation and degradation of social and physical infrastructure. The challenge is how to mobilise financial resources to initiate local area development programmes in the remote marginal areas, away from markets, infrastructure and formal banking and financial systems. Funding is largely out of reach of communities. Even after establishment of instruments like national desertification funds, it is unlikely for the community groups to approach the money easily for implementing projects. This paper documents experiences in Pakistan.

Coverage: Asia

Contains examples or case studies from: Pakistan

Ecosystem or sector focus: Drylands

Topics: Financial mechanisms, Convention on Combating Desertification

#141. Huston, M. (1993). 'Biological diversity, soils and economics', *Science* 262:1676-1680

Terrestrial biological diversity is supported by solar energy captured by plants growing in soil. This soil-based plant productivity also provides the foundation for human societies through production of food and renewable forms of energy. Variations in plant productivity, resulting from differences in inherent soil fertility, variations in climate and weather, and differences in chemical inputs and agricultural practices, produce patterns of biodiversity that are associated with the agricultural component of economic productivity. Ecological processes lead to a generally negative relation between the diversity of plant species and potential agricultural productivity at both local and global scales. One implication of this negative relation is that the preservation of areas of high plant biodiversity does not require the sacrifice of productive agricultural lands.

Coverage: Global

Ecosystem or sector focus: Agriculture

Topics: Valuation, Causes of biodiversity loss

#142. Inamdar, A., & de Merode, E., (1999), *Towards Financial Sustainability for Protected Areas: Learning from Business Approaches*. WWF-UK: Godalming. 56 pp.

This is a practical guide to help managers improve the financial viability of protected area operations. It looks at basic tools and methods for financial management that are commonly used in the private sector, and assess their application to protected areas. Various case studies of this are provided. The manual looks at success factors associated with creating greater commercial awareness and provides lessons learned and best practices in improving the financial viability of protected areas.

Coverage: Global

Ecosystem or sector focus: Protected Areas

Topics: Financial mechanisms, Private sector, Markets and charges, Incentive measures

#143. International Institute for Environment and Development, (1997), *Valuing the Hidden*

Harvest: Methodological Approaches for Local-Level Analysis of Wild Resources.

Sustainable Agriculture and Environmental Economics Programmes, Research Series Volume 3 No 4, International Institute for Environment and Development: London. 71 pp. ISBN 1358-3775

There is a growing interest in the role of wild resources in local livelihoods. Yet many natural resource policies fail to consider their full economic benefits. Whose knowledge and whose valuations count when conducting economic assessments? In many cases economic analyses are made on the basis of limited, highly aggregated data and with limited insight into local level perspectives. This paper suggests some methodological alternatives and presents case studies of the local-level economic analysis of wild resources.

Coverage: Global, Africa, Latin America, Pacific

Contains examples or case studies from: Botswana, Brazil, Zimbabwe, Nigeria, Papua New Guinea

Ecosystem or sector focus: Agriculture, Forests, Wildlife

Topics: Valuation, Incentive measures

#144. Isaacs, J. C. (2000). 'The limited potential of ecotourism to contribute to wildlife conservation', *Wildlife Society Bulletin* 28 (1):61-69

Ecotourism has been proposed as a viable economic activity that can minimize negative human impacts on wildlife habitat and provide an incentive to preserve natural areas. The potential of ecotourism as a wildlife conservation strategy is limited by its inability to insure the long-term protection of environmental assets and by its tendency to contribute directly to environmental degradation. Ecotourism is a proxy market designed to align consumers' preferences for recreation with the protection of environmental assets. Because it does not necessarily address the direct protection of those assets, it is prone to market failure. Pressures on governments and firms involved in providing ecotourism services will impair their ability to minimize detrimental effects of human economic behavior. Ethical appeals to minimize harmful practices face serious obstacles. Promoting ecotourism may actually

distract from more appropriate means of environmental protection.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife, Tourism

Topics: Markets and charges, Financial mechanisms, Incentive measures

#145. IUCN - The World Conservation Union (Ed.), (1994), *Report of the First Global Forum on Environmental Funds*. Proceedings of the First Global Forum on Environmental Funds: Santa Cruz, Bolivia. 128 pp. ISBN 2-8317-0247-X

This document covers the background to National Environmental Funds, and the requirements for establishing and operating them. It also presents a series of profiles of different environmental funds from around the world.

Coverage: Global, Africa, Asia, Europe, North America, Latin America, Pacific

Contains examples or case studies from: Belize, Bhutan, Bolivia, Brazil, Chile, Colombia, Dominican Republic, El Salvador, Guatemala, Honduras, Indonesia, Jamaica, Mexico, Panama, Papua New Guinea, Peru, Philippines, Poland, Sri Lanka, Uganda

Ecosystem or sector focus: Forests, Wildlife, Protected Areas, Marine and coastal

Topics: Financial mechanisms, Economic instruments, Trust Funds, Debt conversion

#146. James, R. F., (1991), *Wetland Valuation: Guidelines and Techniques*. PHPA/AWB Sumatra Wetland Project Report No 31, Asian Wetland Bureau - Indonesia: Bogor. 160 pp. This document has been prepared as a guide for those wishing to conduct economic valuation of wetlands. A number of key issues of concern when valuing natural areas are discussed briefly, and detailed guidelines on the application of a number of specific valuation techniques are presented. The document focuses mainly on practical issues and methodologies.

Coverage: Global
Asia

Contains examples or case studies from: Nepal, USA, Fiji, Thailand, Korea, Philippines, Australia

Ecosystem or sector focus: Wetlands, Marine and coastal, Fisheries

Topics: Valuation

#147. James, A. N., Green, M. J. B., & Paine, J. R., (1996), *Financial Indicators for Biodiversity Assessment: In Situ Conservation Investments*. Paper presented at a workshop on Investing in Biodiversity, 5th Global Biodiversity Forum, Buenos Aires, Argentina, 1-3 Nov 1996. 20 pp.
<http://www.biodiversityeconomics.org>

Drawing upon the results of a three year project at the World Conservation Monitoring Centre, this paper examines the issues involved in the compilation and analysis of financial indicators for the assessment of in situ biodiversity conservation at the national level. An overview of the existing data on financial indicators and targets for in situ conservation are presented, including the recently completed global survey of governmental budgets for protected areas by the WCMC. The paper then discusses the methodological issues involved in standardising data on investment in biological diversity conservation, the determination of standards for judging the adequacy of investment, and ways to improve the future collection of such information. The discussion is conducted within the framework of the upcoming national reports by the Parties of the Convention on Biological Diversity, and the specific objective of establishing financial indicators from the data included in the national reports.

Coverage: Global

Ecosystem or sector focus: Protected Areas

Topics: Financial mechanisms, Economic instruments, Convention on Biological Diversity

#148. Janssen, R., & Padilla, J. E., (1996), *Valuation and Evaluation of Management Alternatives for the Pagbilao Mangrove Forest*. CREED Working Paper No 9, International Institute for Environment and Development: London. 47 pp.

Mangrove forests and swamps are rapidly declining in many parts of the world. This decline has resulted in the loss of important environmental and economic functions and products, including forest products, tidal wave control, breeding ground for fish etc. One of the major threats to mangroves in the Philippines is the rapidly increasing aquaculture industry. To understand the importance of mangroves insight into the total economic value of mangroves is important. Comparisons are made with the total value generated by alternative uses such as aquaculture and forestry. In addition to economic value, equity and sustainability objectives are taken into account and analyzed according to the perspective of different types of decision makers involved. The aim of this paper is to demonstrate the use of results obtained from valuation of mangroves to support an evaluation of management alternatives for the Pagbilao mangrove forest. The structure of this paper is as follows: first the study site is introduced; this is followed by a review of management alternatives for the Pagbilao mangrove forest, and an assessment of the values of the goods and services linked to these management alternatives. Next, the results from the valuation are used to support the selection of the preferred management alternative, first in a cost-benefit approach, then combined with other types of information in a multi-criteria approach. This paper concludes that if economic efficiency is maximized, conversion to aquaculture is the preferred alternative. However if equity and sustainability objectives are included, commercial forestry is the preferred alternative.

Coverage: Asia

Contains examples or case studies from: Philippines

Ecosystem or sector focus: Marine and coastal, Wetlands, Fisheries

Topics: Valuation

#149. Jordan, A., (1992), *Financing Global Environmental Protection: The Global Environment Facility*. Working Paper GEC 92-37, Centre for Social and Economic Research on the Global Environment: London.

Although developed and developing countries share a common but differentiated responsibility for causing global environmental change, the

developing nations are usually too overburdened with domestic, developmental problems to give priority to measures that specifically protect the global environment. The general feeling in the international community is that northern countries will have to provide the South with 'new and additional' sources of finance, if global environmental problems are to be resolved and sustainable development encouraged. The issue of global environmental 'aid' proved to be a sticking point at the 'Earth Summit' in Rio, and seems poised to dominate the North-South discourse in the foreseeable future. In the aftermath of Rio, it seems likely that more intense attention will be focused on the Global Environment Facility (GEF), an experimental funding operation recently established within the UN, with a mandate to finance projects in the developing world that realise global environmental benefits. This paper analyses the elaboration, structure and operation of the Facility in its first two years, and suggests interlinked themes that seem likely to dominate the post-Rio functioning of the Facility. Attention is focused on the problematical role played by the World Bank, the central actor in both the elaboration and operation of the Facility. It is suggested that the GEF represents a microcosm for exploring the far broader issues of institutional change and adaptation, and the gradual reorientation of international relations in the post-Cold War era.

Coverage: Global

Topics: Financial mechanisms, Convention on Biological Diversity, UN Framework Convention on Climate Change

#150. Joshi, M., (1999), *Financing Sustainable Forestry: Issues Under International Deliberation*. Programme on Forests, United Nations Development Programme: New York. 46 pp.

This background document was produced to facilitate discussion on matters left pending on financing needs at the Third Session of the Intergovernmental Forum on Forests. It presents a review of financial and economic aspects of sustainable forest management.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Financial mechanisms, Economic instruments, Trust Funds, Debt conversion, Carbon offsets

#151. Juma, C., Monteith, H., Krugmann, H., Angura, T., Acquay, H., Akinlo, A. E., Wandera, P., & Mugabe, J. (Eds.), (1995), *Economic Policy Reforms and the Environment: African Experiences*. Environment and Trade Series, United Nations Environment Programme: Geneva. 214 pp. ISBN 1020-1610

This book examines the relationship between trade and the environment, focusing especially on the trade implications of domestic and international environmental measures, including possible trade distortionary effects of environmental measures, and on the environmental effects of trade liberalisation. It examines African perspectives on structural adjustment and sustainable development, and outlines a number of country case studies which analyse the links between macroeconomic and trade policy and the environment in different sectors.

Coverage: Africa

Contains examples or case studies from: Kenya, Uganda, Nigeria, Ghana

Ecosystem or sector focus: Wildlife, Protected Areas, Forests, Industry

Topics: Economic instruments, Economic policies, Trade, Taxes, Subsidies, Causes of biodiversity loss, Disincentives

#152. Kaiser, J., & Lambert, A., (1996), *Debt Swaps for Sustainable Development*. IUCN - The World Conservation Union: Gland. 2-8317-0362-X

This handbook describes how debt conversions can be implemented, using practical examples and case studies from around the world. It deals especially with debt swaps designed for sustainable development. The main conclusions offered in the handbook are that debt conversion is much less complicated in practice than it appears in theory, that there is no single "recipe" for all debt swaps, and that debt swaps often required a joint initiative of NGOs in both the debtor and the creditor country.

Coverage: Global

Contains examples or case studies from: Zambia, Philippines, Mexico

Topics: Financial mechanisms, Economic instruments, Economic policies, Economic policies, Private sector, Incentive measures

#153. Kramer, R. A., (1994), *Cost and Compensation Issues in Protecting Tropical Rainforests: Case Study of Madagascar.*

Environment Working Paper No 62, World Bank Environment Department Africa Technical Department: Washington DC. 32 pp.

Development projects for protecting rainforests and other ecologically important ecosystems often have considerable impacts on local residents. This study examines the cost to villagers of establishing the Mantadia National Park in the eastern rainforest of Madagascar. Two methods are used to estimate economic impacts on villagers: opportunity costs based on household cashflow models, and contingent valuation analysis based on direct questioning. The study concludes that compensation costs appear to be a significant part of the full costs of implementing protected area projects and should be built into project design from an early stage.

Coverage: Africa

Contains examples or case studies from: Madagascar

Ecosystem or sector focus: Forests, Wildlife, Protected Areas

Topics: Valuation, Market valuation, Contingent valuation, Economic policies, Economic instruments

#154. Kramer, R. A., Richter, D. D., Pattanayak, S., & Sharma, N. P. (1997). 'Ecological and economic analysis of watershed protection in Eastern Madagascar', *Journal of Environmental Management* 49:277-295

Watershed protection is one of the many goods and services provided by the world's tropical forests. Flood damage alleviation is a particularly important component of this service. This study attempts to measure flooding alleviation benefits resulting from the protection of upland forests in Eastern Madagascar and to examine the

relationships between the economic concept of value and the bio-physical dimensions of the protected area. The results of this analysis should help policy makers assess the trade-offs between the costs and benefits of protecting tropical rainforest.

Coverage: Africa

Contains examples or case studies from: Madagascar

Ecosystem or sector focus: Forests, Watersheds, Protected Areas, Wildlife

Topics: Valuation, Effect on production, Mitigative and avertive expenditures

#155. Kramer, R. A. (1997). 'Valuing a global environmental good: US residents' willingness to pay to protect tropical rain forests', *Land Economics* 73:196-210

Although contingent valuation (CV) is the most common technique for valuing non-market environmental resources, rarely has it been applied to global environmental goods. This study uses CV in a national survey to assess the value US residents place on tropical rain forest protection. On average, respondents were willing to make a one-time payment of approximately \$21-31 per household to protect an additional 5 percent of tropical forests. Although respondents were able to give consistent responses across two different CV formats, focus groups were unwilling or unable to allocate their aggregate rainforest valuations across or among regions or specific rain forests.

Coverage: Global, North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Forests, Tourism, Protected Areas

Topics: Valuation, Contingent valuation, Financial mechanisms, Causes of biodiversity loss

#156. Kremen, C., Niles, J., Dalton, M., Daily, G., Ehrlich, P., Fay, J., Grewal, D., & Guillery, R. (2000). 'Incentives for Rain Forest Conservation Across Scales', *Science* 288:1828-1832

Globally, tropical deforestation releases 20 - 30% of anthropogenic greenhouse gases. Conserving forests could reduce emissions, but the cost-effectiveness of this mechanism for mitigation

depends on the associated opportunity costs. We estimated these costs from local, national, and global perspectives using a case study from Madagascar. Conservation generated significant benefits over logging and agriculture locally and globally. Nationally, however, financial benefits from industrial logging were larger than conservation benefits. Such different economic signals across scales may exacerbate tropical deforestation. The Kyoto Protocol could potentially overcome this obstacle to conservation by creating markets for protection of tropical forests to mitigate climate change.

Coverage: Africa

Contains examples or case studies from: Madagascar

Ecosystem or sector focus: Forests

Topics: Economic instruments, Causes of biodiversity loss, Climate change

#157. Kumar, R., & Young, C., (1996), *Economic Policies for Sustainable Water Use in Thailand*. CREED Working Paper No 4, International Institute for Environment and Development: London. 33 pp.

This paper has been prepared as part of the ongoing CREED project on Macro Economic Policies and the Environment in Thailand. The objective of the paper is to illustrate how the Social Accounting Matrix of Thailand may be extended to incorporate water resources and give examples of what the supply and demand functions for water would look like. The framework is based upon an integrated approach to demand and supply management of water resources and its implications for water pricing policies. The discussion concentrates on modifications and extensions of the social accounting matrix and on demand and supply equations for water that reflect the true scarcity of water for different uses and from different sources. There is an attempt, at the conceptual level, to introduce the user cost of water in the accounting matrix, thereby enabling a link between Computable General Equilibrium (CGE) models and user costs. Incorporation of the modified social accounting matrix and demand and supply equations for different water resources into the general equilibrium model would be a follow up of this exercise, to be undertaken at a later stage.

Coverage: Asia

Contains examples or case studies from: Thailand

Ecosystem or sector focus: Water, Wetlands, Agriculture, Watersheds, Industry, Infrastructure, Urban settlements

Topics: Valuation, Economic instruments, Economic policies

#158. Kumari, K., (1995), *An Environmental and Economic Assessment of Forest Management Options: A Case Study in Malaysia*. Environment Department Papers No 026, Environmental Economics Series, World Bank: Washington DC. 49 pp.

The capacity of natural forests to supply, if properly managed, a perpetual stream of timber and non-timber goods and services has been overlooked virtually everywhere; and Malaysia is no exception. It has been established that one of the most urgent enabling measures for sustainable forest development is the valuation of the resource, in order to highlight the full extent of benefits that can be provided. The framework for valuation adopted in this study was the total economic valuation (TEV) approach which represents both a pragmatic and consistent approach. A TEV of the flow of benefits from the forests under a range of management options was derived for the peat swamp forests of North Selangor. The analysis sought to illustrate what such TEV would mean in the context of the management of a particular forested site. A variety of methods, such as use of market prices (where available), damage cost avoided approach, surrogate/replacement cost approach and production function effect, were adopted to value some key goods and services of that could be appropriated from the forests of the Study Site. The results of this case study show that even when local benefits alone are considered it is financially profitable to shift from unsustainable to sustainable options. For the shift to more sustainable options to be actually adopted, however, there is a further requirement for new international financial mechanisms. These mechanisms would facilitate the local appropriation of globally provided forest conservation benefits. The results are significant at both the national and international level. At the national level, a dual strategy must be adopted, one that targets concurrently both the forest and

non- forest timber policies. In particular, Peninsular Malaysia must take advantage of its exemplary forest policy and legislation, and take the step towards its practical enforcement. At the international level, the global public good nature of conservation benefits require that new resource transfer mechanisms are agreed and implemented.

Coverage: Asia

Contains examples or case studies from: Malaysia

Ecosystem or sector focus: Forests

Topics: Valuation, Economic instruments, Incentive measures, Economic policies

#159. Kumari, K., (1996), *An application of the Incremental Cost Framework to Biodiversity Conservation: A Wetland Case Study in Malaysia*. Working Paper GEC 96-15, Centre for Social and Economic Research on the Global Environment: London.

Incremental cost refers to the difference between the cost that a developing country will incur to generate 'global environmental benefits' as required under the Convention on Biological Diversity (CBD) and what the country would otherwise incur under domestic considerations. This study estimates the incremental cost of adjusting the forest management practice in the peat forests of North Selangor to achieve defined global benefits in a cost-effective manner. The shift from the current practice to the recommended alternative requires the adoption of a log transportation method which is more environmentally benign, but which does not now constitute a domestic priority. The recommended tramline option, which has a less disruptive influence on the overall bio-diversity of the peat forests, would also enhance the survival probability of the endangered Sumatran rhinoceros. Currently, however, canals are a more prevalent means of transportation because they represent the least-cost option to the loggers. The incremental costs of shifting to the tramline option is estimated for two scenarios: first, through the use of reconditioned equipment and, second, where new equipment has to be procured. Cost savings achieved due to concurrent domestic benefits of adopting the tramline option are also estimated for two key components: treatment of water abstracted for domestic use, and forest rehabilitation. The

results show the annual incremental costs to loggers at the North Selangor peat forests to range from RM 0.19 million to RM 0.39 million for re-conditioned and new equipment, respectively. The annual cost-saving for domestic water treatment is estimated at RM 0.48 million and that for forest rehabilitation at RM 1.50 million. Deducting these total cost savings (RM 1.98 million) gives an incremental cost of RM - 1.59 million/year if the logger has to acquire new equipment, whilst the use of reconditioned equipment gives an incremental cost of RM - 1.79 million/year: i.e. incremental savings rather than costs are accrued. The divergence between private and social costs, and the occurrence of negative incremental costs have to be discussed in the context of Malaysia's current forestry practices and priorities if any meaningful and effective compensation is to be transacted.

Coverage: Asia

Contains examples or case studies from: Malaysia

Ecosystem or sector focus: Wetlands, Water

Topics: Valuation, Convention on Biological Diversity

#160. Lake, R., (1996), *Financial Resources for Biodiversity Conservation in Developing Countries: Indicators and Targets for Donor Country Financial Assistance*. Paper presented at a workshop on Investing in Biodiversity, 5th Global Biodiversity Forum, Buenos Aires, Argentina, 1-3 Nov 1996. 7 pp. <http://www.biodiversityeconomics.org>

This paper evaluates whether funds being provided by developed countries for biodiversity conservation in developing countries represent "new and additional resources", as required by Agenda 21 and the Convention on Biological Diversity (CBD). The paper assumes that resources should be "new and additional" in relation to historical levels of both aid for biodiversity and total aid before the signature of the CBD and the agreement of Agenda 21 in 1992. It examines biodiversity spending by the Global Environment Facility and other bilateral and multilateral donors; aid for sectors relevant to biodiversity conservation, such as agriculture, forestry and the integration of the environment into decision-making; total aid flow; debt; and structural adjustment. It also summarises

estimates of the cost of biodiversity conservation in developing countries. Information on developing countries' expenditure of their own resources on conservation is provided to illustrate the scale of the current funding shortfall. The challenge of global biodiversity conservation requires that donors fulfil their legal and political obligations to provide new and additional financing. As part of this, the GEF should be replenished at a level substantially higher in real terms than the \$ 2 billion pledged for 1994-1997.

Coverage: Global

Topics: Financial mechanisms, Convention on Biological Diversity

#161. Langford, I. H., Kontogianni, A., Skourtos, M. S., Georgiou, S., & Bateman, I. J., (1997), *Multivariate Mixed Models for Open-Ended Contingent Valuation Data: A Case Study on Willingness to Pay for Conservation of Monk Seals*. Working Paper GEC 97-10, Centre for Social and Economic Research on the Global Environment: London.

Although dichotomous choice (DC) contingent valuation (CV) has been recommended by the US NOAA "blue-ribbon" panel for large-scale contingent valuation studies, useful information can still be obtained from smaller, open-ended (OE) studies, often undertaken as a precursor to a DC survey. The CV [note use CV rather than CVM throughout] study considered here was carried out in Greece and looked at willingness-to-pay (WTP) for protecting the Mediterranean Monk Seal (*Monachus-monachus*) in the Aegean area. This is the most endangered seal in the world, and the application of the CVM methodology was the first such application in Greece. The OE data consists of two responses: first, a binary response detailing whether or not respondents were in principle prepared to pay for the protection of this seal; secondly, those respondents who answered "yes" to the first question were then asked to state their maximum WTP for such protection. A multivariate binomial - log-normal mixture model is used to develop a bid function including explanatory variables such as income, sex, age and education. Such a modelling approach provides an alternative to more commonplace tobit estimation. However, the model is extended to include further information which was collected on: (a) an increased WTP amount given in response to

information that the initial WTP amount may not be enough to prevent the extinction of the seal; (b) respondents were asked to divide their final WTP amount between use, option and existence values, the latter requiring a multivariate model with four binary and four continuous responses per individual in the same model. The discussion focuses on the methodological issues raised with some comment on the substantive interpretation of results.

Coverage: Europe

Contains examples or case studies from: Greece

Ecosystem or sector focus: Marine and coastal, Wildlife

Topics: Valuation, Contingent valuation

#162. Leclerc, A., (1996), *Generating Income in Your Backyard: A Worthy Approach to Financing Biodiversity*. Paper presented at a workshop on Investing in Biodiversity, 5th Global Biodiversity Forum, Buenos Aires, Argentina, 1-3 Nov 1996. 7 pp.

<http://www.biodiversityeconomics.org>

While local revenue generation cannot be expected to always raise the millions required to set up vast protection programs, it can at times provide the operations money for changing a paper park into a real operational protected area, or a desirable conservation concept into an applied regulation or specific program for sustainable use. This however, calls for innovative thinking, and for carefully designed applications of the "user/benefactor pay" and "cost recovery" principles. It also calls for perceiving the private sector as a partner of sort and not as an enemy, neither as an almighty driver as is sometimes the case with the tourism industry in protected areas. In addition, it can mean that Environmental Non-Governmental Organisations (ENGOS) should become learned about, and involved with, the above. This may enable them to suggest the viable fiscal solutions when recommending new governmental initiatives/programs. In doing so, ENGOS can more efficiently attempt to defuse the financial questions before they are even posed. The paper addresses issues such as: a) user fees and other forms of revenue generation for parks - including partnership with the tourism sector, b) user fees for other governmental conservation programs (with examples/cases from the review of potential cost recovery for

Environment Canada - this study has permitted to identify a number of areas with significant cost recovery potential), and c) on the risks of poorly designed/applied revenue generation programs, d) the dangers with unpredictable public/media perception and reaction, e) the potentially significant management related side benefits which includes cost recovery and local revenue generation.

Coverage: North America

Contains examples or case studies from: Canada

Ecosystem or sector focus: Protected Areas, Tourism

Topics: Financial mechanisms, Taxes, Markets and charges, Private sector

#163. Lee, H.-D. (1998). 'Use and value of coastal wetlands in Korea', *Intercoast Network* 32:7-8

This article looks at the productivity values of coastal wetlands in Korea, including fisheries, habitat functions, waste treatment services and aesthetic functions. It concludes that economic valuation has an important role in contributing to well-informed policy decisions.

Coverage: Asia

Contains examples or case studies from: Korea

Ecosystem or sector focus: Marine and coastal, Wetlands, Fisheries

Topics: Valuation, Economic policies

#164. Lintott, J. (1996). 'Environmental accounting: useful to whom and for what?', *Ecological Economics* 16:179-190

The development of statistics can only be understood in relation to their particular uses. Proposals to integrate environmental costs and benefits into national accounts can only be evaluated by considering them in the context of their likely policy use. Their most important potential use is as a measure of welfare or progress. Environmentally adjusted national accounts correspond to a very weak view of sustainability. The use of environmental accounts as a measure of welfare assumes a complete substitutability between manufactured and natural capital. Problems of monetary undervaluation are likely to lead to a huge underestimation of

environmental costs. Issues of poverty and inequality are ignored. Policy targeting a revised national income will continue to aim for ever higher output while making very limited concessions to environmental concerns. An alternative approach to allowing for environmental costs in policy making is the construction and use of a set of social and environmental indicators.

Coverage: Global

Topics: Environmental accounting, Valuation, Economic policies

#165. London Economics, (1992), *Economic Costs of Carbon Dioxide Reduction Strategies*. Working Paper Series No III, Global Environment Facility: Washington DC. 60 pp.

Over the last 5 years the problem of global warming has become one of the world's chief environmental priorities. This paper considers the relevant economics of pollution control as applied to carbon dioxide. The complexity of the policy framework is explored, and policy options explored. Empirical evidence on the costs of carbon dioxide abatement are presented, and major sub-sectors such as electric power and transport are examined. The document concludes by proposing an approach for developing a least-cost national strategy for carbon dioxide abatement.

Coverage: Global

Ecosystem or sector focus: Forests, Industry

Topics: Pollution, Climate change, Carbon offsets, Economic instruments, Economic policies

#166. Lonergan, S., & Ruitenbeek, J. (1994). 'Applications of ecological economics in developing countries', *Ecological Economics* 11 (2):91-161

This special issue contains five papers which provide an insight into how ecological economics is being applied in selected developing countries. The first two papers are written from a macro-level perspective, providing a state-of-the-art example of sustainable income accounting in Zimbabwe and an account of sustainable approaches to agricultural production in sub-

Saharan farming systems. The following three papers are presented from a more sectoral perspective. In turn they address: the problem of setting compensation levels in the wake of forest conservation programmes in Brazil; applications of valuation methods to policies for improving wildlife conservation in Kenya's national parks; and the importance of decentralised participation in tsetse fly control programmes in Ethiopia.

Coverage: Global, Africa, Latin America

Contains examples or case studies from: Brazil, Ethiopia, Kenya, Zimbabwe

Ecosystem or sector focus: Agriculture, Forests, Wildlife, Protected Areas

Topics: Economic instruments, Economic policies, Valuation, Environmental accounting

#167. Loomis, J. B. (2000). 'Can environmental economic valuation techniques aid ecological economics and wildlife conservation?', *Wildlife Society Bulletin* 28 (1):52-60

This article evaluates the potential usefulness of nonmarket valuation concepts and techniques from environmental economics for improving wildlife conservation. The concepts include distinguishing between on-site recreation use value and off-site passive use or existence values. In addition, it reviews 3 nonmarket valuation techniques. I illustrate the concepts and use of the technique of contingent valuation with a case study of valuation of increased ecosystem services for a riverine ecosystem. Results suggested that the benefits to households living along the river exceeded the costs of water rental from farmers and conservation easements.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife

Topics: Valuation, Contingent valuation

#168. Loureiro, W., & de Moura, R. P. R., (1996), *Ecological ICMS (Tax Over Circulation of Goods and Services): A Successful Experience in Brazil*. Paper presented at workshop on Incentives for Biodiversity: Sharing Experiences, 4th Global Biodiversity Forum, Montreal, Canada 30 August - 1 September

1996. 4 pp.

<http://www.biodiversityeconomics.org>

This paper summarises changes in Brazilian tax laws so that biodiversity conservation is rewarded instead of penalise. The changes have resulted in an increased area of conservation, improved quality of conservation areas, and municipalities have witnessed an increase in revenues which help with the protection of sensitive areas. The paper recommends that fiscal compensation for land use restrictions should be developed to foster local commitment to protected areas.

Coverage: Latin America

Contains examples or case studies from: Brazil

Ecosystem or sector focus: Forests, Agriculture, Protected Areas

Topics: Private sector, Taxes, Financial mechanisms, Incentive measures, Economic instruments

#169. Maddison, D., (1994), *A Cost Benefit Analysis of Slowing Climate Change*. Working Paper GEC 94-28, Centre for Social and Economic Research on the Global Environment: London.

This paper attempts to condense a mass of information relating to economic growth assumptions, carbon emissions forecasts, abatement cost estimates and global warming damage functions and incorporate it into a cost benefit analysis of slowing climate change. By these means it is possible to explore what conventional assumptions imply about the dimensions of the climate change problem and provide evidence on the extent to which society ought to incur control costs now in order to prevent future climate change using the rules commonly associated with project appraisal. This paper develops a model which takes baseline economic growth and future greenhouse gas emissions as given and calculates the evolution of CO₂ concentrations over time according to a statistically estimated model of the carbon cycle. Average global temperatures respond to elevated CO₂ concentrations via a process of lagged adjustment and this rise in temperature is taken as an index of global environmental change. The warming of the planet can be slowed by reducing emissions from the baseline (which incurs a cost) or alternatively by terrestrial sink enhancement, i.e. planting forests to absorb carbon from the

atmosphere. In a business as usual scenario the model predicts a temperature rise of 3.6°C above preindustrial levels by the end of the next century inflicting damage with a present value of \$8.9 trillion. An optimal policy however seems to involve an immediate 12.7% cut in emissions and the establishment of 37.1 million hectares of forests. The optimal tax on carbon emissions for the year 2000 is estimated to be \$16.84 per tonne and the optimal policy reduces temperature rise by 0.3°C relative to business as usual. By following the optimal policy costs are reduced by \$700 billion. It is also suggested that policies to halt deforestation and remove the subsidies paid to fossil fuel producers might reduce overall costs by a further \$1.1 trillion.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Climate change, Valuation, Carbon offsets, Economic policies, Economic instruments

#170. Maler, K.-G. (1991). 'National accounts and environmental resources', *Environmental and Resource Economics* 1:1-15

In this paper, optimal growth theory is used to derive the appropriate definition of the net national product concept, when there are environmental resources and environmental damage to take into account. The basic conclusions are that conventionally defined NP should be corrected by deducting environmental damage and adding the value of the net change of all resources.

Coverage: Global

Topics: Environmental accounting, Valuation, Economic policies

#171. Maler, K.-G., Aniyar, S., Casler, C., & Weir, E., (1997), *The Economics of Coastal Wetlands*. Beijer Discussion Paper No 94, Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences: Stockholm. 25 pp. ISBN 1102-4941

This paper presents an approach to estimating the value of the services provided by mangrove forests, and by those in Los Olivitos, Venezuela in particular.

Coverage: Latin America

Contains examples or case studies from: Venezuela

Ecosystem or sector focus: Wetlands, Marine and coastal, Fisheries

Topics: Valuation

#172. Markandya, A., & Perrings, C., (1991), *Resource Accounting for Sustainable Development: A Review of Basic Concepts, Recent Debate and Future Needs*. LEEC Paper DP 91-06, London Environmental Economics Centre: London. 53 pp.

Environmental accounting is motivated by a desire to bring environmental issues at the centre of the development debate. It tries to monitor the environmental impacts of economic activity, and to develop a set of indicators of these impacts in an integrated fashion, so that policy makers are better informed about environmental issues. This paper looks at the background to environmental valuation and indicators, and explains the methods and techniques for constructing environment accounting systems. It illustrates this with examples from forestry and wildlife sectors, and from Botswana and Indonesia.

Coverage: Global, Africa, Asia

Contains examples or case studies from: Botswana, Indonesia

Ecosystem or sector focus: Forests, Agriculture

Topics: Environmental accounting, Valuation, Economic instruments, Economic policies, Trade

#173. Markandya, A., & Richardson, J. (Eds.), (1992), *The Earthscan Reader in Environmental Economics*. Earthscan Publications Ltd: London. 469 pp. ISBN 1-85383-106-9

This reader is a sourcebook that brings together the most important contributions to the literature on environmental and natural resource economics. It covers the theoretical issues, the different ways of valuing the environment, economic instruments of environmental policy, environment and development, and global environmental problems. An extensive introduction is provided which maps out the area

of environmental economics and the different approaches to it.

Coverage: Global, Latin America, North America

Contains examples or case studies from: Costa Rica, El Salvador, USA

Ecosystem or sector focus: Wildlife, Fisheries, Industry

Topics: Valuation, Economic instruments, Economic policies, Trade, Incentive measures, Disincentives, Pollution, Taxes, Subsidies

#174. McNeely, J., (1988), *Economics and Biological Diversity: Developing and Using Economic Instruments to Conserve Biological Diversity*. IUCN - The World Conservation Union: Gland. 232 pp. ISBN 2-88032-964-7

Current processes of development are depleting many biological resources at such a rate that they are rendered essentially non-renewable. Effective government intervention is needed to meet the needs of society, because experience has shown that too little biological diversity will be conserved by market forces alone. Economic inducements are likely to prove an effective measure for converting over-exploitation to sustainable use of biological resources. This book looks at the background and application of economic incentives for biodiversity conservation. It examines the economic costs and benefits of biological diversity, describes what economic incentives are and provides an overview and examples of the use of economic incentives at community, national and international levels. It also describes mechanisms for funding incentive packages, and presents guidelines for using incentives.

Coverage: Global, Africa, Asia, Caribbean, Europe, Latin America, North America

Contains examples or case studies from: Brazil, Bolivia, Indonesia, Thailand, Zimbabwe, Nepal, Kenya, Mexico, China, Mali, Honduras, Japan, Philippines, Costa Rica, India, Zambia, USA

Ecosystem or sector focus: Forests, Wildlife, Protected Areas, Wetlands, Marine and coastal, Drylands, Watersheds, Industry

Topics: Incentive measures, Trade, Causes of biodiversity loss, Economic instruments, Disincentives, Economic policies, Financial

mechanisms, Valuation, Convention on Biological Diversity

#175. McNeely, J. (1989). 'How to pay for conserving biological diversity', *Ambio* 18 (6):308-313

This article looks at ways of addressing the difficulty of raising sufficient finance for biodiversity conservation. Using case studies from around the world, it illustrates innovations in biodiversity funding and makes conclusions about the broader policy and institutional conditions that are necessary to ensure that conservation is properly financed.

Contains examples or case studies from: Costa Rica, Venezuela, Ecuador, Thailand, Cote d'Ivoire, USA, Sri Lanka, Zambia, Zimbabwe, Nepal

Ecosystem or sector focus: Forests, Protected Areas, Marine and coastal, Water

Topics: Financial mechanisms, Incentive measures, Economic instruments, Convention on Biological Diversity

#176. McNeely, J., (1994), *Trade and Biological Diversity: The Internalization of Environmental Costs*. 8 pp.

Trade is a dominant force in international economics. It also has a fundamental environmental dimension, helping determine the way that nations utilize their natural resources. However, all too often trade policies have contradictory effects, and the environment is usually the victim of such inconsistency. Trade practices as they affect developing countries need to be viewed against the overwhelming requirement of sustainable development, and adjusted where they clearly conflict with it. It is a tenet of economics that resources are used to build the capital necessary to invest in modernizing the economy, an approach all the more justifiable in developing countries with young economies. Yet protectionism in the richer countries sharply reduces the ability of developing countries to generate adequate income from the use of the natural resources, causing needless depletion of the environment and a reduction of the capacity of the environment to fuel future development. Add to this the unpredictable

nature of trade regulations, where new restrictions can often undermine investments which were sensible in the context they were made, and it becomes clear that developing countries navigate a treacherous course. The successful conclusion of GATT's Uruguay Round may be helpful to at least some developing countries, but vigilance is required to ensure that developing countries receive their fair share of benefits, without paying high environmental costs. One means of doing this is to ensure that trade liberalization is accompanied by the removal of subsidies to agriculture in developed countries. A general solution would be for each nation to have a "Foreign Policy on the Environment", which would be published and widely disseminated. NGOs should encourage governments to effect such reviews as a matter of urgent conservation and development priority, perhaps as part of the National Biodiversity Strategies called for under the new Convention on Biological Diversity.

Coverage: Global

Topics: Trade, Incentive measures, Economic policies, Economic instruments, Taxes, Subsidies

#177. McNeely, J., & Weatherly, W. P., (1995), *Innovative funding to support biodiversity conservation*. IUCN - The World Conservation Union: Gland. 23 pp.

It is widely appreciated that insufficient investment is being made in conserving biodiversity, and that innovative approaches are required for generating the additional financial support required for implementing the Convention on Biological Diversity. It appears that domestic resources in most developing countries will continue to be inadequate for financing the conservation of biodiversity due to factors such as the limited tax and capital base of many of these countries, their under-developed taxation systems and weak capital markets, and the need to divert resources to servicing foreign debt. Other reasons for socially insufficient levels of investment in biodiversity include the lack of well defined transferable property rights, high transaction costs, differences between social and private discount rates, imperfect information, inappropriate political institutions, skewed political incentives, and bureaucratic. Clearly, such problems cannot be solved by simply providing more funds. Instead, a combination of policy changes enabling new funding mechanisms is

required. This paper surveys the current situation, present trends, and promising innovations in the financing of biodiversity conservation. It paper seeks to help the widest range of investors who could (and should) have a hand in crafting and using these tools. Obviously, simply generating more money is not a sufficient response to the global loss of biodiversity, especially because so much difficulty is already being experienced in spending the available funding in a credible way. Generating additional funds from government sources will require the general public to be convinced that the funds generated will be used in the common interest, and will be effective in conserving biodiversity.

Topics: Financial mechanisms, Convention on Biological Diversity, Economic instruments, Economic policies

#178. McNeely, J., (1996), *Trade and the Convention on Biological Diversity: Internalizing the Costs of Trade on Biodiversity*. Paper presented at Workshop on Trade Related Aspects of the Convention on Biological Diversity, Singapore, 11 December 1996. 8 pp.

All civilizations have been based on trade. In today's world, no nation can maintain or improve its standard of living unless it is able to trade raw materials and manufactured goods from distant lands. This international trade has enabled the entire world to draw on local ecosystems, feeding the growing population of the world at the cost of over-exploiting some local resources and thus affecting biological diversity. Thus trade is a major factor in national programmes to implement the Convention on Biological Diversity (CBD). Further, trade is fundamental to the second and third objectives of the CBD -- sustainable use and equitable sharing of the benefits of use -- and thus directly affects the first objective -- conservation. In the modern global economy, use almost always implies exchanges or trades between producers and consumers of biological goods and services. Whether this trade is sustainable is a fundamental concern of the CBD. Whether the distribution of returns from trade is equitable is also a fundamental concern of the CBD. Various decisions of the Conference of the Parties to the CBD clearly stake out at least some of the current interests of the CBD community in trade issues. What has gone

unstated, however, is the recognition that a change in the relative prices of resources or in the international trade regime may be the single most important factor affecting the resilience of ecological systems and the biodiversity that supports them. Trade by definition deals with products, while conserving biodiversity, using biological resources sustainably, and equitably sharing the benefits arising from such use are processes. Perhaps the major challenge facing the relationship between WTO and CBD is how to ensure that the benefits and costs of global trade on biodiversity are internalized into the prices paid for commodities, and that the prices paid in turn feed back into maintaining the processes that ensure the continuing productivity of our planet's ecosystems. This paper will discuss some of the relevant issues and suggest several ways to move ahead on these issues.

Coverage: Global

Topics: Trade, Convention on Biological Diversity, Economic policies

#179. McNeely, J., (1997), *Sustainable Finance for Protected Areas*. Paper presented at workshop on Protected Areas in the 21st Century: From Islands to Networks, Albany, Western Australia, 24-28 November 1997. 14 pp.

Insufficient investment is being made in protected areas, and innovative approaches are required for generating the additional financial support. The need for additional resources arises from the imbalance between a country's needs for managing protected areas on the one hand, and the ability of the country to mobilize resources on the other. Resources can be augmented through existing mechanisms, as well as through new mechanisms. Even so, it appears that domestic resources in most developing countries will continue to be inadequate for financing the conservation of biodiversity. Trying to finance protected areas under current policy conditions, which include market failures and inappropriate incentives, will require unattainable levels of funding. This is the case because the world is currently spending about US\$1 trillion in direct and indirect subsidies of energy, water, agrochemicals, marginal agriculture, deforestation, and heavily polluting industries that undermine protected area management. Without correcting these distortions, additional funding for protected

areas is likely to be futile. Further, both the policy reforms and the more appropriate determination of prices are likely to save financial resources and generate new funding, thereby further reducing the need for additional resources. This paper surveys the current situation, present trends, and promising innovations in the financing of protected areas, emphasizing innovative tools that are relatively poorly known.

Topics: Financial mechanisms, Private sector, Economic instruments, Economic policies, Convention on Biological Diversity, Taxes, Subsidies

#180. McNeely, J., (1999), *Achieving Financial Sustainability in Biodiversity Conservation Programmes*. A framework paper prepared for presentation at an Inter American Development Bank Workshop on Investing in Biodiversity Conservation, Washington D.C., on the 28th October 1996. 58 pp. <http://www.biodiversityeconomics.org>

It is widely appreciated that insufficient investment is being made in conserving biodiversity, and that innovative approaches are required for generating the additional financial support required for implementing the Convention on Biological Diversity. The need for additional resources arises from the imbalance between a country's need for capacity building and provision of basic infrastructure for conserving biodiversity on the one hand, and the ability of the country to mobilise resources on the other. This paper surveys the current situation, present trends, and promising innovations in the financing of biodiversity conservation. It describes each promising financial tool and the policies, technologies, and entrepreneurial initiatives required to make the tool successful. It estimates the importance of each tool, describes limits to its wider use, and identifies actions that could enhance that tool's leverage. It emphasises innovative tools that are relatively poorly known. This paper seeks to help the widest range of investors who could (and should) have a hand in crafting and using these tools. They include the full spectrum of those active, and potentially active, in biodiversity conservation: the international governing system; national governments; the private sector, both national and multinational; and NGOs, both local and international.

Coverage: Global

Topics: Financial mechanisms, Incentive measures, Economic instruments, Convention on Biological Diversity

#181. Mendelsohn, R., & Balick, M. (1995). 'The value of undiscovered pharmaceuticals in tropical forests', *Economic Botany* 49 (2):223-228

Previous estimates of the potential value of higher plants in tropical forests for pharmaceuticals are too high because analysts mistakenly used gross revenues to value drugs instead of net revenues. Correcting this error, the article estimates that each new drug is worth an average of US\$ 94 million to a private drug company and US\$ 449 million to society as a whole. Given recent experience searching for new drugs, it is estimated that the higher plants of the world's tropical forests contain about 375 potential pharmaceuticals of which 48 (about one in eight) have already been discovered. Multiplying these values by the number of potential new drugs suggests that a complete collection and screening of all tropical plant species should be worth about US\$ 3-4 billion to a private pharmaceutical company, and as much as US\$ 147 billion to society as a whole.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Valuation, Bioprospecting

#182. Merrifield, J. (1996). 'A market approach to conserving biodiversity', *Ecological Economics* 16:217-226

The policy used to implement the Endangered Species Act only prohibits actions that are harmful to listed species. While doing far too little to advance the cause of biodiversity, such prohibitions, or the prospect of them, seem to be imposing significant costs on many regional economies, and much greater impacts are feared. The article describes a market mechanism for simultaneously internalising the social cost of eliminating especially scarce habitat, and the social benefits of protecting or producing it. For landowners with low value non-habitat uses, the market mechanism transforms habitat from a major liability into a money-making asset. For

landowners with high value non-habitat uses, the market mechanism would be a very attractive alternative to the current slow and expensive case-by-case consultation process. Environmentalists will appreciate the market process because it is less subject to politicisation, or being gutted budgetarily or administratively, while assuring that agreed-upon, safe biological minimums cannot be violated.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife, Fisheries, Agriculture, Protected Areas, Forests

Topics: Economic instruments, Incentive measures

#183. Moran, D., (1994), *Contingent Valuation and Biodiversity Conservation in Kenyan Protected Areas*. Working Paper GEC 94-16, Centre for Social and Economic Research on the Global Environment: London. 28 pp.

The financial returns to Kenyan tourism demonstrate the importance of the country's tourist potential to economic development, and the role of wildlife protected areas in this. Yet there is little coincidence between those that benefit from protected areas and those that pay for their continued existence. Kenyans pay an implicit subsidy to support conservation for the benefit of the world at large. Using a contingent valuation survey, this study attempts to calculate the consumer surplus attached to the current non-consumptive use of protected areas by foreign tourists. This is more than double the opportunity cost of protected areas, and is additional to current financial returns from tourism. Recommendations are made that more of this consumer surplus could be captured through the current park entry fee structure.

Coverage: Africa

Contains examples or case studies from: Kenya

Ecosystem or sector focus: Wildlife, Protected Areas

Topics: Valuation, Contingent valuation, Economic instruments, Incentive measures, Markets and charges, Financial mechanisms

#184. Munasinghe, M., (1992), *Environmental Economics and Valuation in Development Decisionmaking*. Environment Working Paper No 51, Environment Department, World Bank: Washington DC. 77 pp.

One essential step towards achieving sustainable development is the economically efficient management of natural resources. This paper explains the key role of environmental economics in facilitating the more effective incorporation of environmental concerns into development decision making. This paper reviews concepts and techniques for valuation of environmental impacts that enable environmental considerations to be explicitly considered in the conventional cost-benefit calculus used in economic decision making. Key related aspects including environmental impacts of economy-wide policies, discount rate issues, and multi-criteria analysis are reviewed. The process of internalizing environmental externalities may be facilitated by making even rough qualitative assessments early on in the project evaluation cycle. The advantages of such an approach include: the early exclusion of options that are not sound environmentally; more effective in-depth consideration of those alternatives that are preferable from the environmental viewpoint; and better opportunities for redesigning projects and policies to achieve sustainable development goals. This paper seeks to help practitioners in the field of environmental valuation, whose main concern is to keep up with, and make use of the advances most relevant to their own areas of application. A number of developing country case studies which cover a wide range of practical valuation methods, are reviewed. The evidence presented suggests that the valuation techniques for determining "use values" may be applied successfully in appropriate cases. However, examples involving the estimation of "non-use values" are virtually non-existent in the developing world, and rather scarce even in the industrialized nations. The use of multi-objective decision methods also needs to be explored, where economic valuation is not feasible.

Coverage: Global, Africa, Latin America, Caribbean

Contains examples or case studies from: Lesotho, Peru, Costa Rica, Kenya, Haiti

Ecosystem or sector focus: Water, Wildlife, Protected Areas, Forests, Tourism, Agriculture

Topics: Valuation, Economic instruments, Economic policies, Land degradation, Travel cost, Contingent valuation, Effect on production

#185. Munasinghe, M., & McNeely, J. (Eds.), (1994), *Protected Area Economics and Policy: Linking Conservation and Sustainable Development*. IUCN - The World Conservation Union and The World Bank: Gland and Washington DC. 364. 0-8213-3132-9

This volume presents the papers presented at a Workshop on the Economics of Protected Areas at the IUCN-World Conservation Union Fourth Congress on National Parks and Protected Areas, held in Caracas Venezuela in 1992. They seek to bring the techniques of environmental economics to bear on the vital task of improving the design and management of protected areas.

Coverage: Global

Contains examples or case studies from: Ghana, USA, Indonesia, Australia, Madagascar, Ecuador, UK, Canada, Nepal, Netherlands Antilles, Venezuela

Ecosystem or sector focus: Protected Areas, Marine and coastal, Forests, Drylands, Fisheries, Industry

Topics: Private sector, Valuation, Incentive measures, Economic instruments, Economic policies, Causes of biodiversity loss, Markets and charges, Financial mechanisms

#186. Myers, N., (1996), *Perverse Subsidies*. Paper presented at IUCN Workshop on Economics of Biodiversity Loss, April 1996, Gland, Switzerland. 11 pp.

<http://www.biodiversityeconomics.org>

The question asked in this paper is: which subsidies are detrimental to society's overall and long-term interests? Subsidies represent 3.8% of a global economy of \$26 trillion and therefore play a prime role in the functioning of the global economy. They can be detrimental, i.e. 'perverse,' to society in the sense that they contribute to the destruction of the environment and the over-exploitation of natural resources. For example, agricultural subsidies can lead to over-loading of croplands and pollution from synthetic fertilisers and pesticides. The main problems associated

with subsidies are that they are very expensive for governments and that they cause inefficiencies in production or the misuse and over-use of resources. The case of subsidies for marine fisheries is studied in detail. All major marine fisheries are considered to be over-exploited and while world-wide harvest has increased almost fivefold since 1950, the catch has been declining since 1989. Subsidies, aimed at preserving the fishermen's jobs, aggravate the situation by allowing the fishing industry to continue over-exploiting the fisheries in spite of the declining annual catch. As a result, there is now an excessive extractive capacity in the fishing industry. Several policy responses are proposed, such as using the subsidies to retrain fishermen who are put out of work through reduced catches-whether reduced through declining stocks or through policy shifts. Another proposal is for governments to charge foreign fishermen for the right to catch off their shores. Finally, the solution proposed is that of a limited number of tradeable fishing rights to individual fishermen.

Coverage: Global

Ecosystem or sector focus: Agriculture, Forests, Fisheries, Marine and coastal

Topics: Causes of biodiversity loss, Incentive measures, Disincentives, Taxes, Subsidies

#187. National Center for Environmental Economics, (2001), *The United States Experience with Economic Incentives for Protecting the Environment*. EPA-240-R-01-001, National Center for Environmental Economics, Office of Policy, Economics, and Innovation, Office of the Administrator, U.S. Environmental Protection Agency: Washington DC. 230 pp.

Over its 30-year history the predominant tool used by the U.S. Environmental Protection Agency (EPA) to help achieve the nation's environmental goals has been uniform, nationally applicable regulations derived from environmental law. Those regulations, e.g., source-specific emissions limits, product specifications, and pollution-control guidelines, have been responsible for much of the improvement in air and water quality that is evident in the country today. But over the past 20 years, and during the past decade in particular, EPA has begun to use a much broader array of

tools to manage environmental quality. Among these relatively new tools, several kinds of economic incentives are being applied more and more widely. Because of the wide and growing use of economic incentives at all levels of government in the United States, it is important to understand them more clearly. For example, what kinds of economic incentives are being used today to address what kinds of problems? Are particular incentives better suited for use at specific levels of government? Even more important are questions regarding relative effectiveness. How well have economic incentives performed in terms of improving environmental quality? How economically efficient and cost-effective have they been? To what extent have they stimulated technological change and innovation? How can past experience with economic incentives help improve their use today and in the future? This report attempts to answer those questions by providing a broad overview and analysis of the current use of economic incentives as an environmental management tool in the United States.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Urban settlements, Industry, Infrastructure, Agriculture, Protected Areas, Wildlife, Forests

Topics: Incentive measures, Economic instruments, Economic policies, Taxes, Subsidies, Markets and charges, Pollution

#188. Navrud, S., & Mungatana, E. (1994).

'Environmental valuation in developing countries: the recreation value of wildlife viewing', *Ecological Economics* 11:135-151

Few environmental valuation studies have been carried out in developing countries. This study shows that the Travel Cost (TC) and the Contingent Valuation (CV) methods can be successfully applied to value natural resources in developing countries. These two independent methods were used to estimate the recreational value of wildlife viewing, which is a valid, but very conservative, estimate of the total economic value of the wildlife species. The annual recreational value of wildlife viewing in Lake Nakuru National Park in Kenya was found to be \$7.5-\$15 million. The flamingos accounted for more than one third of the value. Recognising that this is only one of

many parks in Kenya, and that wildlife viewing is becoming an important part of the global trend of increasing ecotourism, this shows that sustainable management of wildlife resources could provide a very significant and much needed revenue source for developing countries in the future. The challenge for the developing countries is to find ways to realise this economic potential, which also secures the preservation of wildlife.

Coverage: Africa

Contains examples or case studies from: Kenya

Ecosystem or sector focus: Wetlands, Water, Wildlife, Protected Areas, Fisheries

Topics: Valuation, Travel cost, Contingent valuation, Financial mechanisms, Markets and charges

#189. Newell, R. G., & Stavins, R. N., (1999), *Climate Change and Forest Sinks: Factors Affecting the Costs of Carbon Sequestration*. Discussion Paper 9-31, Resources for the Future: Washington DC. 43 pp.

The possibility of encouraging the growth of forests as a means of sequestering carbon dioxide has received considerable attention because of concerns about the threat of global climate change due to the greenhouse effect. In fact, this approach is an explicit element of both U.S. and international climate policies, partly because of evidence that growing trees to sequester carbon can be a relatively inexpensive means of combating climate change. But how sensitive are such estimates to specific conditions? We examine the sensitivity of carbon sequestration costs to changes in critical factors, including the nature of the management and deforestation regimes, silvicultural species, agricultural prices, and discount rates. We find, somewhat counter-intuitively, that the costs of carbon sequestration can be greater if trees are periodically harvested, rather than permanently established. In addition, higher discount rates imply higher marginal costs, and they imply non-monotonic changes in the amount of carbon sequestered. Importantly, retarded deforestation can sequester carbon at substantially lower costs than increased forestation. These results depend in part on the time profile of sequestration and the amount of carbon released upon harvest, both of which may vary by species, geographic location, and

management regime, and are subject to scientific uncertainty.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Markets and charges, Economic instruments, Climate change, Carbon offsets

#190. Norgaard, R. B. (1987). 'Economics as mechanics and the demise of biological diversity', *Ecological Modelling* 38:107-121

Macro explanations of the loss of biological diversity have emphasised how higher population levels have forced the transformation of relatively undisturbed areas and how industrial pollutants and energy-intensive agriculture have put new, and relatively uniform, selective pressure on species. This paper explores how a third macro phenomenon, social organisation based on specialisation and exchange, has contributed to the demise of biological diversity. It argues that knowledge, technologies and supporting structures evolved relatively independently up until a century ago, like patches on a patchwork quilt, with only regional exchange, including crops and agriculture. Hence people applied diverse selective pressure to a portion of each patch, meaning that people had little detrimental impact on biological diversity overall and in some cases even enhanced it. During the past century this patchwork quilt has transformed into a global exchange economy supporting a fourfold increase in population. The global order is organised around a monolithic vision based on comparative advantage, specialisation and exchange. This had resulted in a reduction of the number of crops grown over broad regions. Yet there is more variation within a given region with respect to crops grown in a given year, because each region responds to market signals generated by changes in all of the regions. Specialisation has reduced the diversity of selective pressure of agricultural practices on species, while increased annual variation within each region has selected against species with narrow niches. The dominant vision of social organisation stems from the Newtonian model of systems consisting of mechanically related atomistic parts. This article presents a contrasting model of ecological systems consisting of tightly coevolved parts and relations. The maintenance of biodiversity will require moderation of the dominant vision and social

organisation more often designed around a coevolutionary view.

Coverage: Global

Ecosystem or sector focus: Agriculture

Topics: Causes of biodiversity loss, Economic instruments

#191. Norton-Griffiths, M., & Southey, C. (1995). 'The opportunity costs of biodiversity conservation in Kenya', *Ecological Economics* 12:125-139

This paper estimates the opportunity costs of biodiversity conservation in Kenya from the potential net returns of agricultural and livestock production, and compares them with the net returns from tourism, forestry and other conservation activities. At the national level, agricultural and livestock production in the parks, reserves and forests of Kenya could support 4.2 million Kenyans and generate gross annual revenues of \$565 million and net returns of \$203 million. These forgone net returns of \$203 million, some 2.8% of GDP, represent the opportunity cost to Kenya of biodiversity conservation. The current combined net venues of \$42 million from wildlife tourism and forestry are thus inadequate to cover these opportunity costs to land. The government of Kenya is clearly subsidising conservation activities whose chief values are all indirect and external to Kenya, and their ability to continue doing so will be a function of growth and modernisation in the Kenyan economy. Dependency on land will increase if the economy stagnates and rural populations continue to grow, and while the government of today may not consider disbanding the parks and reserves, the situation could be different in 25 years when rural populations have doubled again. In contrast, dependency on land will fall only once the economy grows and modernises and rural populations are drawn off the land and into industrial and service sectors. It is argued that given the global nature of the benefits from Kenya's conservation efforts, it is inappropriate that so much of the cost is born by Kenya. The present scale of subsidies should instead form the basis for international negotiations to transfer funds to meet all or part of them. At present the global environment facility (GEF) is the only operational programme through which such contributions can be channelled to meet the

incremental costs of biodiversity conservation, but situations such as the one described for Kenya were never envisaged when the GEF was designed. If the developed world expects a country like Kenya to maintain conservation estate on its behalf, then it must be prepared to contribute substantially towards these costs until such time as Kenya can afford to carry the burden itself.

Coverage: Africa

Contains examples or case studies from: Kenya

Ecosystem or sector focus: Wildlife, Agriculture, Forests, Protected Areas

Topics: Valuation, Economic policies, Incentive measures, Subsidies, Financial mechanisms

#192. O'Neill, J. (1997). 'Managing without prices: the monetary valuation of biodiversity', *Ambio* 26 (8):546-550

Environmental managers manage without prices - their day to day decisions are normally made without any appeal to monetary values or any other single common measure. But neo-classical economic theory suggests that monetary valuation is necessary in decision-making. This paper examines three arguments for monetary valuation of biodiversity and shows that none are satisfactory. While there may be problems in existing procedures for environmental decision-making, these do not include the failure to use monetary values.

Coverage: Global

Topics: Valuation, Markets and charges

#193. Organisation for Economic Co-operation and Development, (1994), *Economic Incentive Measures for the Conservation and Sustainable Use of Biological Diversity: Conceptual Framework and Guidelines for Case Studies*. Organisation for Economic Co-operation and Development: Paris. 29 pp.

In 1993 the OECD Group on Economic and Environmental Policy Integration formed an Expert Group on Economic Aspects of Biodiversity to undertake a two year project on the use of economic incentive measures for the conservation and sustainable use of biological diversity. At the first meeting of the expert group

it was agreed that the development of country case studies would be an appropriate and practical approach to acquiring better understanding of the use of economic incentives in support of biodiversity. This conceptual framework places the use of economic incentives into a larger perspective, linking incentives with the main causes of biodiversity loss and the objectives of the CBD.

Coverage: Europe

Topics: Convention on Biological Diversity, Incentive measures, Economic instruments, Economic policies, Causes of biodiversity loss

#194. Organisation for Economic Co-operation and Development, (1996), *Handbook of Incentive Measures for Biodiversity: Design and Implementation*. Organisation for Economic Co-operation and Development: Paris. 171 pp. ISBN 92-64-17059-6

This is a practical handbook to assist policy makers in the design and implementation of appropriate incentive measures for the effective management of biodiversity. It synthesises the lessons learned from the experiences of OECD Member countries in the use of a variety of incentive measures, and combines this with a conceptual framework to develop comprehensive guidance on the policies available for preventing biodiversity loss. It uses case studies to illustrate the practical application of incentive measures for biodiversity in European countries and elsewhere.

Coverage: Global, Europe, Australia and New Zealand, Asia, Latin America

Contains examples or case studies from: Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Japan, Korea, Mexico, Netherlands, New Zealand, Poland, Turkey, UK, USA

Ecosystem or sector focus: Protected Areas, Agriculture, Forests, Fisheries, Marine and coastal, Wildlife, Water, Wetlands, Fisheries

Topics: Incentive measures, Economic instruments, Economic policies, Trade, Disincentives, Causes of biodiversity loss, Taxes, Subsidies, Financial mechanisms

Other: Also published in French

#195. Organisation for Economic Co-operation and Development, (1999), *Economic Instruments for Pollution Control and Natural Resources Management in OECD Countries: A Survey*. Organisation for Economic Co-operation and Development: Paris. 115 pp.

The OECD Working Party on Economic and Environmental Policy Integration (WPEEPI) decided at its 12th Session on 6-7 November 1997, to launch a survey on the use of economic instruments for pollution control and natural resource management in OECD countries. The objectives of the survey were to update the OECD database on the use of economic instruments for pollution control in OECD countries (last updated in 1992-1993); survey the use of economic instruments in OECD countries for natural resource management; and survey the use of financial assistance schemes in OECD countries for both pollution control and natural resource management. The ongoing OECD work programme on statistics on environmental taxes provided information on the use of environmentally related taxes for pollution control. Accordingly, a comprehensive questionnaire on the use of environmentally related economic instruments was sent to OECD countries in 1998, and responses were received from 24 of the 29 Member countries. This document presents the information contained in those submissions.

Coverage: Europe

Topics: Economic instruments, Incentive measures, Financial mechanisms, Economic policies

Other: Also published in French

#196. Othman, M. S. H., & Abdullah, N. M. R., (1991), *Economic Valuation of Wetland Plant, Animal and Fish Species of Tasek Bera and Residents' Perceptions on Development and Conservation*. AWB Publication No 77, Asian Wetland Bureau: Kuala Lumpur. 46 pp.

This document reports on a survey carried out on the economic values of plant, animal and fish species utilised by residents of the wetlands of Tasek Bera in Malaysia. Perceptions on conservation issues arising from agricultural

developments and proposed power transmission lines are also evaluated. The study suggests that the average annual household value derived from wetlands is RM 2,504, to a total of RM 463,166 for the whole community. Younger generations are found to not support any development programmes, while those in the higher income bracket are ignorant of the environmental effects of developments. Although some kinds of passive development projects are welcomed by the community, most respondents preferred their area to be conserved for the benefit of future generations. The study concludes that there is a need to develop the Tasek Bera area, but care must be taken in carrying out such projects so that damage to forest and wetland areas is minimised.

Coverage: Asia

Contains examples or case studies from: Malaysia

Ecosystem or sector focus: Marine and coastal, Wetlands, Agriculture, Infrastructure, Fisheries, Forests

Topics: Valuation, Causes of biodiversity loss, Market valuation

#197. Pacini, C., Wossink, A., Vazzana, C., & Omodei-Zorini, L., (2000), *Environmental Accounting in Agriculture: A Theoretical Overview with Special Reference to Tuscany*. American Agricultural Economics Association Annual Meeting, July 30-August 2: Tampa, Florida. 21 pp.

This paper addresses its specifics of environmental accounting for agriculture. Particularly it focuses on (a) data collecting/presenting or the environmental accounting methodology in agriculture, and. (b) indicators to measure the environmental consequences of agricultural production. The paper takes farming systems in the Tuscany Region in Italy and its specific environmental policy and management issues as a back drop. A new Environmental Accounting Information System (EAIS) is exposed that comprises both a set of environmental indicators for the evaluation of the farm externalities and the estimate of the farm environmental capital, a data collection system (the Environmental Accounting Questionnaire) and a set of elaboration methodologies for the indicators calculation.

Examples about how to collect data and indicators elaboration methodology application are presented with special concern to ecological-environmental models and yardsticks (GLEAMS, EPRIP), biodiversity indicators and landscape evaluation.

Coverage: Europe

Contains examples or case studies from: Italy

Ecosystem or sector focus: Agriculture

Topics: Environmental accounting, Valuation

#198. Panayotou, T. (1994a). 'Conservation of biodiversity and economic development: the concept of transferable development rights', *Environmental and Resource Economics* 4 (1):91-110

Coastal areas of the Akamas Peninsula in north-west Cyprus have a high level of biodiversity, as well as containing several rare and endemic plant species. Part of the Akamas Peninsula has been zoned by the Government of Cyprus as a non-development area. So as to save costs in its conservation, raise funds and avoid conflicts with potential developers, a system of transferable development rights has been proposed. Under this scheme developers, rather than being compensated with cash for activities foregone, would retain their rights to development but not be able to exercise them on-site. Development rights could be traded for property in other areas, or sold to groups concerned with the conservation of the Akamas Peninsula.

Coverage: Europe

Contains examples or case studies from: Cyprus

Ecosystem or sector focus: Marine and coastal

Topics: Economic instruments, Markets and charges, Property rights

#199. Panayotou, T., (1994b), *Economic Instruments for Environmental Management and Sustainable Development*. Environmental Economics Series Paper No 16, United Nations Environment Programme: Nairobi. 108 pp.

The importance of economic instruments for environmental policy is stressed in both the Rio Declaration and Agenda 21. Economic instruments provide a way of internalising the

costs of environmental degradation and instituting the polluter-pays principle. They also provide a means for governments to deal with environmental issues in a cost effective manner. This report presents a comprehensive outline of economic instruments for environmental management, illustrated with case studies from around the world.

Coverage: Global

Contains examples or case studies from: USA, Germany, Netherlands, Denmark, France, Italy, Norway, Sweden, New Zealand, Finland, Brazil, Cote d'Ivoire, Sri Lanka, Papua New Guinea, Congo, Ghana, Central African Republic, China, Pakistan, Chile, Malaysia, Poland

Ecosystem or sector focus: Marine and coastal, Fisheries, Forests, Water, Industry, Urban settlements

Topics: Incentive measures, Economic instruments, Financial mechanisms, Taxes, Subsidies, Markets and charges, Bonds and deposits, Property rights, Deforestation, Pollution, Economic policies

#200. Panayotou, T., (1994c), *Financing Mechanisms for Environmental Investments and Sustainable Development*. Environmental Economics Series Paper No 15, United Nations Environment Programme: Nairobi. 44 pp.

This document addresses the issues involved in finding funds to fill the financing gap of implementing sustainable development initiatives, and meeting the obligations attached to multilateral environmental agreements. It looks both at ways of reducing existing financing needs, of generating additional resources from existing mechanisms, and of deploying new and innovative financing mechanisms for environmental conservation. Examples of financing mechanisms are given from around the world.

Coverage: Global

Topics: Financial mechanisms, Economic instruments, Economic policies, Bioprospecting, Markets and charges, Taxes, Subsidies, International Conventions

#201. Pearce, D., Barbier, E. B., & Markandya, A., (1988), *Environmental Economics and*

Decision-Making in Sub-Saharan Africa.

LEEC Paper DP 88-01, London Environmental Economics Centre: London. 23 pp.

Africa's economic crisis is largely an agricultural crisis, which means that it is also an environmental crisis. Analysing the interaction between economy and the environment is the subject matter of environmental economics. This paper applies environmental economics principles and tools to economic and environmental issues in Sub-Saharan Africa. It looks at assessing the state of the environment, at identifying economic factors that lead to natural resource changes, at shifts in economic behaviour and their motivations, at valuation of the costs of environmental degradation and at devising market and economic policy measures which aim to provide incentives for sustainable development and environmental management.

Coverage: Africa

Ecosystem or sector focus: Agriculture

Topics: Incentive measures, Valuation, Trade, Causes of biodiversity loss, Economic instruments, Economic policies

#202. Pearce, D., (1991a), *Afforestation and the Greenhouse Effect: The Economics of Fixing Carbon by Growing Trees*. Gatekeeper Series, GK 91-04, London Environmental Economics Centre: London. 5 pp.

Concern about global warming has focused attention on ways of reducing greenhouse gas emissions. This short paper looks at carbon fixing by trees, and suggests methods with which to calculate the economic value of this.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Climate change, Valuation

#203. Pearce, D., (1991b), *An Economic Approach to Saving the Tropical Forests*. London Environmental Economics Centre: London. 30 pp.

This paper examines economic aspects of forest conservation and degradation. It describes one approach to decision-making about tropical forest use - the cost-benefit approach. Describing the

total economic value of tropical forests, the paper gives examples of how they can be calculated. It concludes that the concept of total economic value offers a comprehensive framework within which to value tropical forests.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Valuation, Economic policies

#204. Pearce, D., (1992), *Economic Valuation and the Natural World*. Centre for Social and Economic Research on the Global Environment: London. 170 pp.

This document introduces the concepts and methodologies for environmental valuation. It argues that making choices in the context of environmental quality involves comparing private and public, priced and unpriced goods. In this context it is necessary to impute a value to environmental goods and services, and making sure that these values are reflected in economic policies and programmes and in market prices. The paper describes the importance of valuing environmental goods and services, and presents methods and examples of this for different countries and ecosystems.

Coverage: Global

Ecosystem or sector focus: Forests, Wetlands, Protected Areas, Water, Wildlife, Urban settlements, Industry

Topics: Valuation, Economic planning, Economic policies

#205. Pearce, D., & Bann, C., (1993), *North-South Transfers and the Capture of Global Environmental Value*. Working Paper GEC 93-24, Centre for Social and Economic Research on the Global Environment: London.

As the 20th Century closes there is a recognition that many environmental problems have the properties of a global public good, or, perhaps better expressed, a global public 'bad'. If goods create human wellbeing, bads detract from it. Public goods are shared by all because their consumption by one person (or one country), entails their consumption by another person (or another country). For a good to be truly public it must also be effectively impossible to exclude

these 'joint consumers' through pricing or other means. A global public bad, then, is a loss of global wellbeing brought about by the actions of individuals and nations and which it is impossible, or very difficult, for any one individual or country to avoid. The solutions to such problems tend to involve a deliberate change in property rights, usually through the creation of an international agreement to protect the global environment. Effectively, such agreements convert what were global open access resources into global common property resources. With open access there are no owners. With common property there are communal owners and their success in controlling the problem will depend on the design of incentives to maintain the agreement.

Coverage: Global

Topics: Financial mechanisms, Incentive measures

#206. Pearce, D., & Warford, J., (1993), *World Without End: Economics, Environment and Sustainable Development*. Oxford University for the World Bank: Washington DC. 440 pp. ISBN 0-19-520881-1

This book explores how economic growth can become environmentally sustainable. It provides a background and overview to the concept of sustainable development, and to the links between economic theory and the environment. The book addresses the causes of and policy responses to resource degradation as well as analysing international environmental issues from an economic standpoint.

Coverage: Global

Ecosystem or sector focus: Agriculture, Forests, Water, Industry, Infrastructure

Topics: Valuation, Trade, Economic instruments, Financial mechanisms, Taxes, Subsidies, Disincentives, Causes of biodiversity loss, Economic policies, Incentive measures, Climate change, Pollution

#207. Pearce, D., & Moran, D., (1994), *The Economic Value of Biodiversity*. Earthscan Publications Ltd: London. 172 pp. ISBN 1 85383 195 6

Economics and conservation are at loggerheads. In particular, economic forces drive biodiversity loss. This book argues that this conflict doesn't have to be the case. It is the result of market failures, producing skewed decisions and destructive policies. Yet the values of biodiversity can be captured, and used to change economic decisions. This book looks at the economic causes of biodiversity loss, and describes methodologies for economic valuation. Case studies from different countries and sectors are also presented to illustrate the economic valuation of biodiversity. The book also looks at ways of capturing biodiversity values through markets and other means. It concludes by looking at the ways in which economic development can be reconciled with biodiversity conservation goals.

Coverage: Global, Africa, Latin America

Contains examples or case studies from: Botswana, Peru

Ecosystem or sector focus: Drylands, Wetlands, Marine and coastal, Agriculture, Forests

Topics: Valuation, Causes of biodiversity loss, Economic instruments, Economic policies, Incentive measures, Financial mechanisms, Convention on Biological Diversity

#208. Pearce, D., (1997a), *Can Non-Market Values Save the World's Forests?* Working Paper GEC 97-13, Centre for Social and Economic Research on the Global Environment: London.

Tropical forests are disappearing at the rate of about 0.8% per annum. Their disappearance is largely explained by the 'uneven playing field' between conservation and development values. Many conservation values have no market. This paper reviews the available data on what those conservation values are and shows that many have been exaggerated. In particular, pharmaceutical and other non timber values will be sufficient to justify conservation in only a limited number of cases. Maximum willingness to pay for carbon storage, on the other hand, could outweigh timber values. Much therefore depends on whether the world will agree a carbon trading regime to control global warming.

Coverage: Global

Ecosystem or sector focus: Forests, **Topics:** Valuation, Markets and charges, Climate change, Carbon offsets, Financial mechanisms

#209. Pearce, D., (1997b), *An Economic Overview of Wildlife and Alternative Land Uses.* Working Paper GEC 97-05, Centre for Social and Economic Research on the Global Environment: London.

The 'sustainable use' of wildlife, as opposed to its outright preservation through command and control' policies, has a clear economic rationale. That rationale is based on the fact that wildlife competes with human appropriation of the land for food supply, infrastructure, and other economic development. Stripped of its economic value, wildlife cannot compete - the competitive playing field is too heavily tilted against it. Some conservation policies have perverse effects. Forbidding the use of wildlife products can simply 'disinvest' economic value, i.e. make the resource valueless (or less valuable) from an economic point of view. Since much wildlife is also a nuisance, both in terms of disease, interference with crops, and even danger to human life, the effect of taking economic value away is to lose the potential for a conservation relationship between wildlife and local community. One answer to such problems is to invest economic value in wildlife by creating markets for its use and then, critically, sharing the resulting revenues with local communities. Another solution lies in privatisation where the landowner collects the revenues and hopefully shares them with local communities or, at least, provides employment. The clue to such arrangements lies in positive incentives, not threats of fines or worse for failing to conserve. Moreover, traditional preservationist approaches leave all the pressures on land unaffected: people are simply excluded from access to land and nothing happens to change the demand for that land. Evidence on the financial rates of return to wildlife utilisation is fairly extensive, though not always in a form that makes assessment easy. Where it has been standardised in terms of different 'models' of revenues and costs, the evidence suggests that, on many occasions, privatised wildlife pays far better than the usual alternative of cattle, but that on some occasions neither option would meet a standard financial test of being worthwhile. In the long run wildlife will have to pay its way on a more sustainable basis. Economic appraisal, as opposed to financial appraisal, suggests that when modifications for overvalued exchange rates and for the 'true' cost

of labour, rates of return increase. In turn this suggests at least that the wildlife sector should be better treated by national governments, e.g. with favourable tax regimes. Further and wider economic appraisal assesses not the flow of costs and revenues, but the total willingness to pay for wildlife. Only a few studies have been carried out for Africa but they all suggest substantial willingness to pay for conservation, particularly from tourists. The relevance of these exercises is that they are, in effect, tracing out the demand curve for wildlife. This then permits an assessment of the effects of charging different levels of price for wildlife viewing and consumptive uses. Several of the economic studies suggest that Africa under-prices its wildlife. The wider economic studies also suggest that there has to be a greater effort to tap the 'global value' of African wildlife, i.e. the amount that individuals will pay to visit Africa, to conserve the option of future visits, and even simply to conserve wildlife even if there is no chance of the individual ever visiting reserves for real. The Global Environment facility exists to 'capture' such global value, but its resources are modest. This suggests a full exploration of the panoply of global financing mechanisms that exist or that could exist, from debt-to-nature swaps to carbon offsets.

Coverage: Africa

Ecosystem or sector focus: Wildlife, Protected Areas

Topics: Valuation, Financial mechanisms, Markets and charges

#210. Peres, C. A., (1997), *Evaluating the Sustainability of Subsistence Hunting In Tropical Forests*. Working Paper GEC 97-22, Centre for Social and Economic Research on the Global Environment: London.

Large-bodied vertebrates are perhaps the most ecologically sensitive extracts of tropical forests, and their sustained management will become increasingly critical to the long-term integrity of these ecosystems. This paper presents the results of a long-term programme (1986-1996) of wildlife surveys, based on a standard line-transect censusing technique, which was designed to quantify the impact of different levels of hunting pressure across a wide range of amazonian forest habitats. This is the most comprehensive set of quantitative biodiversity inventories of large-

bodied birds and mammals for a given region of tropical forest. Population density and biomass estimates obtained at 25 terra firme and floodplain forest sites are used to determine which game species are most susceptible to population declines and local extinctions resulting from subsistence hunting practices. These estimates are then applied to a demographic model to determine the potential production and sustainable harvest of different game species within two broad classes of forest types. Data presented here indicate that estimates of forest productivity and baseline population density are essential components of sampling protocols designed to evaluate to what extent a game harvest regime can be considered to be sustainable.

Coverage: Global

Ecosystem or sector focus: Wildlife, Forests

#211. Perrings, C., Gilbert, A., Pearce, D., & Harrison, A., (1989), *Natural Resource Accounts for Botswana: Environmental Accounting for a Natural Resource-Based Economy*. LEEC Paper DP 89-11, London Environmental Economics Centre: London. 66 pp.

For various reasons the existing national accounts do not contain adequate measures of the natural resources used in Botswana. The main reason for this is that many resources are under communal or common ownership, and are not traded. This means that there are no market prices by which to measure their relative value. This report considers the advantages of creating a set of accounts to include measures of the value of environmental goods and services, and suggests methods for proceeding with the construction of such accounts.

Coverage: Africa

Contains examples or case studies from: Botswana

Topics: Environmental accounting, Valuation, Incentive measures, Economic policies, Causes of biodiversity loss

#212. Perrings, C., Folke, C., & Maler, K.-G., (1992), *The Ecology and Economics of Biological Diversity: Elements of a Research*

Agenda. Beijer Discussion Paper No 1, Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences: Stockholm. 28 pp. ISBN 1102-4941

This paper lists the issues that are thought to be important elements of a research agenda on the ecology and economics of biodiversity loss, but with emphasis on the economics of the problem. It also provides some motivation for the priorities suggested. The first cluster of priorities relates to ecological questions concerning the nature and measurement of change in biodiversity, both globally and at the level of particular ecosystems. The second concerns economic valuation. The third concerns the driving forces behind biodiversity loss, and the fourth concerns the question of what is to be done.

Coverage: Global

Topics: Valuation, Incentive measures, Economic instruments, Economic policies, Causes of biodiversity loss, Carbon offsets

#213. Perrings, C., & Pearce, D. (1994). 'Threshold effects and incentives for the conservation of biodiversity', *Environmental and Resource Economics* 4:13-28

Biological diversity is a central component of the stock of natural capital on which all economic development is based. Other things being equal, loss of biological diversity implies loss of development potential, and its conservation through sustainable use or outright protection implies the protection of that potential. One characteristic of biodiversity loss of especial importance is that it is associated with ecological threshold effects. This paper explores the implication of this characteristic for the properties of a biodiversity conservation strategy.

Coverage: Global

Topics: Incentive measures, Causes of biodiversity loss, Economic instruments, Economic policies

#214. Perrings, C., Maler, K.-G., Folke, C., Holling, C. S., & Jansson, B.-O. (Eds.), (1995), *Biodiversity Loss: Economic and Ecological Issues*. Cambridge University Press: Cambridge. 348 pp. ISBN 0-521-47178-8

This volume reports key findings of the Biodiversity Program of the Royal Swedish Academy of Sciences' Beijer Institute. The program brought together a number of eminent ecologists and economists to consider the nature and significance of the biodiversity problem. In encouraging collaborative work between these closely related disciplines it sought to shed new light on the concept of diversity; the implications of biological diversity for the functioning of ecosystems; the driving forces behind biodiversity loss; and the options for promoting biodiversity conservation. The results of the program are surprising. It is shown that the core of the biodiversity problem is a loss of ecosystem resilience and the insurance it provides against the uncertain environmental effects of economic and population growth. This is as much a local as a global problem, implying that biodiversity conservation offers benefits that are as much local as global. The solutions as well as the causes of biodiversity loss lie in incentives to local users.

Coverage: Global

Ecosystem or sector focus: Water, Wetlands, Drylands, Forests

Topics: Causes of biodiversity loss, Incentive measures, Economic instruments, Valuation, Economic policies

#215. Perrings, C., (1995), *Economic Values of Biodiversity*. Reprint Series, Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences: Stockholm. 87 pp.

The important gap between the market price of environmental resources and their value to individuals and society is only gradually coming to be understood. Together market and policy failures are the main underlying causes of biodiversity loss. To resolve these we need first to evaluate their consequences. Valuation can be seen as a method of determining the relative importance of the environmental consequences of economic activities. This paper describes in detail, with examples, the theory and methodology of biodiversity valuation. It then goes on to explain and illustrate how valuation can be applied and used as a tool for biodiversity conservation, such as through the use of incentive measures.

Coverage: Global

Ecosystem or sector focus: Forests, Tourism

Topics: Deforestation, Valuation, Economic instruments, Economic policies, Contingent valuation, Travel cost, Effect on production, Market valuation, Incentive measures, Markets and charges, Taxes, Subsidies

#216. Perrings, C. (Ed.), (2000a), *The Economics of Biodiversity Conservation in Sub-Saharan Africa: Mending the Ark*. Edward Elgar Publishers Ltd: Cheltenham. ISBN 1840641509

This book contains case studies of the economic causes of biodiversity loss in a range of ecosystems including wetlands, montane forests, tropical moist forests, semi-arid savannahs and lakes, discussing the policy options for conserving biodiversity in each case. They also analyse in detail the environmental consequences of policy reform in Ghana on the large and small scale, and present practical recommendations for implementing the Convention on Biological Diversity. Among other areas they consider are the Hadejia- Nguru wetlands of northern Nigeria, Nyae Nyae in Namibia, Marsabit Forest Reserve in Kenya, and demersal and gillnet fisheries in Malawi.

Coverage: Africa

Contains examples or case studies from: Ghana, Kenya, Nigeria, Namibia, Malawi

Ecosystem or sector focus: Water, Wetlands, Forests, Wildlife, Protected Areas, Fisheries, Drylands

Topics: Convention on Biological Diversity, Causes of biodiversity loss, Valuation, Economic instruments, Economic policies

#217. Perrings, C., (2000b), *The Economics of Biodiversity Loss and Agricultural Development in Low Income Countries*. Environment Department, University of York: York. 26 pp.

Biodiversity conservation has traditionally been seen as problem of protecting genetic diversity. Increasingly, however, biodiversity conservation is being taken out of zoos and protected areas. It is therefore interesting to consider the problem of biodiversity loss not just in refugia, but in managed ecosystems. These are ecosystems from

which some species have been deleted in order to enhance the productivity of others. The problem of biodiversity conservation in such cases does not therefore involve preservation of all existing species. It involves maintenance of sufficient interspecific and intraspecific diversity to protect the productivity of the system. Put another way, the problem of biodiversity conservation in managed systems requires us to think about the optimal or efficient level of species deletion. The main this paper poses is whether current rates of biodiversity loss are efficient, especially in agroecosystems. It considers three aspects of the problem. The first, is to identify the external costs of biodiversity loss in agroecosystems in developing countries. The second is the relationship between market failure and income. The third is to consider what can be done through market based instruments, institutional and property rights reform to address the problem. The conclusions of the paper can be summarised as follows. Biodiversity loss matters in agroecosystems for a number of reasons, the most important of which are that it reduces the capacity of farmers to cope with external shocks (whether market or environmental). These costs of biodiversity loss are external to the market-they involve market failure. The problem is most severe in low-income countries where mechanisms for private and social insurance against the risks to agricultural incomes are limited. Governments frequently act as insurers of last resort, distributing famine relief when farm incomes fail. Given the limited resources of governments in low-income countries, however, and given the fact that the risks to farm incomes are often highly correlated within such countries, this is seldom an effective solution. In the absence of effective private or social insurance mechanisms, the best way to deal with biodiversity externalities may be through the private costs of different farming systems. Where biodiversity-poor farming systems involve greater social cost, they should also involve greater private cost.

Ecosystem or sector focus: Agriculture

Topics: Causes of biodiversity loss, Economic instruments, Markets and charges, Economic policies

#218. Peters, C., Gentry, A., & Mendelsohn, R. (1989). 'Valuation of an Amazonian rainforest', *Nature* 339:655-656

In an exercise to estimate the conservation value of an area of Amazonian rain forest in terms of its value for sustainable non-timber and timber product extraction, local market prices (less collection and transport costs) were used. This was based on data collected on market prices, and analysis of quantities of products harvested and sold. Using a 5% discount rate, a "net present conservation value" of US\$ 6,800 per hectare of forest was calculated. This figure was far higher than the returns from clear-cut timber harvesting, or from subsequent plantations or cattle ranching.

Coverage: Latin America

Contains examples or case studies from: Peru

Ecosystem or sector focus: Forests

Topics: Valuation, Market valuation

#219. Phillips, A. (Ed.), (1998), *Economic Values of Protected Areas: Guidelines for Protected Area Managers*. IUCN - The World Conservation Union: Gland and Cambridge. 52. 2-8317-0461-8

These guidelines look at how economic values can be assessed for protected areas, and identify cases where protecting the environment has made a significant contribution to the economy. They use a number of case studies to illustrate these methods, and to reveal that protected areas are often significant revenue earning entities and can provide great benefits to national and local economies. This, in turn, provides an opportunity for sustainable industries and for the generation of financial returns. With proper management, these economic values can be identified and captured for the benefit of both conservation and economic development.

Coverage: Global

Contains examples or case studies from: Kenya, Uganda, Madagascar, Croatia, India, Nepal, South Africa, Australia, Honduras, Belize, Fiji

Ecosystem or sector focus: Protected Areas

Topics: Valuation

#220. Phillips, A., (2000), *Financing Protected Areas: Guidelines for Protected Area Managers*. IUCN - The World Conservation Union: Gland. 58 pp. ISBN 2-8317-0544-4

These guidelines aim to provide protected area managers with information about financing their protected areas and where to look for finance beyond existing sources. Access to funds is becoming increasingly important for effective management. The guidelines cover the development of a financial strategy, provide information on financing sources, and illustrate this with a number of national case studies.

Coverage: Global

Australia and New Zealand

Africa

Latin America

Contains examples or case studies from: Costa Rica, New Zealand, South Africa

Ecosystem or sector focus: Protected Areas

Topics: Financial mechanisms

#221. Repetto, R., (1996), *Macroeconomic Policies and Biodiversity Loss*. Paper presented at IUCN Workshop on Economics of Biodiversity Loss, April 1996, Gland, Switzerland. 8 pp.

<http://www.biodiversityeconomics.org>

This paper focuses on macroeconomic policy and its relationship to the destruction of tropical forests. Forests and woodlands are threatened by demand for agricultural land, which depends on domestic demand for agricultural products, which responds to growth in population, per capita income and income distribution, which, in turn, depend on macroeconomic policies. Several macroeconomic policies are identified as having pervasive influences on the use and conservation of forest resources. These include forest revenue structures, trade and investment incentives to promote wood-using industries, and credit, tax and pricing incentives for land-intensive plantations and ranches. For instance, a policy of openness to international trade can aggravate the problem of biodiversity loss because it will increase the demand for forest products and because countries at early stages of development that export mostly primary commodities will not resist the pressure to cut down their forests.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Causes of biodiversity loss, Economic instruments, Economic policies

#222. Repetto, R., & Austin, D., (2000), *Pure Profit: The Financial Implications of Environmental Performance*. World Resources Institute: Washington DC. 64 pp.

This report demonstrates how environmental issues can successfully be integrated into financial analysis. It explains a newly developed methodology derived from fundamental principles of financial analysis and demonstrates the approach by applying it empirically to companies in the U.S. pulp and paper industry. The results show clearly that companies within this industry face environmental risks that are of material significance and that vary widely in magnitude from firm to firm. These risks are not evident in companies' financial statements nor are they likely to be incorporated in current market valuations. The methodology is consistent with the framework used by analysts to evaluate conventional business risks and opportunities, and avoids some of the limitations of other approaches currently used to relate environmental and financial performance. The approach is forward-looking and scenario-based, recognizing that financial markets are concerned more with the future than with the past. It deals explicitly with uncertainties regarding future environmental policies and other environmental pressures on the firm, rather than merely assessing past and present levels of environmental performance. It uses standard techniques of financial analysis to derive measures of expected environmental impacts on share values and financial measures of environmental risk. It focuses on those environmental issues deemed most important by industry experts and not simply those for which data are readily available. This tool will be of interest to professionals in both investment and corporate communities. Investors can use it to integrate environmental risks more fully into financial analysis in evaluating insurance underwriting. Environmental managers can use it to quantify their environmental exposures and risks; to benchmark their companies (or facilities) against rivals; to identify which investments in environmental control would do most to reduce their outstanding environmental risks; and to move beyond compliance-based environmental actions toward a more forward-looking and strategic approach. Managers and CFOs could use it to gauge how much it would be worth spending in self-insurance to eliminate environmental risks, or as part of a strategic management system emphasizing real options.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Forests

Topics: Economic instruments, Economic policies, Private sector, Markets and charges

#223. Richards, M. (1994). 'Towards valuation of forest conservation benefits in developing countries', *Environmental Conservation* 21 (4):308-319

This article argues that the valuation of both marketed and non-marketed forest benefits forms a vital tool for policymaking and decision making. It presents basic concepts in the economic analysis of forest conservation, describes different valuation methods, and provides case studies of the valuation of forest conservation benefits from various developing countries.

Coverage: Global, Africa, Asia, Latin America, Middle East, North Africa and Gulf States

Contains examples or case studies from: Cameroon, Costa Rica, Djibouti, Ethiopia, Morocco, Nepal, Nicaragua, Peru, Uganda, Zimbabwe

Ecosystem or sector focus: Forests, Wetlands

Topics: Valuation

#224. Richards, M., & Costa, P. M. (1999). 'Can Tropical Forestry be made Profitable by 'Internalising the Externalities'?', *Natural Resource Perspectives* (46):1-6

This paper discusses the potential and constraints of a range of 'innovative incentive mechanisms' for stimulating sustainable (natural) forest management and conservation, including those like carbon offset trading which attempt to capture the global public good values (or externalities) of tropical forests and internalise them into positive incentives for forest users or managers. Its policy conclusions are: Forest exploitation and degradation happen because it is profitable; the main causes of this are market and policy failures, including weak regulation. Innovative incentive mechanisms should aim to tackle market and policy failures and bring private returns into line with social returns as far as possible. No innovative incentive mechanism can be successful without effective regulation. At the

international level, without environmental regulations there is insufficient demand or willingness to pay. At the national level, increasing the profitability of forestry would also increase forest exploitation without effective regulation. 'Innovative financing' can help to build the regulatory framework. Fiscal market-based instruments, such as forest pricing incentives and charges made on the principle of the 'polluter and beneficiary pays', score highly in terms of bringing private costs closer to social costs, but demand strong political commitment. Donors could encourage them more by funding research to establish optimum tax levels and likely economic and environmental impacts, and by helping to build the administrative capacity required to implement and monitor them. Efforts to encourage sustainable forestry should be complemented by measures to make forest-degrading activities less attractive, especially by tackling extra-sectoral causes of forest degradation and investing in social capital and labour-intensive agriculture.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Financial mechanisms, Incentive measures, Economic instruments, Economic policies, Taxes, Subsidies, Markets and charges, Debt conversion, Carbon offsets

#225. Richards, M., (1999), *'Internalising the externalities' of tropical forestry: a review of innovative financing and incentive mechanisms*. European Tropical Forestry Paper 1, Overseas Development Institute: London. 44 pp.

The main objective of this paper, commissioned by the European Commission, is to review the potential of 'innovative' financing and financial incentive mechanisms (IFIMs) for 'sustainable' forestry in the tropics, and to attempt to provide policy guidance for donors and other decision makers. The approach taken is to examine the key problems that IFIMs seek to overcome. It was found that the issues of financing and how to create positive financial incentives are not easy to separate. It is argued that the main problem is not a lack of finance per se, but that forestry is unattractive compared to alternative land uses, primarily due to market and policy failures which either depress the value of forest products and services, or make other land uses more profitable.

Policy failures in particular cause negative or perverse incentives for forestry. Thus the key challenge is to find ways of modifying market incentives so that forestry becomes more attractive than alternative land uses, including forest exploitation. This can result either from improving returns to forestry or by reducing its opportunity cost. A key aspect of this is forestry's time or discounting problem: forest managers can rarely afford to wait for the benefits of long-term management when alternative land uses provide much quicker returns. The main reason deforestation occurs is because people find it profitable. At the same time, and by definition, 'sustainability' demands that the underlying problems be tackled. IFIMs should therefore counter market and policy failures as far as possible. These factors point to a high potential for carbon trading, 'polluter and beneficiary pays' taxes and other market-based instruments, appropriate forest pricing and performance bonds, always accompanied by appropriate regulatory measures. An essential complement to attempts to make sustainable forestry more attractive (which many see as a losing battle anyway) is to make forest degradation less attractive. The paper also concludes that no IFIM will work unless and until there is effective regulation, whether at the national or international level. The 'catch-22' of IFIMs is that the instruments with higher potential tend to face most technical and political problems. Tackling policy failure is likely to have the most impact, but forestry is not always high up a country's set of priorities. Analysis of the distribution of the costs and benefits of sustainable forestry and the options for donors implies that there could be a global negotiating table for IFIMs in which governments undertake to tackle policy failure as long as donors make every effort to capture and return global externalities.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Incentive measures, Financial mechanisms, Taxes, Subsidies, Debt conversion, Carbon offsets, Trust Funds, Markets and charges

#226. Rietbetgen-McCracken, J., & Abaza, H., (2000a), *Economic Instruments for Environmental Management: A Worldwide Compendium of Case Studies*. United Nations Environment Programme and Earthscan

Publications Ltd: London. 208 pp. ISBN 1 85383 690 7

There is now key empirical evidence of the power of economic instruments in managing the environment. This volume describes a variety of environmental problems to which economic instruments can be applied. It is illustrated with case studies from different sectors and countries.

Coverage: Global, Africa, Asia, Europe, Latin America

Contains examples or case studies from: Botswana, Zimbabwe, Ghana, Malaysia, Thailand, Poland, Hungary, Mexico, Colombia, Chile, Brazil

Ecosystem or sector focus: Forests, Drylands, Water, Urban settlements, Infrastructure, Protected Areas

Topics: Economic instruments, Economic policies, Markets and charges, Subsidies, Pollution, Taxes

#227. Rietbetgen-McCracken, J., & Abaza, H., (2000b), *Environmental Valuation: A Worldwide Compendium of Case Studies*. United Nations Environment Programme and Earthscan Publications Ltd: London. 232 pp. ISBN 1 85383 695 8

The use of economic valuation methods is fundamental in the management of the environment and natural resources. This volume presents the results of a range of international applications of different valuation techniques. It is illustrated with case studies from different sectors and countries.

Coverage: Global, Africa, Asia, Europe, Latin America

Contains examples or case studies from: Kenya, Ghana, Cameroon, Philippines, Taiwan, Sri Lanka, Estonia, Russia, Chile, Netherlands Antilles, Haiti, Mexico, Nicaragua

Ecosystem or sector focus: Water, Wildlife, Protected Areas, Forests, Infrastructure, Marine and coastal, **Topics:** Valuation, Market valuation, Contingent valuation, Travel cost, Effect on production, Mitigative and avertive expenditures

#228. Rubec, C., (1996), *Canadian Case Study on a National Tax Incentive Measure*

for Biodiversity. Paper presented at workshop on Incentives for Biodiversity: Sharing Experiences, 4th Global Biodiversity Forum, Montreal, Canada 30 August - 1 September 1996. 2 pp.

<http://www.biodiversityeconomics.org>

This paper summarises amendments to Canadian tax law which enable people to donate ecologically sensitive lands to conservation interests. Seen as a complement to traditional conservation efforts such as establishing parks, this new law uses economic incentives to further biodiversity conservation.

Coverage: North America

Contains examples or case studies from: Canada

Ecosystem or sector focus: Forests, Protected Areas, Wildlife

Topics: Private sector, Incentive measures, Taxes

#229. Rubino, M. C., de Callejon, D. P., & Lent, T., (2000), *Business and Biodiversity in Latin America*. Discussion Paper, Environmental Projects Unit, International Finance Corporation: Washington DC. 53 pp.

This document looks at the emerging sector of biodiversity business. It argues that the alliance between businesses and conservation interests offers enormous potential benefits. The report outlines the business and conservation rationale for such investments, and some of the investment opportunities in biodiversity-linked businesses. It also analyses financing needs for such initiatives. Illustrative case studies are provided from different countries in Latin America.

Coverage: Latin America

Contains examples or case studies from: Argentina, Brazil, Bolivia, Chile, Costa Rica, Ecuador, Honduras, Mexico, Paraguay, Peru, Venezuela

Ecosystem or sector focus: Agriculture, Forests, Tourism

Topics: Trade, Private sector, Economic instruments, Financial mechanisms

#230. Ruitenbeek, J. (1992). 'The rainforest supply price: a tool for evaluating rainforest

conservation expenditures', *Ecological Economics* 6:52-78

Economic policies are often suggested as mechanisms for promoting rainforest conservation in developing countries. To help decide whether international resources should be used to protect specific rainforests, the calculation of a 'rainforest supply price' (RSP) is proposed. Korup National Park in Cameroon contains the oldest rainforest in Africa and as a haven for important endangered species - it is the subject of active international conservation efforts. A cost-benefit analysis of a conservation project to protect Korup from increased land-use pressures suggests that it is not in Cameroon's interest unless a 5.4 million ECU inducement is transferred to Cameroon. Given the protection afforded, the transfer is equivalent to a RSP of 1060 ECU per km "SUP 2" per year. Evaluation of six other tropical rainforest projects suggest that international donors made transfers having values ranging from 15 to 1575 ECU per km "SUP 2" per year. It is thus concluded that the inducements required are within a range that conservation interests are apparently willing to mobilise.

Coverage: Global, Africa, Asia, Latin America

Contains examples or case studies from: Bolivia, Cameroon, Costa Rica, Ecuador, Nigeria, Philippines

Ecosystem or sector focus: Forests

Topics: Valuation, Economic instruments, Economic policies, Financial mechanisms

#231. Saichoono, S. M. (1995). 'Contingent valuation as an additional tool for evaluating wildlife utilisation management in Zambia: Mumbwa Game Management Area', *Ambio* 24 (4):246-249

This case study evaluates self interest in wildlife management by the local community of the Mumbwa Game Management Area in Zambia. The discussion centres on the methods employed - contingent valuation. The results show a positive reception to new approaches by the park managing authority. The contingent valuation approach is used to determine the willingness to pay and willingness to accept compensation by community members based on their consumption of wildlife. The study however also demonstrates

a land use conflict with negative responses to wildlife.

Coverage: Africa

Contains examples or case studies from: Zambia

Ecosystem or sector focus: Wildlife, Protected Areas, Drylands

Topics: Valuation, Contingent valuation, Causes of biodiversity loss, Financial mechanisms

#232. Salazar, J. E., (1998), *Environmental Finance: Linking Two Worlds*. Paper presented at a workshop on Financial Innovations for Biodiversity, 10th Global Biodiversity Forum, Bratislava, Slovakia, 1-3 May 1998. 15 pp.

<http://www.biodiversityeconomics.org>

Why financiers can not digest and incorporate - easily- environmental issues into its core business? In building a bridge between the financial and the environmental world there are many issues to be addressed to. Financiers and environmentalists are people with its own approach, philosophy, language, definition on success and failure, accounting, among other. Then in promoting financial innovations for biodiversity, discrepancies and coincidences should be analysed. In Peru, from 1996 several workshops, interviews and a survey at the financial community were carried out (sponsored by the University of Kent, the Ebert Foundation, GTZ, British Council and PROFONANPE) to learn about local financier's use of eco-criteria into its decision making process. Here the driving idea was that by changing financier's criteria, business practices could change. In Peru, financiers have a strong influence on their clients' practices (because of their small capitalisation level and dependence on debt) and are a reduced number while the business community is enormous. As at July 1998, in Peru there is no private environmental funds (venture or development capital), so for developing the first one it was critical to identify a project pipeline (e.g., to offer to potential investors) to market this initiative. In doing so, financiers found difficult to understand bio-conservation rationale but it was easy (for financiers) to digest clean technology issues (driven by eco-efficiency). So financier's preferences for brown (to green) projects are highlighting critical issues, which must be analysed in detail.

Coverage: Latin America

Contains examples or case studies from: Peru

Topics: Financial mechanisms, Private sector, Trust Funds, Taxes

#233. Salazar, J. E., (2000), *El Banquero Exitoso del Tercer Milenio*. Friedrich Ebert Stiftung: Lima. 146 pp.

This book looks at needs and opportunities for the financial sector in Peru to take account of environment and biodiversity concerns. It aims to influence decision-makers and policy makers from banks and other financial institutions to look at the sustainability of their business operations. It makes a number of proposals and recommendations for the opportunities for bio-financing, and outlines some of the tools and methods available for achieving this.

Coverage: Latin America

Contains examples or case studies from: Peru

Topics: Financial mechanisms, Economic instruments, Economic policies, Incentive measures

Other: Spanish language publication

#234. Sanchirico, J. N., & Wilen, J. E., (1998), *Marine Reserves: Is There a Free Lunch?*

Discussion Paper 99-09, Resources for the Future: Washington DC. 27 pp. This paper employs a spatial and intertemporal model of renewable resource exploitation to investigate the effects of marine reserve creation. The model combines the H. S. Gordon/Vernon Smith hypothesis of a rent dissipation process with Ricardian notions that resources are exploited across space in a pattern dependent upon relative profitabilities. The metapopulation model employed here incorporates modern biological ideas that stress patch heterogeneity, linkages, and dispersal processes between patches. The spatial bioeconomic model is then used to simulate the effects of reserve creation under various ecological structures. It finds, under certain parameter configurations and ecological linkages, that there is potential for a "double-dividend" where both aggregate biomass and harvest increase after an area of the fishery is set aside and protected from exploitation.

Coverage: Global

Ecosystem or sector focus: Marine and coastal, Fisheries, Protected Areas

Topics: Incentive measures, Valuation, Causes of biodiversity loss

#235. Sarmiento Gutierrez, M. B., (1992), *Estimating the Environmental Benefits of the Amazon Forest: An Intertemporal Valuation Exercise*. Working Paper GEC 92-44, Centre for Social and Economic Research on the Global Environment: London.

The social valuation of natural resources and ecosystems has led researchers to investigate the nature of the benefits and costs of their preservation, as well as to develop concepts and methodologies suitable to reflect their social valuation. The total economic value concept (TEV) (Randall, 1989) tries to capture all the components that are supposed to affect directly and indirectly human welfare with respect to environmental resources. TEV comprises the direct use values of a resource (e.g. timber, recreation), preferences towards the mere existence of natural resources (existence value), and the value of the ecological functions performed by them (indirect use values), regardless of the existence of markets. The purpose of this article is twofold. First, an integrative approach to valuing tropical forests is suggested. Krutilla and Fisher (1975) developed an intertemporal framework to value natural resources in which emphasis is given to irreversibility of development decisions, a rate of appreciation of the preservation benefits and a technological decay function for prevailing development technologies. We integrate the Krutilla and Fisher model (1975) with the TEV concept to seek a partial valuation of Amazon forest functions. Such valuations are useful for (a) refined project appraisal incorporating conservation benefits and (b) an estimate of values which could be used to serve as a basis in international agreements on financing conservation of such an ecosystem. In the more general case, where policy makers have to decide land use and planning in the Amazon forest, estimates of the cost of deforestation could serve to incorporate the criterion of minimizing the total social costs of deforestation as a goal.

Coverage: Latin America

Ecosystem or sector focus: Forests

Topics: Valuation, Causes of biodiversity loss

#236. Schelske, O., (1998), *Financial Innovations for Biodiversity: the Swiss Experience*. Paper presented at a workshop on Financial Innovations for Biodiversity, 10th Global Biodiversity Forum, Bratislava, Slovakia, 1-3 May 1998. 28 pp.
<http://www.biodiversityeconomics.org>

In Switzerland, the issue of biodiversity protection is addressed through several sectoral policies. This paper analyses two cases of sectoral policies: ecological direct payments, which are within the realm of Swiss agricultural policy; and the activities of the Swiss Foundation for the Conservation of Cultural Landscapes (Fonds Landschaft Schweiz, FLS) which is within the realm of Swiss conservation policy. Both cases represent examples of the use of financial instruments for the protection of biodiversity. One of the most highly regulated and controlled sectors in Swiss economy, Swiss agriculture was reformed in 1992 due to the GATT Uruguay Round. Agricultural price and income policies were separated and domestic support prices were decreased. Swiss agriculture became multi-functional. Its objectives are now to ensure food supply for the national population, to protect natural resources (especially biodiversity), to protect traditional landscapes and to contribute to the economic, social and cultural life in rural areas. On one hand, direct payments are used to ease the transition of Swiss agriculture toward global and free market conditions. On the other hand, direct payments are offered to those farmers who are willing to use more ecological and biodiversity-sound management practices. This paper shows the design and success of these direct payments. Another instrument for biodiversity protection is the Swiss Foundation for the Conservation of Cultural Landscapes (Fonds Landschaft Schweiz). It was set up by the Swiss Parliament during Switzerland's 700-year celebration in 1991. The Foundation supports specific projects for nature and landscape conservation, for example the conservation and sustainable use of old orchards, corridors of regional ecosystems, or old chestnut plantations in southern Switzerland. The Foundation is financed by federal, cantonal and communal authorities and by private donations. Biodiversity

protection policies are beginning to be implemented into agricultural and landscape policies. Because biodiversity protection is a broad concept, a concentration on funds from agricultural and landscape policies will not be sufficient. Therefore, instruments focusing on other sectors should be suggested.

Coverage: Europe

Contains examples or case studies from: Switzerland

Ecosystem or sector focus: Agriculture

Topics: Economic instruments, Taxes, Subsidies, Financial mechanisms, Private sector, Causes of biodiversity loss

#237. Sedjo, R., & K., S. S., (1999), *Eco-Labeling and the Price Premium*. Discussion Paper 00-04, Resources for the Future: Washington DC. 17 pp.

International environmental and government organizations propose eco-labeling as a market incentive to cause industry to operate in an ecologically sustainable and biodiversity-friendly manner. A microeconomic analysis questions whether eco-labeling will cause producer profits in a competitive industry to decline, even under a voluntary system, and whether eco-labeling will necessarily generate different prices for labeled and unlabeled product. Using wood product as an example, results identify conditions that may exist when firms lose profits, even under a voluntary system, and where existing production constraints may lead to a single price, regardless of labeling.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Markets and charges, Economic instruments

#238. Sedjo, R., & Sohngen, B., (2000), *Forestry Sequestration of CO₂ and Markets for Timber*. Discussion Paper 00-35, Resources for the Future: Washington DC. 86 pp.

Forestry has been considered to have potential in reducing the atmospheric concentration of carbon dioxide by sequestering carbon in above-ground timber and below-ground roots and soil. This potential has been noted in the Kyoto Protocol,

which identified specific forestry activities for which carbon sequestration credits could be obtained. To date, a few forestry efforts have been undertaken for carbon purposes, but most of these efforts have been on a small scale. Proposals have been under discussion, however, that would result in the creation of very large areas of new forest for the purpose of offsetting some of the additional carbon that is being released into the atmosphere. Concerns are expressed, however, that large-scale sequestration operations might have impacts on the world timber market, affecting timber prices and thereby reducing the incentives of traditional suppliers to invest in forest management and new timber production. Such a “crowding out” or “leakage” effect, as it is called in the literature, could negate much or all of the sequestered carbon by the newly created sequestration forests. Accordingly, the purpose of this study is to examine and assess the interactions between carbon sequestration forestry, particularly, newly created carbon forests, and the markets for timber. The approach of this study involves utilizing an existing Dynamic Timber Supply Model (DTSM) to examine the interactions between newly created sequestration forests and the markets for timber. This model has been used to examine global timber supply and, more recently, has been modified to include carbon considerations. This study suggests that even without any specific sequestration efforts, commercial forestry offers the potential to sequester substantial volumes of carbon, approaching ten gigatons (Gt) (or petagrams (Pg)), in vegetation, soils and market products over the next century. At current rates of atmospheric carbon build up this is equal to about three years of net carbon releases into the atmosphere. This volume of carbon sequestration could be increased 50–100% by 50 million hectares (ha) of rapidly growing carbon-sequestering plantation forests, even given the anticipated leakages due to market price effects. Finally, the projections suggest that the amount of crowding out and carbon leakages are likely to be very modest. The 50 million ha of carbon plantations are projected to reduce land areas in industrial plantations, that is, crowd out, only from 0.2 to 7.8 million ha over the 100-year period. The addition of carbon sequestration forests offers the potential to increase the carbon sequestration of the forest system more than 50%, up to 5.7 Gts, above that already captured from market activity. This estimate assumes that crowding out and associated projected leakages will occur. At current rates of atmospheric carbon

buildup, about 2.8% of the expected total buildup in atmospheric carbon over the next century could be offset by 50 million ha of carbon plantations.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Financial mechanisms, Markets and charges, Carbon offsets, Climate change

#239. Seidl, A., (1998), *Financing Open Space in Colorado, USA*. Paper presented at a workshop on Financial Innovations for Biodiversity, 10th Global Biodiversity Forum, Bratislava, Slovakia, 1-3 May 1998. 12 pp. <http://www.biodiversityeconomics.org>

The Colorado State Land Board's Stewardship Trust was established through a constitutional amendment in November of 1996. The Board is required to designate 295,000 to 300,000 acres of trust lands into a special trust--the Stewardship Trust by January 1, 2001. This land will be preserved and managed as to preserve its natural values. The Board can use a number of land management tools in order to accomplish its goals including: conservation easements, the purchase of development rights, sales, leases, exchanges for conservation purposes etc. Lands must be nominated for the Trust and evaluated based upon their potential value to the common good in preserving representative ecosystems and critical habitats in the state of Colorado. The Great Outdoors Colorado (GOCO) program was established in 1992 and charged with making matching fund grants to local governments, park and recreation districts and non-profit land protection organisations to facilitate the purchase and protection of land. Programs include trail construction, open space, wildlife and river preservation, environmental education, park promotion, wildlife and outdoor recreation. GOCO is financed through earmarked state lottery funds and has provided more than \$100 million for 808 projects to date. Several other states including Utah, Montana, and Wisconsin are considering creating similar quasi-governmental programs for decentralised land use planning. The proposed Colorado Wilderness Tax would be the first state sales tax to target non-consumptive users of natural resources. The Wilderness Tax would be imposed on items commonly purchased by non-consumptive users of the state's natural resources including: cameras

and film, binoculars, camping equipment, backpacks and hiking boots. Tax revenues are to be earmarked for the management and protection of Colorado's wilderness areas. Voters are conflicted over the equity and efficiency of the proposed legislation.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Protected Areas, Tourism

Topics: Financial mechanisms, Taxes, Private sector

#240. Shogren, J. F., Tschirhart, J., Anderson, T., Whritenour Ando, A., Bessinger, S. R., Brookshire, D., Brown, G., Coursey, D., Innes, R., Meyer, S. M., & Polasky, S. (1999). 'Why economics matters for endangered species protection', *Conservation Biology* 13 (6):1257-1261

This article offers three reasons why economics matters more to species protection than many people think and what this implies for the ongoing debate over the reauthorisation of the US Endangered Species Act of 1973. Economics matters because human behaviour generally, and economic parameters in particular, help determine the degree of risk to a species. In a world of scarce resources, the opportunity cost of species preservation must be taken into account in decision making. Economic incentives are critical in shaping human behaviour, and consequently the recovery of species. Endangered species protection that explicitly addresses these basic principles can avoid wasting valuable resources that yield no gain in species protection.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife, Protected Areas

Topics: Incentive measures, Causes of biodiversity loss

#241. Shogren, J., & Toman, M., (2000), *How Much Climate Change Is Too Much? An Economics Perspective*. Climate Change

Issues Brief No. 25, Resources for the Future: Washington DC. 22 pp.

Having risen from relative obscurity as few as 10 years ago, climate change now looms large among environmental policy issues. Its scope is global; the potential environmental and economic impacts are ubiquitous; the potential restrictions on human choices touch the most basic goals of people in all nations; and the sheer scope of the potential response—a significant shift away from using fossil fuels as the primary energy source in the modern economy—is daunting. The magnitude of these changes has motivated experts the world over to study the natural and socioeconomic effects of climate change as well as policy options for slowing climate change and reducing its risks. The various options serve as fodder for often testy negotiations within and among nations about how and when to mitigate climate change, who should take action, and who should bear the costs. Lurking behind these policy activities is a deceptively simple question: How much climate change is acceptable, and how much is “too much”? (The other key questions are, Who is going to pay for mitigating the risks? What policies will be used for mitigation?) The lack of consensus on this issue reflects the uncertainties that surround it and differences in value judgments regarding the risks and costs. This paper, reviews the economic approach to the question of how much climate change is too much. The economic perspective emphasizes the evaluation of benefits and costs broadly defined while addressing uncertainties and important considerations such as equity. It also considers some important criticisms of the benefit–cost approach. Then, it discusses the key factors that influence the benefits and costs of mitigating climate change risks. This discussion leads to a review of findings from the many quantitative “integrated assessment” models of climate change risks and response costs. This review does not lead to a simple answer to our overarching question about how much climate change is too much. But the paper does identify several good reasons for taking a deliberate but gradual approach to the mitigation of climate change risks. The issues covered are both diverse—ranging from the economics and philosophy of long-term cost-benefit analysis, to modeling strategies for representing climate change risks and greenhouse gas abatement costs—and, at times, somewhat complex. The paper tries to be fairly comprehensive while seeking to make the discussion as accessible as possible.

Coverage: Global

Topics: Climate change

#242. Simpson, R. D., (1995), *Biodiversity prospecting and biodiversity conservation*.

Paper presented at IUCN Workshop on Financing Biodiversity Conservation Harare, Zimbabwe 13-15 September 1995. 12 pp.

<http://www.biodiversityeconomics.org>

Biodiversity prospecting is the search for chemicals produced by wild organisms. The author of this paper argues that the economic values generated by biodiversity prospecting are negligible, that investments made in strengthening biodiversity prospecting capacity are likely to have little effect on economic incentives for the conservation of endangered habitats, and that in addition to their shortcomings as conservation strategies, biodiversity prospecting may also have several drawbacks as development strategies.

Coverage: Global

Topics: Bioprospecting, Valuation

#243. Simpson, R. D., & Sedjo, R. A., (1996b), *Investments in Biodiversity Prospecting and Incentives for Conservation*. Discussion Paper 96-14, Resources for the Future: Washington DC. 17 pp.

There is considerable interest in biodiversity prospecting (the search for valuable new products from natural sources) as a conservation strategy. In an earlier paper, we have argued that the value of the marginal species (and, by extension, the incentives for the conservation of the habitat on which it is found) is small. In this paper, we show that investments in biodiversity prospecting are unlikely to increase incentives for conservation by much. If the value of the marginal species were appreciable, researchers ought already to have made investments to exploit it. If it is not, it is doubtful that additional investments will generate any substantial increase. It is important to be clear about our findings: we are not saying that none of the myriad uses of biodiversity is important. Quite to the contrary, we are saying that if biodiversity is important, more effective strategies for its conservation must be found.

Coverage: Global

Topics: Bioprospecting, Financial mechanisms, Incentive measures, Markets and charges

#244. Simpson, R. D., & Craft, A. B., (1996), *The Social Value of Using Biodiversity in New Pharmaceutical Product Research*.

Discussion Paper 96-33, Resources for the Future: Washington DC. 46 pp.

Biologists and conservation advocates have expressed grave concern over perceived threats to biological diversity. "Biodiversity prospecting" -- the search among naturally occurring organisms for new products of agricultural, industrial, and, particularly, pharmaceutical value -- has been advanced as both a mechanism and a motive for conserving biological diversity. Economists and others have attempted to estimate the value of biodiversity for use in new pharmaceutical project research. Most of these existing approaches are incomplete, however, as they have not considered full social welfare, i.e., both consumer surplus and profit. This paper addresses social welfare by calibrating a model of competition between differentiated products with data from the pharmaceutical industry. We find that the magnitude of losses from even catastrophic declines in biodiversity are negligible in comparison to the value of world production. While social values of biodiversity prospecting might motivate habitat conservation in some areas, these values are likely to be small relative to land value in other uses in even some of the more biologically rich regions of the world.

Coverage: Global

Topics: Bioprospecting, Causes of biodiversity loss, Incentive measures, Financial mechanisms, Markets and charges

#245. Simpson, R. D., & Sedjo, R. A., (1996a), *Valuation of Biodiversity for Use in New Product Research in a Model of Sequential Search*. Discussion Paper 96-27, Resources for the Future: Washington DC.

We develop a model of search in which a researcher chooses the size of sequential batches of samples to test. While earlier work has considered similar questions, the contribution of this paper is to use the search model to place a value on the marginal research opportunity. The

valuation of such opportunities may be of little interest or relevance in many of the contexts in which search models are employed, but we apply our analysis to an area of considerable societal interest: the valuation of biological diversity for use in new product research. While data from which to make inferences are limited, we find that, using plausible estimates of relevant parameters, the value of biodiversity in these applications is negligible.

Coverage: Global

Topics: Bioprospecting, Incentive measures, Valuation, Markets and charges

#246. Simpson, R. D., (1999), *The price of biodiversity*.
<http://www.nap.edu/issues/15.3/simpson.htm>

This paper looks at the ways in which conservation agencies use economic arguments to convince people in developing countries to conserve biodiversity. It argues that all too often such attempts are misguided, and can lead to serious inequities. These failures also damage the credibility of conservationists, who would do better to take a different approach to promoting biodiversity.

Coverage: Global

Ecosystem or sector focus: Tourism

Topics: Financial mechanisms, Private sector, Bioprospecting, Markets and charges, Incentive measures

#247. Smith, D. (Ed.), (1995), *The Use of Economic Principles for Integrated Management of Freshwater Resources*. United Nations Environment Programme, Freshwater Unit: Nairobi. 110 pp.

This reports on a workshop, the purpose of which was to provide a practical introduction to how economic principles and tools could be used to improve the environmental sustainability of water use. The workshop was aimed at water and environmental managers and policymakers. The perspective behind the workshop was that it was not necessary (or even desirable) to apply sophisticated economic instruments to achieve marked improvements in the sustainability of

water use and economic welfare. Rather, that applying some basic economic principles would significantly improve the efficiency of water use and thereby provide more people with clean water on an environmentally sustainable basis.

Coverage: Global

Ecosystem or sector focus: Fisheries, Water, Wetlands

Topics: Markets and charges, Economic instruments, Economic policies

#248. Smith, J., Mourato, S., Veneklaas, E., Labarta, R., Reategui, K., & Sanchez, G., (2000), *Willingness to Pay for Environmental Services Among Slash-And-Burn Farmers in the Peruvian Amazon: Implications for Deforestation and Global Environmental Markets*. American Agricultural Economics Association Annual Meeting, July 30-August 2: Tampa, Florida. 7 pp.

A Contingent Valuation survey shows that the possibility of trade in carbon sequestration services exists between utility companies and slash-and-burn farmers in the Amazon and that farmers positively value the environmental services of the forest. Global environmental markets could enhance the effectiveness of traditional forest conservation efforts while benefiting resource-poor farmers.

Coverage: Latin America

Contains examples or case studies from: Peru

Ecosystem or sector focus: Forests, Agriculture

Topics: Valuation, Contingent valuation, Markets and charges

#249. Soderbaum, P., (2000), *Ecological Economics*. Earthscan Press Ltd: London. 254 pp. ISBN 1853836850

Economics is often presented as the study of the impersonal forces of supply and demand and the laws relating to them. Rational Economic Man is the agent generating these forces. This book takes quite a different approach, presenting the individual as a political being and a responsible actor. It proposes the Political Economic Person as the central actor and the Political Economic Organization - rather than firms exclusively

driven by profit maximization - as the basis for understanding corporate behaviour. Ideologies, worldviews, beliefs and scientific perspectives have all to be taken into account if economics is to deal successfully with the social and environmental problems we face. Starting from the roles individuals have as citizens, parents, professionals, or consumers, it offers a different way of understanding the market economy, from that of conventional or neo-classical economics. This both accounts for the enormous environmental problems we face, and suggests how we can address them. For example, business has to be understood in terms of a broader idea of efficiency than that of cost-revenue analysis, or monetary reductionism. Such broader ideas of the purpose of business are needed for improved environmental performance. It is argued that cooperation - as opposed to competition and confrontation - can be both rational and socially necessary. The book presents an ecological economics that is interdisciplinary and pluralistic. Taking account of the viewpoints of the key players, it offers an approach to achieving a socially and ecological sustainable society.

Coverage: Global

#250. Sohngen, B., Sedjo, R., Mendelsohn, R., & Lyon, K., (1996), *Analyzing the Economic Impact of Climate Change on Global Timber Markets*. Discussion Paper 96-08, Resources for the Future: Washington DC. 63 pp.

In this paper, we show how ecological and economic models can be linked to determine the economic impact of climate change on global timber markets. We begin by discussing some of the important issues relevant to global impact analyses such as this. We then outline our general modeling framework and discuss the particular models that will be used. Finally, we discuss some of the important issues involved with linking the two types of models.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Markets and charges, Economic instruments, Climate change

#251. Southgate, D., Coles-Ritchie, M., & Salazar-Canelos, P., (1996), *Can Tropical*

Forests be Saved Harvesting Non-Timber Products? Working Paper GEC 96-02, Centre for Social and Economic Research on the Global Environment: London.

Presented in this paper are the results of a study of vegetable ivory production in western Ecuador, which is one of the largest extractive industries in the hemisphere. We have found that, until very recently, payments received by households that collect tagua (*Phytelephas aequatorialis*) barely covered the opportunity cost of labour employed in harvesting. By contrast, super-normal profits have been captured by a few firms that slice tagua into disks, which are exported to overseas button manufacturers. This concentration of economic returns at the top of the domestic marketing chain has been typical of non-timber extraction throughout Latin America. Processing and exporting are becoming more competitive and, as a result, producer-level prices are increasing. Nevertheless, our research findings lead us to doubt that vast tracts of tropical forest will be saved by the collection of non-timber products.

Coverage: Latin America

Contains examples or case studies from: Ecuador

Ecosystem or sector focus: Forests

Topics: Valuation, Markets and charges, Trade

#252. Spaninks, F., & van Beukering, P., (1997), *Economic Valuation of Mangrove Ecosystems: Potential and Limitations*. CREED Working Paper No 14, International Institute for Environment and Development: London. 53 pp.

Mangrove ecosystems provide a range of non-marketed as well as marketed goods and services both on and off-site. Yet, the full value of mangrove products is not easily recognised, and are, therefore, often neglected in development planning. As a result it is often concluded that mangrove forests should be converted to uses which generate directly marketable products, such as aquaculture. Economic valuation methods offer a more comprehensive assessment of the many goods and services provided by mangrove ecosystems, and hence may contribute to more informed decision-making. The objective of this paper is to review and analyse the scope and

limitations of different valuation methods for assessing management alternatives for mangrove ecosystems. The paper compares a range of studies on mangroves with regard to the methodologies employed and the range of products and services valued. It includes a discussion of the benefits of valuation methods for assessing management alternatives, with particular reference to the goods and services of Pagbilao Bay in the Philippines - the study site of the project, Economic Valuation of Mangrove-Fishpond Interactions, for which this paper was written. The literature review and the discussion of the Pagbilao case study illustrate the potential of valuation methods for evaluating management alternatives, as well as the practical limitations to their application. In principle, methods are available but the lack of data and quantitative knowledge regarding some key ecological relationships affirm the need for further inquiry.

Coverage: Asia

Contains examples or case studies from: Philippines

Ecosystem or sector focus: Marine and coastal, Wetlands, Fisheries

Topics: Valuation

#253. Spurgeon, J. P. G., & Aylward, B., (1992), *The Economic Value of Ecosystems: 4 - Coral Reefs*. Gatekeeper Series No GK 92-03, London Environmental Economics Centre: London. 15 pp.

Coral reef ecosystems provide a variety of valuable economic benefits to individuals and society. Yet, despite this high economic value they are threatened by human activities. This paper outlines methods and examples for the economic valuation of coral reefs. It suggests that a proper understanding and accounting of these economic benefits will lead to improved management of reef ecosystems.

Coverage: Global

Ecosystem or sector focus: Marine and coastal, Fisheries

Topics: Valuation, Bioprospecting

#254. Spurgeon, J. P. G. (1998). 'The socio-economic costs and benefits of coastal habitat

rehabilitation and creation', *Marine Pollution Bulletin* 37 (8-12):373-382

This paper provides an overview of the merits and limitations of using an economics-based approach to assess and implement initiatives for coastal habitat rehabilitation and creation. A review of the literature indicates that habitat rehabilitation/creation vary widely between and within ecosystems. For coral reefs, costs range from US\$10,000 to 6.5 million per hectare; for mangroves US\$3,000-510,000/ha; for seagrasses US\$9,000-680,000/ha; and for saltmarshes US\$2,000-160,000/ha. A review of the economic benefits derived from various coastal habitats using a Total Economic Value approach reveals that many thousands of dollars per hectare could ultimately accrue from their rehabilitation/creation. The paper concludes that despite its limitations, a benefit-cost analysis framework can play an important role both in assessing the justification of coastal habitat rehabilitation/creation initiatives, and by helping to improve the overall effectiveness of such initiatives.

Coverage: Global

Ecosystem or sector focus: Marine and coastal, Fisheries

Topics: Valuation, Replacement costs, Effect on production, Mitigative and avertive expenditures

#255. Stedman-Edwards, P., (1998), *Root Causes of Biodiversity Loss: An Analytical Approach*. Macroeconomics Program, WWF - World Wide Fund for Nature: Washington DC. 86 pp.

This document presents an in-depth analysis of the economic and non-economic root causes of biodiversity loss. It presents a framework for identifying and analysing root causes of biodiversity loss, collecting data and applying conceptual models. These are illustrated with examples from around the world.

Coverage: Global

Contains examples or case studies from: Mexico, Guatemala, Bolivia, Indonesia, Thailand, Cameroon, Honduras, Ecuador, India

Ecosystem or sector focus: Agriculture, Forests, Marine and coastal

Topics: Trade, Economic instruments, Incentive measures, Disincentives, Deforestation, Land

degradation, Soil erosion, Community-based management, Private sector, Population growth, Taxes, Subsidies

#256. Steenblik, R., (1998), *Subsidy Reform: Doing More to Help the Environment by Spending Less on Activities that Harm It.*

Paper presented at a workshop on Doing More With Less, IUCN's 50th Anniversary, Fontainebleau, France, November 1998. 23 pp. <http://www.biodiversityeconomics.org>

This paper has one overarching objective: to underline the importance of continuing the reform of government policies and programmes that generate "biodiversity-perverse" subsidies, and to encourage the conservation community to further develop their capacity to speak authoritatively on the issue. As a prelude, the paper reviews the inefficiencies created by subsidies, and the effects they have on the environment in general and biodiversity in particular. It then turns to the current multilateral mechanisms being applied to discipline subsidies to resource-based sectors, with a view to identifying areas in need of further strengthening. Most of the mechanisms used to date reflect attempts to deal with the trade and budgetary effects of subsidies. The application of these disciplines can be expected, in general, to reduce or even eliminate many of the policy-driven incentives to farm intensively, overfish and burn dirty fuels. But governments usually have considerable discretion in how they interpret such disciplines; large variations in the incidence of subsidies within nations can have important implications for their effects on particular ecosystems. It is in identifying such links, this paper suggests, that civil society, particularly environmental NGOs, can make the greatest contribution to the process of subsidy reform.

Coverage: Global

Topics: Causes of biodiversity loss, Subsidies, Economic instruments, Economic policies

#257. Stone, R. (1994). 'A lesson in biodiversity economics ... versus biodiversity law', *Science*

A plan released by the Wilderness Society is designed to acquire and preserve some private lands for their biological value while using tax

credits and penalties to sweeten the deal for private landowners. The plan calls for developing a protected network of connected public and private lands to preserve ecosystems. The second part of this article discusses a law suit filed by a group of Wisconsin botanists and environmentalists who sued the US Forest Service for ignoring an ecosystem approach and thus mismanaging forests. The group argued that the Forest Service is required by law to use the latest scientific thinking on ecosystems, rather than focusing on protecting a handful of species, such as the Northern Spotted Owl, that may or may not reflect the health of a forest.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Wildlife, Forests, Protected Areas

Topics: Economic instruments

#258. Stone, S., (1996), *Economic Trends in the Timber Industry of the Brazilian Amazon: Evidence from Paragominas.* CREED Working Paper Series No 6, International Institute for Environment and Development: London.

The timber industry of the Brazilian Amazon is changing rapidly. From a slowly evolving base of extraction in the estuary areas, the industry has expanded along an extensive road network straddling upland forests. This research examines the changes in the economic profile of timber extraction and processing in an old frontier area of Brazil, the county of Paragominas in the Eastern Amazonian state of Para. As one of the earliest centres of upland logging in the Amazon, its experience after twenty years offers insights to the development of the industry as it spreads to other regions of the basin. This paper presents a theoretical model of industry evolution in frontier areas, and analyses industry response in Paragominas to local shortages in raw material, rising international wood prices and increasingly stable property rights.

Coverage: Latin America

Contains examples or case studies from: Brazil

Ecosystem or sector focus: Forests, Industry

Topics: Causes of biodiversity loss, Markets and charges

#259. Stone, D., Ringwood, K., & Vorhies, F., (1997), *Business and Biodiversity: A Guide for the Private Sector*. World Business Council for Sustainable Development and IUCN - The World Conservation Union: Gland. 68 pp. ISBN 2-8317-0404-9

The world's biological resources are used every day by industry - the agricultural, pharmaceutical and forestry industries to mention but three. However, the Earth's resources are limited and concern has been growing about the way in which they have been managed. This guide has been devised specifically to represent business interests, to tell business people how to become more engaged in implementing the Convention, and to encourage the private sector to contribute its valuable experience to the process under way. To achieve this, the guide proposes a medium-term work program for business. The information in this guide is both theoretical and practical and has been designed to be as relevant to the chief executive officer as it is to corporate or environmental affairs managers or local site managers. The guide's aim is to explain why business should be involved in the biodiversity debate and to suggest how it can participate.

Coverage: Global

Topics: Private sector, Financial mechanisms, Trade, Economic instruments

#260. Stone, C. D., Downes, D., & de Fontaubert, A. C., (1998), *Biodiversity, trade and the fisheries sector, Case Study: West Africa*. IUCN - The World Conservation Union. 50 pp.

<http://www.biodiversityeconomics.org>

In 1997, IUCN-The World Conservation Union, with the financial support of the German Federal Ministry for Economic Co-operation and Development, initiated a project to examine the relationship between the Convention on Biological Diversity (CBD) and the rules of international trade-those administered by the World Trade Organisation (WTO), in particular. The project was motivated by a widely shared concern that the aims of the CBD, which are essentially to conserve and equitably distribute the benefits of the environment, might be undermined by the WTO, which aims at the liberalisation of trade. Liberalised trade has the

potential to integrate economies, regionally and globally, in mutually beneficial ways. But some observers are concerned that it may do so at a cost of impairing the environment and amplifying disparities in wealth, much of which, in poorer nations, is disproportionately represented in endowments of natural resources. Other commentators have claimed to locate synergistic potential, suggesting, for example, that trade law's anti-subsidy disciplines might be conscripted into the campaign against environmental abuses such as over-fishing. 1 Can the agenda of the two regimes be reconciled--with each other and with other major regimes shaping international relations, such as the Law of the Sea? To foster a concrete discussion, the Project Advisors launched three Case Studies. The studies are designed to identify how the institutional tensions might be affecting sustainable development of resources in the field.

Coverage: Africa

Ecosystem or sector focus: Marine and coastal, Fisheries, Wetlands

Topics: Trade, Convention on Biological Diversity

#261. Stonich, S., (1995), 'Development, rural impoverishment and environmental destruction in Honduras', In M. Painter, & W. Durham (Eds.), *The Social Causes of Environmental Destruction in Latin America*. University of Michigan Press: Ann Arbor.

There is a long history of rapid shifts between different export crops in Southern Honduras, primarily driven by the changing demands of international markets, and the government policy of promoting the expansion of export crops in order to generate foreign exchange. These export crop shifts have included, since the 1940s, cotton, cattle, shrimp and melon farming. Each new agricultural boom has increased the concentration of land, driving small farmers off more fertile lands in favour of large commercial producers, and increasing the rates of land clearance, use of agro-chemicals and the intensity and continuity of cultivation. In turn, these changes in land use and ownership have led to greater economic inequality and environmental degradation.

Coverage: Latin America

Contains examples or case studies from: Honduras

Ecosystem or sector focus: Agriculture

Topics: Subsidies, Trade, Economic instruments, Economic policies, Causes of biodiversity loss

#262. Swallow, B. M., & Bromley, D. W. (1995). 'Institutions, governance and incentives in common property regimes for African rangelands', *Environmental and Resource Economics* 6 (2):99-118

The general distinctions between open access, state property, common property and private property are now well established in the academic literature. When applied to African rangelands, however, common property admits a wide variety of resource management regimes. To formulate effective policies it is necessary to understand the structure and operations of particular regimes. This paper discusses three examples of common property regimes, two from the southern African nation of Lesotho and one from the west African nation of Senegal, to illustrate some of the key characteristics of common property regimes. In particular, it is important to understand the structure of governance, the types of institutions that govern behaviour, and the compatibility between governance, institutions and individual incentives. A common property regime can only be effective if its institutions are compatible with the structure of governance. The extent of its effectiveness also depends upon the incentives and expectations of individuals expected to enforce the rules of the institutions or comply with their terms. At present, most African governments lack the organisational capacity and political will necessary to implement state property regimes, official regulations on resource use, or individual property rights for rangelands resources. In many cases it is more appropriate for governments to define and enforce group rights to particular resources, than help to establish conditions in which internal group dynamics yield efficient resource management outcomes.

Coverage: Africa

Contains examples or case studies from: Lesotho, Senegal

Ecosystem or sector focus: Drylands, Agriculture

Topics: Incentive measures, Economic instruments, Economic policies

#263. Swanson, T., & Barbier, E. B., (1992), *Economics for the Wilds: Wildlife, Wildlands and Diversity*. Earthscan Press Ltd: London. 254 pp. ISBN 1853831247

Surely the wilds - both species and habits - should be free of human interference and the cost-benefit analyses of economists if they are to be preserved? Not according to the authors of this book, who argue forcefully and in careful detail that an economics that properly values the resources of the wilds offers the best long-term security for their future. Most of the world's wilds have, in fact, always been utilized by local societies who have managed their resources sustainably, and one important guarantee for their preservation is therefore the continued participation of those communities and an adequate reward to them for their management. The first four chapters of the book look at the questions involved - at the complexity and global nature of the issues, at the application of economics to the wilds and at the policies for their conservation and sustainable management which then result. The following five chapters examine specific forms of utilization of wild species and habitats, both sustainable and unsustainable, and including community based development, tourism, the use of rainforest products, poaching and the impact of conservation on wildlife use. The conclusion argues that a comprehensive utilization strategy for wild resources is needed to ensure their continued existence and the continuing flow of benefits from them.

Coverage: Global

Ecosystem or sector focus: Wildlife, Forests, Protected Areas, Tourism

Topics: Causes of biodiversity loss

#264. Swanson, T., (1992a), *The Economics Of A Biodiversity Convention*. Working Paper GEC 92-08, Centre for Social and Economic Research on the Global Environment: London.

The object of this paper is to demonstrate the application of three basic steps that must be taken to reach the point of implementing an effective international resource management regime, in the context of biodiversity. The three steps are as follows - identification of the nature of the basic forces affecting the resource; the identification of

failures in the existing institutional structure for resource management; and lastly, the identification of the institutional changes necessary to address the identified systemic problems. Three essential elements of an international agreement for the conservation of biological diversity are: informational resource rights; biological diversity reserves; and wildlife trade regimes.

Coverage: Global

Topics: Convention on Biological Diversity, Trade, Economic instruments, Economic policies

#265. Swanson, T., (1992b), *The Economics Of Extinction Revisited And Revised*. Working Paper GEC 92-40, Centre for Social and Economic Research on the Global Environment: London.

This paper provides a new economic model of extinction. It demonstrates that the current model, based on the analysis of Colin Clark, deals with only the proximate forces of extinction (i.e. overexploitation), while the more fundamental explanation of species extinction is the failure of human societies to invest in these species. When human societies do not invest in a species, its stock levels are subject to disinvestment, possible to the level of zero, or extinction. One form of stock disinvestment is the direct disinvestment analysed by Clark, i.e. the decision to remove a species on account of the increased value of investing the returns from disinvestment in other assets. This applies to the depletion of slow-growing valuable species, such as the blue whale. Other forms of stock disinvestments occur in less direct fashion. Species require not only prior stocks to continue in existence, they also require base resources (land in the case of terrestrial species) and in many cases human management. The failure to invest in the provision of these resources for a given species can also result in stock disinvestment, and possibly extinction. The conversion of land to the use of other species explains the bulk of current and threatened extinctions, i.e. the biodiversity problem. The failure to invest in management services explains the depletion of species of medium value and low growth, such as the African elephant and rhinoceros. At base, the fundamental cause of all species depletion is the perceived incentives for investment in those species.

Coverage: Global

Topics: Financial mechanisms, Incentive measures

#266. Swanson, T., (1992c), *Regulating Over Exploitation: Over Exploitation as Underinvestment*. Working Paper GEC 92-39, Centre for Social and Economic Research on the Global Environment: London.

There are two competing explanations for the depletion of renewable resources: underinvestment and overexploitation. One theory argues that renewable resources are depleted on account of the lack of incentives to invest in them; the other theory argues that these resources are depleted due to human mismanagement, especially in respect to the use of inferior management regimes such as open access. This paper demonstrates that these explanations are not competing, and that the more fundamental of the two is the underinvestment hypothesis. In regard to terrestrial resources, mismanagement via open access regimes is not a fundamental explanation of resource depletion because it remains necessary to explain why such a regime would be applied. This paper demonstrates that the nature of the management regime is a function of the state's determination whether to invest in the provision of management services for the resource. When there are insufficient incentives for states to invest in management, then overexploitation is the predictable result. Nevertheless, the fundamental cause of the depletion remains the failure to invest. This paper serves two related purposes. It provides an analytical proof that underinvestment is the fundamental cause of resource depletion. It also provides a bio-institutional model that demonstrates how states make decisions concerning investment and management of renewable resources. This model is useful in demonstrating the mode for intervention in national decision making concerning natural resources.

Coverage: Global

Topics: Financial mechanisms, Incentive measures

#267. Swanson, T., (1994), *Economics and Animal Welfare: A Policy Analysis of the Live Bird Trade*. Working Paper GEC 94-09, Centre

for Social and Economic Research on the Global Environment: London.

There is a popular perception that the commercialisation of the wildlife trade leads to both the endangerment and abuse of the species, and that such trade should therefore be banned. Captive breeding programmes have been advocated as a substitute supplier of wild birds. Bans on trade would of course be effective if the alternative to legal exploitation was nonexploitation of the species or its habitat. Since the exploitation of wildlife will usually occur in either event (i.e. with or without a ban), the choice is often between legal and illegal exploitation. This paper investigates the impact of illegal methods of exploitation on the welfare of the tropical birds captured in open forests. It demonstrates that the illegal exploitation of wildlife minimises the values of the resource, and results in wasteful and abusive forms of utilisation. It also analyses the role of captive breeding as a substitute supplier, and finds it to be merely a method for transporting the genetic resource from the South to the North. A fair and effective form of regulation (to advance animal welfare) would take the form of transporting the rental value of the resource from North to South, rather than the resource from South to North.

Coverage: Global

Ecosystem or sector focus: Wildlife

Topics: Trade, Markets and charges

#268. Swanson, T. (Ed.), (1995a), *The Economics and Ecology of Biodiversity Decline: The Forces Driving Global Change*. Cambridge University Press: Cambridge. 176 pp. ISBN 0521482305

This book surveys from a wide range of viewpoints from ecology and economics in the search for a systematic explanation of changes in the biosphere at a global level. Economists analyse how economic growth predictably alters the earth, and ecologists consider how the drive for fitness and consequent population growth changes the globe. Both look at the institutional interface between humans and the biosphere, and explain global change as the consequence of human non-cooperation and conflict.

Coverage: Global

Topics: Causes of biodiversity loss

#269. Swanson, T., (1995b), *The Theory and Practices of Transferring Development Rights: The Institutions for Contracting for Biodiversity*. Paper presented at IUCN Workshop on Financing Biodiversity Conservation Harare, Zimbabwe 13-15 September 1995. 17 pp.

<http://www.biodiversityeconomics.org>

This study explains why the theory of transferable development rights, runs into difficulty because of the lack of legal bases and institutions for the transfer. The problem, in brief is that while ownership rights at a domestic level can be "un-bundled" though legal agreements such as leases or land zoning, the same can not be accomplished across borders. This model runs into problems when applied to a case of international transfers, where there is no reciprocity (as in agreements where both countries agree to conserve similar portions of wetlands or forests). Transferring use-rights in land to a foreign entity could not be legally enforced. Swanson instead suggests that the model to adopt is that of the franchise, in which three parties are involved: the global community, owner states, and land-owners. The author also suggests what institutions would be needed to enforce these contracts.

Coverage: Global

Topics: Economic instruments, Financial mechanisms, Markets and charges

#270. Swanson, T., (1996), *The Underlying Causes of Biodiversity Decline: An Economic Analysis*. Paper presented at IUCN Workshop on Economics of Biodiversity Loss, April 1996, Gland, Switzerland. 14 pp.

<http://www.biodiversityeconomics.org>

This paper opens with the premise that all of the various examples of biodiversity loss are consequences of human and societal choices and that humans should be seen as being fundamentally responsible for all of the various forms of biodiversity decline by reason of their choices regarding the allocation of resources. The paper commences by setting forth the original economic framework utilised to explain over exploitation-based resource depletion, and then goes on to demonstrate how this "irresponsible"

behaviour may be incorporated within a more fundamental theory of human choice regarding resource allocation and biodiversity depletion. This theory is then developed in order to demonstrate how each of the various phenomena associated with biodiversity loss is a proximate cause of biodiversity decline resulting from fundamental human choices concerning the allocation of the resources required for continued survival. The paper argues that economic forces drive biodiversity losses which implies the conclusion that the assessment of biodiversity decline requires an understanding and assessment of these economic forces. In order to redress the decline of diversity it will be necessary to reshape the economic incentives that cause human societies to choose systematically to reshape the living world in the way that they do.

Coverage: Global

Topics: Incentive measures, Disincentives, Causes of biodiversity loss, Subsidies, Economic policies

#271. Tacconi, L., (2000), *Biodiversity and Ecological Economics: Participation, Values and Resource Management*. Earthscan Press Ltd: London. 254 pp. ISBN 1853836761

It is vital that we adopt interdisciplinary approaches such as ecological economics to gain an understanding of the values that determine human interaction with, and use and abuse of, the environment. This book is a model of applied ecological economics. It presents an accessible introduction to the subject while at the same time broadening its theoretical basis by introducing a post-positivist, participatory method. The theoretical framework is applied to case studies in biodiversity conservation, drawn from around the world and a range of different ecosystems.

Coverage: Global

#272. Tan, J., (1998), *Environmental Foundations: Funding Community Innovations in Biodiversity Conservation*. Paper presented at a workshop on Financial Innovations for Biodiversity, 10th Global Biodiversity Forum, Bratislava, Slovakia, 1-3 May 1998. 7 pp.
<http://www.biodiversityeconomics.org>

Environmental foundations managing relatively large funds for environmental projects are providing access to international funds for local NGOs. These foundations, considered as National Environmental Fund holders or NEFs are able to act as conduit for international funds to be distributed to local, particularly, community based NGOs or people's organisations (POs). The Foundation for the Philippine Environment or FPE is one of seven NEFs in the Asia-Pacific Region. The Establishment of FPE was an initiative of the Philippine and U.S. NGOs with the support of the governments of the two countries. In 1990, a Memorandum of Agreement between the Philippines and U.S. governments established the Natural Resources Management Program to support NGO activities for the purpose of creating an endowed, private, non-profit foundation for the environment. In April 1991, USAID and WWF/US signed a co-operative agreement to complete the first of two debt-for-nature swaps amounting to USD 5 million, planned for a total of USD 25 million. In January 1992, FPE was officially registered with the Securities and Exchange Commission. In March 1993, a Memorandum of Understanding was concluded among the governments of the Philippines (represented by the Department of Finance) and the U.S. (represented by USAID/Manila) and FPE for the establishment of the endowment. In September 1993, the second debt-for-nature swap was concluded for USD 13 million. A subsequent debt-for-nature swap financed by the Bank of Tokyo cost USD 104 thousand. Under its agreement with USAID, FPE's endowment fund was initially managed by WWF/US. In June 1994, the endowment fund was formally transferred to FPE's management, making FPE an independent institution actively funding on-the-ground biodiversity conservation programs in the Philippines. The endowment that FPE manages was initially valued at almost USD 22 million converted immediately into Philippine Pesos at almost 570 million. FPE vision is of an "ecologically balanced, clean and healthy environment with communities living fully and caring responsibly for their environment."

Coverage: Asia

Contains examples or case studies from: Philippines

Ecosystem or sector focus: Protected Areas

Topics: Financial mechanisms, Debt conversion, Trust Funds

#273. Tejam, C., & Ross, A., (1997), *Manual of Practices: Contingent Valuation Survey for Integrated Coastal Management*

Applications. GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas: Quezon City.

This manual outlines the steps and methods in conducting contingent valuation study. It describes a contingent valuation survey used to assess the perceived conservation value of Batangas Bay in the Philippines, and the willingness of coastal dwellers to pay for this conservation. This included questions about the amount that householders would be willing to increase their garbage collection and sewage treatment payments so as not harm the marine environment, their willingness to pay fees to maintain fisheries resources and to contribute towards coral reef conservation. Results of the survey indicated people's willingness to pay for actions to conserve the marine environment - the value that they place on various attributes of Batangas Bay.

Coverage: Asia

Contains examples or case studies from: Philippines

Ecosystem or sector focus: Marine and coastal, Urban settlements, Industry, Infrastructure

Topics: Valuation, Contingent valuation

#274. Tietenberg, T., (1995), 'Design lessons from existing air pollution control systems: the case of the United States', In S. Hanna, & M. Munasinghe (Eds.), *Property Rights in a Social and Ecological Context: Case Studies and Applications*. Beijer International Institute of Ecological Economics and World Bank: Stockholm and Washington DC.

Beginning in 1975, the Environmental Protection Agency in the USA has piloted various incentives schemes together known as the "Emissions Trading Program". Here, the introduction of tradable permits for emissions are used as incentives for firms to limit the pollution loads they generate, or to force polluting industries to pay for the emissions they discharge. One of the first steps was to allow firms which reduced emissions below that required by their standards

to gain an emissions reduction credit, that could then either be offset against emissions created elsewhere by the firm, or sold to other industries. This type of approach was then applied to lead in gasoline, where a fixed amount of lead rights was allocated to oil refiners. Refiners who did not use their full allocation of rights were permitted to sell them to others. Similar systems have since been applied to ozone-depleting chemicals, acid rain-causing electric utility emissions and smog production. More recently, the principle of credit trading has evolved into one of allowance trading. Newer programmes are based on allowances defined in discrete terms, rather than credits for pollutant flows (for example a permit for a certain amount of tons, rather than tons per year, which has to be renewed once used up). The system now also contains a set-aside of allowable permits that they government can sell, should the need arise.

Coverage: North America

Contains examples or case studies from: USA

Ecosystem or sector focus: Urban settlements, Industry, Infrastructure

Topics: Economic instruments, Markets and charges

#275. Tobias, D., & Mendelsohn, R. (1991). 'Valuing ecotourism in a tropical rainforest reserve', *Ambio* 20 (2):91-93

This article reports on a study carried out to measure the value of ecotourism at a tropical rainforest site in Costa Rica, using the travel cost method. By observing travel behaviour, the study reveals that Costa Rican visitors are willing to pay considerably for the experience of visiting the site. The current value of the site per hectare, based on domestic and foreign tourism alone, is between 1-2 times higher than the purchase price currently paid by the reserve for the acquisition of new lands.

Contains examples or case studies from: Costa Rica

Ecosystem or sector focus: Forests, Tourism

Topics: Valuation, Travel cost

#276. Toman, M., (1998), *Research Frontiers in the Economics of Climate Change*.

Discussion Paper 98-32, Resources for the Future: Washington DC. 24 pp.

Academic and policy debates over climate change risks and policies have stimulated economic research in a variety of fields. This article briefly discusses eight overlapping areas of current research in which further effort particularly is warranted. These areas include decision criteria for policy; risk assessment and adaptation; uncertainty and learning; abatement cost and the innovation and diffusion of technology; and the credibility of policies and international agreements. Further analysis in these areas not only will advance academic understanding but also will provide insights of considerable importance to policymakers.

Coverage: Global

Topics: Climate change, Carbon offsets, Economic instruments

#277. Totten, M., (1999), *Getting it Right: Emerging Markets for Storing Carbon in Forests*. World Resource Institute: Washington DC. 49. 1-56973-413-5

This document sets out the potential for businesses and the environmental community to find common solutions that use forests to mitigate the climate-warming dangers of greenhouse gases. It argues that there is an accelerating momentum to create a market for forests as sinks for carbon emissions. Examples of this emerging market in carbon offsets are given from around the world.

Coverage: Global

Contains examples or case studies from: Costa Rica, Belize, Paraguay, Bolivia, Malaysia, USA, Brazil, Australia, Mexico, Honduras, Netherlands

Ecosystem or sector focus: Forests, Watersheds

Topics: Climate change, Markets and charges, Financial mechanisms, Economic instruments, Deforestation

#278. Tressler, S., (1995), *Charitable Giving in the United States: A Model and Opportunity for Funding Conservation of Biodiversity*. Paper presented at IUCN Workshop on Financing Biodiversity Conservation Harare, Zimbabwe 13-15

September 1995. 7 pp.

<http://www.biodiversityeconomics.org>

The purpose of this paper is to explore trends in charitable giving that suggest opportunities to support conservation of biodiversity around the world. The level of charitable giving in the United States, which totalled \$129.88 billion in 1994¹, suggests that serious consideration should be given to developing this source of funding for conservation of biodiversity. The U.S. model could be replicated in other developed countries and emerging economies. The latter presents a particular opportunity to build philanthropic traditions as economies grow.

Coverage: North America

Contains examples or case studies from: USA

Topics: Economic instruments, Financial mechanisms, Taxes

#279. Trexler, M., (1995), *Biodiversity Conservation Through Joint Implementation: Advancing Common Agenda Elements*.

Paper presented at IUCN Workshop on Financing Biodiversity Conservation Harare, Zimbabwe 13-15 September 1995. 7 pp.

<http://www.biodiversityeconomics.org>

This paper reviews the successes and difficulties of Joint Implementation of carbon offset projects for forest conservation. This paper considers only one method used for carbon offsets, but this method is considered to be the one which has the greatest impact on biodiversity conservation. The Joint Implementation concept in the Convention on Climate Change (CFFF) has led to a pilot phase, which this author argues should be developed to provide strong incentives for private sector industry (power plants, manufacturers) to endorse offsets as alternatives to facility-specific emissions reductions. Several industry-financed offset projects are briefly summarised. However offset projects face important barriers, notably the burden of proving that preservation will result in carbon offset rather than displace the destruction of the forest elsewhere. The author calls for a strengthening of policy frameworks to enable JI projects to overcome barriers, and suggests seven key points to address in the design of future JI projects.

Coverage: Global

Ecosystem or sector focus: Forests

Topics: Climate change, Carbon offsets, Private sector, Financial mechanisms, Economic instruments

#280. Trexler, M., (1999), *Innovative Forest Financing Options and Issues: Forest Conservation and Management for Climate Change Mitigation*. Programme on Forests, United Nations Development Programme: New York: New York. 69 pp.

This issues paper focuses on one potential innovative financing mechanism for sustainable forest management activities - the Clean Development Mechanism. It covers the background to the climate change issue, looks at different options for integrating forest and land-use based options into the SDM and gives examples of ongoing forestry projects being pursued for climate change mitigation purposes. The strengths and weaknesses of different financing mechanisms and strategies are assessed.

Coverage: Global, Asia, Latin America

Contains examples or case studies from: Belize, Bolivia, Costa Rica, Ecuador, Guatemala, Malaysia, Mexico, Paraguay, Peru

Ecosystem or sector focus: Forests

Topics: Financial mechanisms, Economic instruments, Private sector, Climate change, Carbon offsets

#281. Tri, N. H., Adger, W. N., Kelly, M., Granich, S., & Ninh, N. H., (1996), *The Role of Natural Resource Management in Mitigating Climate Impacts: Mangrove Restoration in Vietnam*. Working Paper GEC 96-06, Centre for Social and Economic Research on the Global Environment: London. 27 pp.

The risk that tropical storm occurrence may alter as a result of global warming presents coastal managers with a serious challenge. This paper examines a strategy to protect coastal populations and resources against these effects, based on the rehabilitation of a natural ecosystem, the mangrove. It quantifies the economic benefits of mangrove rehabilitation undertaken to enhance sea defence systems in three coastal districts of northern Vietnam. The results of this analysis show that mangrove rehabilitation can be

desirable from an economic perspective solely on the direct use benefits by local communities. Such activities have even higher benefit:cost ratios with the inclusion of the indirect benefits resulting from the avoided maintenance costs for the sea dike systems which the mangroves protect from coastal storm surges.

Coverage: Asia

Contains examples or case studies from: Vietnam

Ecosystem or sector focus: Marine and coastal, Wetlands

Topics: Valuation, Climate change, Market valuation, Effect on production, Mitigative and avertive expenditures

#282. t'Sas Rolfes, M., (1995), *Private Sector Mechanisms for Financing Biodiversity Conservation: Some Lessons From Southern Africa*. Paper presented at IUCN Workshop on Financing Biodiversity Conservation Harare, Zimbabwe 13-15 September 1995. 11 pp. <http://www.biodiversityeconomics.org>

There are two approaches to overcoming the "missing markets" for biodiversity: either internalise the externalities of conservation, the approach favoured by most multilateral bodies, or create a market. This paper explains why market mechanisms have greater promise of succeeding in Southern Africa, despite the opposition of supporters of species preservation. It backs up this argument with a case study of the South African ecotourism company Conservation Corporation (ConsCorp). By giving private or communal landowners the right to sell the products of biodiversity on markets there is an incentive to conserve - where strict efforts to preserve the same species creates no such incentive. Given the right legal framework, the market can do a better job than either the state, or foreign NGO's. Who presently invests in conservation? Investors include mining corporations, livestock and game ranchers, wealthy individuals seeking the tax breaks afforded to farmers, and most recently environmental entrepreneurs such as ConsCorp.

Coverage: Africa

Contains examples or case studies from: South Africa

Ecosystem or sector focus: Wildlife, Protected Areas, Tourism

Topics: Financial mechanisms, Private sector

#283. t'Sas Rolfes, M., (1996), *The Use of Auctions as an Incentive Measure for Wildlife Conservation*. Paper presented at workshop on Incentives for Biodiversity: Sharing Experiences, 4th Global Biodiversity Forum, Montreal, Canada 30 August - 1 September 1996. 3 pp.
<http://www.biodiversityeconomics.org>

This paper highlights the success of public game auctions as a means of providing incentives for wildlife conservation in South Africa. The initial experiences of the National Parks Board in selling White Rhinos to the private sector were not successful for conservation because the set price of purchasing a rhino from the NPB was significantly less than the price obtained from trophy hunters. Once auctioning was introduced as a pricing mechanism the purchasing price rose and private landowners had the incentive to breed their own rhino populations. This paper reviews the case and provides a summary of 'lessons learned'.

Coverage: Africa

Contains examples or case studies from: South Africa

Ecosystem or sector focus: Wildlife, Protected Areas

Topics: Incentive measures, Economic instruments, Financial mechanisms, Markets and charges

#284. Turner, R. K., Perrings, C., & Folke, C., (1995), *Ecological Economics: Paradigm or Perspective?* Working Paper GEC 95-17, Centre for Social and Economic Research on the Global Environment: London.

This paper addresses the issue of whether ecological economics represents a separate and distinct paradigm from environmental economics. The latter is taken to represent the application of the standard economic tool kit to environmental issues. It is concluded that the competing paradigms thesis is at best only partially true. Most important is the finding that there appears to be an emerging consensus around a new

substantive research agenda which straddles environmental, resource and ecological economics.

Coverage: Global

#285. Turpie, J., Smith, B., Emerton, L. A., & Barnes, J., (1999), *The Economic Value of the Zambezi Basin Wetlands*. IUCN - The World Conservation Union, Regional Office for Southern Africa: Harare. 346 pp.

This reports on a study carried out to value the Zambezi Basin wetlands in Southern Africa. It presents an overview of the theoretical background to economic valuation, and the available methods and techniques for valuation. It looks in detail at four major wetland sites and presents monetary estimates of their direct and indirect values. The impacts of macroeconomic and sectoral economic policies on wetland status are analysed, and recommendations made for the use of economic instruments and incentives for wetland wise use and sustainable management.

Coverage: Africa

Contains examples or case studies from: Botswana, Malawi, Mozambique, Namibia, Zambia, Zimbabwe

Ecosystem or sector focus: Wetlands, Water, Forests, Marine and coastal, Drylands, Fisheries

Topics: Valuation, Contingent valuation, Market valuation, Effect on production, Mitigative and avertive expenditures, Replacement costs, Economic instruments, Economic policies, Disincentives, Incentive measures, Causes of biodiversity loss

#286. Umana, M. R., (1996), *Conservation Strategies and Incentive Mechanisms Implemented Within the La Amistad Conservation Development Initiative for Costa Rica and Panama*. Paper presented at workshop on Incentives for Biodiversity: Sharing Experiences, 4th Global Biodiversity Forum, Montreal, Canada 30 August - 1 September 1996. 5 pp.

<http://www.biodiversityeconomics.org>

Based on the experiences of the La Amistad Conservation and Development Initiative, this

paper outlines several methods undertaken by that group to conserve and sustainably use the resources of La Amistad Biosphere Reserve. These efforts include a revolving credit fund, tree nurseries, diversification of crops, the establishment of market opportunities, reducing soil erosion, providing technical training, and enhancing environmental education. These efforts employ a variety of direct and indirect incentives such as subsidies, cost sharing programmes, and agency support. The paper outlines the initiative, the institutional and legal frameworks, the effectiveness of the incentives, and lessons and recommendations.

Coverage: Latin America

Contains examples or case studies from: Costa Rica, Panama

Ecosystem or sector focus: Forests, Protected Areas

Topics: Incentive measures, Financial mechanisms, Trust Funds

#287. United Nations, (1993), *Integrated Environmental and Economic Accounting*. Department for Economic and Social Information and Policy Analysis, Statistical Division, Studies in Methods Series F No 61, United Nations: New York. 182 pp. ISBN 92-1-161359-0

This handbook presents methods for integrated environmental and economic accounting. It gives a conceptual basis for implementing a satellite national account system for environmental and economic accounting that describes the relationships between the natural environment and the economy. Ultimately, integrated environmental and economic accounting is intended to support integrated social, economic and environmental policy by means of an integrated information system.

Coverage: Global

Topics: Environmental accounting, Valuation

#288. United Nations Environment Programme, & International Institute for Sustainable Development, (2000), *Environment and Trade: A Handbook*. The United Nations Environment Programme, Division of Technology, Industry and Economics, Economics and Trade Unit and

the International Institute for Sustainable Development: Geneva. 96 pp. ISBN 1-895536-21-9

The handbook has been developed to highlight the relationship between environment and trade. The primary aim is to foster a broader understanding of these interlinkages to enable governments to develop practical approaches to integrating these policies. It is possible, but by no means automatic, that trade and environmental policies should support each other in achieving their objectives. Close integration of these policies is necessary to maximize the benefits that trade can bring to increase human welfare and economic development more sustainably. The handbook is aimed mainly at those with some knowledge about trade, environment or development, but not expert on the intersection of the three. It is also a practical reference tool for policy-makers and practitioners. But the target audience is not just government policy-makers; the media and public may also find it useful. The handbook uses clear language and a minimum of jargon to foster a greater understanding by all elements of civil society. This handbook should help us understand how trade can affect the environment, for better and for worse, and how environmental concern can work through the trading system to foster or frustrate development, in both rich and poor countries. It is critical to ensure that trade's potential for growth and development does, in fact, lead to environmentally sustainable development. Broader understanding and awareness of these linkages will then be the foundation on which fair and environmentally sustainable policies and trade flows are built.

Coverage: Global

Topics: Trade

#289. United Nations Environment Programme (Ed.), (2000), *Funding Protected Areas in the Wider Caribbean: A Guide for Managers and Conservation Organizations*. Proceedings of the Ninth Intergovernmental Meeting on the Action Plan for the Caribbean Environment Programme and Sixth Meeting of the Contracting Parties to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region: Kingston, Jamaica, 14-18 February 2000. 48 pp.

This document is an orientation to sources of funding for protected areas and biodiversity conservation. It is intended to serve as a primer and basic guidelines for protected area agencies and managers, as well as NGOs. It deals both with financing mechanisms and funding sources available for protected areas and biodiversity conservation in the Wider Caribbean. It shows, through many case studies and examples from Latin America and the Caribbean, the many ways in which protected area managers have incorporated different funding sources for establishment and management of parks. The document includes sections in planning for financial sustainability, cross-cutting themes in biodiversity finance, finance and revenue-generating mechanisms and fundraising from international donors. It also presents sources of information and technical assistance for funding protected areas.

Coverage: Caribbean, Latin America

Contains examples or case studies from: Antigua, Netherlands Antilles, Belize, Costa Rica, British Virgin Islands, Guatemala, Panama

Ecosystem or sector focus: Marine and coastal, Protected Areas, Tourism

Topics: Financial mechanisms, Economic instruments, Markets and charges, Trust Funds, Debt conversion, Carbon offsets, Bioprospecting, Taxes, Valuation, Private sector

#290. Vallejo, N., & Hauselmann, P. (Eds.), (1998), *From Theory to Practice: Incentive Measures in Developing Countries*. Benefiting from Biodiversity Series, WWF - World Wide Fund for Nature: Gland. 42 pp. 2-88685-216-1

Five years after the establishment of the Convention on Biological Diversity, the massive degradation of ecosystems continues. Thousands of species have disappeared, the climate is changing. Are the efforts to save the planet without hope? This publication shows, to the contrary, that some initiatives - born and tested in developing countries - are beginning to reverse these trends. It looks at what incentive measures are, and what types of incentive measures are available for biodiversity conservation. Presenting case studies of the introduction and use of incentive measures for biodiversity from a range of countries and ecosystems, the document makes conclusions as to successful elements and lessons

learned in the design and use of incentive measures for biodiversity conservation.

Coverage: Global, Africa, Asia, Latin America

Contains examples or case studies from: Brazil, Kenya, Colombia, Cameroon, Cote d'Ivoire, Uganda, India, Malaysia

Ecosystem or sector focus: Forests, Tourism

Topics: Taxes, Subsidies, Economic instruments, Incentive measures, Financial mechanisms, Economic policies, Private sector, Community-based management, Causes of biodiversity loss

#291. van Tongeren, J., Lutz, E., & Shweinfest, S., (1991), *Integrated Environmental and Economic Accounting: A Case Study for Mexico*. Environment Working Paper 50, Environment Department, World Bank: Washington DC. 34 pp.

This document presents a case study of the application of environmental accounting to Mexico using the integrated environmental and economic accounting framework developed by the United Nations Statistical Office. Depreciation of produced asset balances was calculated and deducted from the GDP to arrive at the standardised NDP. Depletion of oil was accounted for, and degradation concerns were addressed. These effects were valued. Environmentally adjusted NDP ranged from 94% of traditional NDP to 87% when deducting the cost of degradation.

Coverage: Latin America

Contains examples or case studies from: Mexico

Ecosystem or sector focus: Agriculture, Forests, Industry

Topics: Environmental accounting, Valuation

#292. Verbruggen, H., Kuik, O., & Bennis, M., (1995), *Environmental Regulations as Trade Barriers for Developing Countries: Eco-labelling and the Dutch Cut Flower Industry*. CREED Working Paper Series No 2, International Institute for Environment and Development: London.

The present expansion of environmental standards and regulations in industrialised countries can have significant impacts on the

market access of developing countries. The fear in many developing countries is that stricter product standards in the markets of developed countries will act as trade barriers for their exports. Moreover, there is widespread suspicion that environmental restrictions are sometimes used as an indirect means of protecting northern industries. This paper briefly examines these issues, focusing on recent eco-labelling schemes for cut flowers in the Netherlands. The paper concludes that eco-labels may have a significant negative impact on the export opportunities of a number of developing countries.

Coverage: Global
Europe

Contains examples or case studies from:
Netherlands

Ecosystem or sector focus: Agriculture

Topics: Markets and charges, Trade

#293. Verbruggen, H., Kuik, O., Bennis, M., Hoogeveen, H., & Mollerus, R., (1998), *Environmental Product Measures: Barriers for South-North Trade?* CREED Working Paper Series No 18, International Institute for Environment and Development: London.

An increasing volume of exports from the south is subject to environmental regulations in northern markets. The frequency of incidence of these measures, their coverage in value terms and their impacts on the market access for exporters from developing countries, are the subjects of this paper. In order to assess the extent and coverage of such environmental measures two indices are developed - the Frequency Index of Environmental Measures (FIEM) and the Coverage Index of Environmental Measures (CIEM) - and are applied to developing countries' exports to the EU market in 1992. In order to assess the impacts of environmental measures on the market access of products from developing countries, the results of a survey among Zimbabwean exporting firms are presented. It is concluded that FIEM and CIEM are potentially valuable monitoring tools and some recommendations for further work are proposed.

Coverage: Global, Europe, North America, Africa

Contains examples or case studies from:
Zimbabwe

Topics: Trade

#294. von Moltke, K., & Spanninks, F., (2000), *Traditional Chinese Medicine and species endangerment: an economic research agenda.* CREED Working Paper Series No 32, International Institute for Environment and Development: London.

The debate about Traditional Chinese Medicine (TCM) and species endangerment has generally focused on the species themselves and their role in the TCM pharmacopeia. There has been little research on the economics of TCM and its implications for species endangerment. Yet in China, the rapid transformation of the economy and the associated increase in the purchasing power of Chinese consumers mean that, left to its own dynamics, the market pressures on medicinal species for TCM will grow over the coming years. While the pressures themselves may be unavoidable, further research may contribute to mitigating the impacts. Based on discussions at a workshop held in China 1997, this paper identifies some key issues regarding the relationship between the demand for TCM and the endangerment of medicinal species. It also proposes a research agenda in the economics of TCM which may go some way towards identifying options for alleviating the economic pressure on endangered species.

Coverage: Asia

Contains examples or case studies from: China

Ecosystem or sector focus: Wildlife

Topics: Trade, Valuation

#295. Windevoxhel, N., (1992), *Valoracion Economica Parcial de los Manglares de la Region II de Nicaragua.* Unpublished Tesis de Magister Scientiae, Turrialba.

The value of mangroves of Héroes y Martínez on the North Pacific coast of Nicaragua was valued by looking at loss of local income and productivity resulting from deforestation. The survey looked at the value of direct uses of artisanal forestry, fishing and mollusc extraction, and related fall in availability and yield to loss of mangroves. It then builds up ecological-economic

models to assess values under different mangrove exploitation scenarios.

Coverage: Latin America

Contains examples or case studies from: Costa Rica

Ecosystem or sector focus: Marine and coastal, Forests, Fisheries

Topics: Valuation, Market valuation, Effect on production

Other: Spanish language publication

#296. Winpenny, J. T., (1991), *Values for the Environment: A Guide to Economic Appraisal*. HMSO Press: London. 277 pp. 0-11-580257-6

This practical guide to the economic treatment of environment in project appraisal uses cost-benefit analysis as the decision framework. The main environmental impacts of projects and the methods available for placing economic values on them are discussed, and the feasibility of environmental valuation for projects is then illustrated for a range of sectors, ecosystems and countries. The guide concludes with a review of relevant policy issues.

Coverage: Global, Global, Africa, Asia, Latin America, Middle East, North Africa and Gulf States, North America

Contains examples or case studies from: Nepal, Morocco, Indonesia, El Salvador, Mali, Australia, Nicaragua, USA, Cameroon, Lesotho, Korea, Ethiopia, Nigeria, Botswana, Philippines, Ecuador, Kenya, Thailand, Egypt, China, Colombia, Brazil, Sudan

Topics: Valuation, Economic instruments, Economic policies, Contingent valuation, Market valuation, Effect on production, Replacement costs, Mitigative and avertive expenditures

#297. Winpenny, J. T., (1995), *The Economic Appraisal of Environmental Projects and Policies*. Organisation for Economic Co-operation and Development: Paris. 171 pp. ISBN 92-64-14583-4

Economic appraisal of environmental impacts is a key element of the decision to invest in new

projects and policies. Several methods exist for carrying out these appraisals. The purpose of this technical guide is to explain to policy analysts and decision makers the basic principles, fields of application, strengths and weaknesses of existing economic evaluation techniques. Case studies are provided from both industrialised and developing countries.

Coverage: Global, Africa, Australia and New Zealand, Europe, Asia, Latin America

Contains examples or case studies from: South Africa, Mali, India, Cameroon, China, Nigeria, Zimbabwe, Kenya, USA, Costa Rica, India, UK, Djibouti

Ecosystem or sector focus: Agriculture, Water, Wetlands, Forests, Fisheries, Protected Areas, Wildlife, Industry, Infrastructure, Urban settlements

Topics: Valuation, Economic instruments, Economic policies, Disincentives, Causes of biodiversity loss, Financial mechanisms, Taxes, Subsidies, Land degradation, Soil erosion, Pollution

Other: Also published in French

#298. World Resources Institute, (2000a), *Financing Biodiversity Conservation*. World Resource Institute. <http://www.wri.org>

Innovative funding mechanisms will be required to support conservation efforts. These mechanisms should be based on the principle that those who benefit from biological resources should pay more of the costs of ensuring that such resources are used sustainably. Efforts are required at the community level to provide economic incentives for conservation, at the national level to ensure that the government policies are compatible with such incentives, and at the international level to ensure that the wealthy nations benefiting from the biological resources of the tropics are able to invest in conserving the productive capacity of those resources.

Coverage: Global

Topics: Financial mechanisms, Convention on Biological Diversity

#299. World Resources Institute, (2000b),
Valuing Ecosystem Services. World Resource
Institute. <http://www.wri.org>

What are Mother Nature's life-support services worth? In one sense, their value is infinite. The Earth's economies would soon collapse without fertile soil, fresh water, breathable air, and an amenable climate. But "infinite" too often translates to "zero" in the equations that guide land use and policy decisions. Practitioners in the young field of ecological economics believe more concrete numbers are required to help nations avoid unsustainable economic choices that degrade both their natural resources and the vital services that healthy natural ecosystems generate.

Coverage: Global

Topics: Valuation, Incentive measures, Financial mechanisms, Convention on Biological Diversity

#300. Young, C., & Aylward, B., (1995),
Adjustment Policies and the Environment: A Critical Review of the Literature. CREED
Working Paper Series No 1, International
Institute for Environment and Development:
London.

Adjustment programmes in developing countries have been the subject of an intense debate since their debut in the early 1980s. Consideration of the environmental consequences of adjustment has added a new dimension to the discussion. This paper seeks to review the existing literature, examining the links between adjustment policies, the environment and the use of natural resources. Special attention is paid to the evidence presented in selected country case studies. A wide diversity of findings suggests that there is no simple answer to the question of whether adjustment is good or bad for the environment. The complexity of adjustment itself makes generalisation impossible, as do the varying circumstances of adjusting countries.

Coverage: Global

Topics: Economic policies, Economic instruments, Causes of biodiversity loss

3 INTERNET RESOURCES

ANSZEE: Australia & New Zealand Society for Ecological Economics

<http://www.cres.anu.edu.au/anzsee>

This site provides information about ANZSEE, a regional node of the International Society for Ecological Economics (ISEE).

Association of Environmental and Resource Economists

<http://www.aere.org/>

Founded in 1979, the Association of Environmental and Resource Economists (AERE) was established as a means of exchanging ideas, stimulating research, and promoting graduate training in resource and environmental economics. Today, with a membership of over 1000 from more than thirty nations, AERE is a strong, active organization. AERE's members come from academic institutions, the public sector, and private industry. It draws from traditional economics, agricultural economics, forestry, and natural resource schools. AERE provides many forums for exchanging ideas relevant to the allocation and management of natural and environmental resources. This site contains information about AERE.

Beijer Institute

http://www.beijer.kva.se/publications/pdf-archive/pdf_archive.html

The Beijer Institute is an international research institute under the auspices of the Royal Swedish Academy of Sciences. The goal of the Beijer Institute is to foster interdisciplinary activities among natural and social scientists, in order to deepen understanding of the interactions between humans and nature, and to inform management of our common environment. The Institute seeks to realize this goal through a variety of activities, including research and training programs, seminars and conferences, and publications aimed both at the general public and the scientific community. This site contains downloadable articles, working papers and other documents. Books and other publications may also be ordered through the site.

Biotrade Initiative

<http://www.biotrade.org/>

UNCTAD launched the BIOTRADE Initiative at the third Conference of the Parties of the Convention on Biological Diversity (CBD) in November 1996. The mission of BIOTRADE is to stimulate trade and investment in biological resources to further sustainable development, in line with the three objectives of the CBD. The BIOTRADE Initiative seeks to enhance the capability of developing countries to produce value-added products and services from biodiversity for both domestic and international markets. It is an integrated programme consisting of three complementary components: the BIOTRADE country programmes; market research and policy analysis; and Internet services. The BIOTRADE country programmes are the most comprehensive part of the Initiative. They identify opportunities and constraints for sustainable resource development in each country, focusing on bio-business development, bio-partnerships, sustainable use, conservation, and benefit-sharing incentives. Country programmes are managed by national focal points with long standing experience in the area of sustainable development and strong links with other national organisations. This site contains information about Biotrade, as well as a "Biolibrary".

CANSEE: Canadian Society for Ecological Economics

<http://socserv2.socsci.mcmaster.ca/~cansee>

This site provides information about CANSEE, a regional node of the International Society for Ecological Economics (ISEE).

Centre for Social and Economic Research on the Global Environment (CSERGE)

<http://www.uea.ac.uk/env/cserge/>

CSERGE is an interdisciplinary research centre with an international profile. The Centre's core academic objectives are to undertake policy-relevant research on global environmental issues and problems, bridging natural and social sciences. This site contains downloadable articles, working papers and other documents. Books and other publications may also be ordered through the site.

Conservation International (CI)

<http://www.conservation.org/library.htm>

Conservation International (CI) is a field-based, non-profit organization that protects the Earth's biologically richest areas and helps the people who live there improve their quality of life. This site contains downloadable articles, working papers and other documents. Books and other publications may also be ordered through the site. Information about CI's Conservation Economics Programme can be accessed on http://www.conservation.org/WEB/FIELDACT/C-C_PROG/ECON/Econ.htm

Convention on Biological Diversity (CBD)

<http://www.biodiv.org/>

This site includes background and papers on the role of economics in the CBD.

ECOECO – Brasil: Brazilian Society for Ecological Economics

<http://www.eco.unicamp.br/ecoeco>

This site provides information about ECOECO – Brazil, a regional node of the International Society for Ecological Economics (ISEE).

Economy and Environment Programme for South East Asia (EEPSEA)

<http://www.eepsea.org/>

Established in 1993, EEPSEA supports training and research in environmental and resource economics in South East Asia. It uses a networking approach to provide financial and technical support to researchers in its ten member countries. The network meets in May and November of each year. This site contains downloadable articles, working papers and other documents.

Ecosystem valuation

<http://www.ecosystemvaluation.org/>

This website describes how economists value the beneficial ways that ecosystems affect people – ecosystem valuation. It is designed for non-economists who need answers to questions about the benefits of ecosystem

conservation, preservation or restoration. It provides a clear, non-technical explanation of ecosystem valuation concepts, methods and applications.

Envalue

<http://www2.epa.nsw.gov.au/envalue/>

The NSW Government has a strong commitment to including the environment in decision making through valuation of changes in environmental quality. The ENVALUE environmental valuation database, developed by the NSW EPA and first released in 1995, is a systematic collection of environmental valuation studies presented in an on-line database. It is expected that the ENVALUE database will assist decision makers in government and industry as well as academics, consultants and environmental groups, to incorporate environmental values into cost-benefit analyses, environmental impact statements, project appraisals and overall valuation of changes in environmental quality.

Environmental Economics Network for Eastern and Southern Africa (EENESA)

http://www.ranesa.co.za/eenesa_home.htm

In November 1993 extensive consultation with university departments of economics and environmental studies and research institutes from Botswana, Eritrea, Ethiopia, Kenya, Lesotho, Mozambique, Namibia, South Africa, Tanzania, Uganda, Zambia and Zimbabwe led to the formation of the Environmental Economics Network for Eastern and Southern Africa (EENESA), which was formally established in October 1994. The network's goal is to develop a regional analytical capacity for natural resource and environmental management. It aims to integrate environmental issues into development planning and macroeconomic policies. The network provides support to research, runs training courses and disseminates information. This site contains information about EENESA.

Environmental Valuation Reference Inventory (EVRI)

<http://www.evri.ec.gc.ca/evri/>

The EVRI is a searchable storehouse of empirical studies on the economic value of environmental benefits and human health effects. It has been developed as a tool to help policy analysts use the benefits transfer approach. Using the EVRI to do a benefits transfer is an alternative to doing new valuation research. The information in the EVRI is available to subscribers.

ESEE: European Society for Ecological Economics

<http://www.euroecolecon.org/>

This site provides information about ESEE, a regional node of the International Society for Ecological Economics (ISEE).

Forum for Economics and Environment (South Africa)

<http://www.econ4env.co.za/>

It is the mission and aim of the Forum for Economics and Environment to promote the interface of economics and the environment in southern Africa through the dissemination of information and the facilitation of open debate. This site presents information about FFE and also contains a number of reports on research in progress.

International Development Research Centre (IDRC)

http://www.idrc.ca/resources/index_e.html

The International Development Research Centre is a public corporation created by the Canadian government to help communities in the developing world find solutions to social, economic, and environmental problems through research. IDRC connects people, institutions, and ideas to ensure that the results of the research it supports and the knowledge that research generates, are shared equitably among all its partners, North and South. This site contains the IDRC Library catalogue, and a collection of IDRC project descriptions, via its web interface. It also provides access to a large number of documents and publications, as well as IDRC'S online publication "Reports".

INSEE Indian Society for Ecological Economics

<http://indev.nic.in/insee/>

This site provides information about INSEE, a regional node of the International Society for Ecological Economics (ISEE).

International Institute for Environment and Development (IIED)

<http://www.iied.org/infopubs/index.html>

IIED aims to provide expertise and leadership in researching and achieving sustainable development at local, national, regional and global levels. In alliance with others we seek to help shape a future that ends global poverty and delivers and sustains efficient and equitable management of the world's natural resources. This site contains downloadable articles, working papers and other documents. Books and other publications may also be ordered through the site.

International Society for Environmental Economics (ISEE)

<http://www.ecologicaleconomics.org/>

ISEE is a nonprofit, member-governed, organization dedicated to advancing understanding of the relationships among ecological, social, and economic systems for the mutual well-being of nature and people. The Society assists its members and ecological economists generally, regional societies of ecological economics, related societies, and other organizations in such matters of common concern as can be dealt with more effectively by united action. To this end, the Society publishes a research journal, books, and other materials; holds and sponsors scientific meetings; develops educational materials; and facilitates a voice for ecological economists in public forums. ISEE, and its regional societies, provide an international forum so that we might all better understand these issues. This site provides information about the ISEE, including regional nodes.

IUCN – The World Conservation Union, Economics Unit

<http://www.biodiversityeconomics.org>

The Economics Unit of IUCN – The World Conservation Union focuses on: Encouraging the private sector to conserve biodiversity; Influencing governments & civil society on the economics of global biodiversity policies; Assisting the conservation community in accessing solid, practical information on biodiversity economics; Integrating an efficient & effective Economics Unit into the new results-driven IUCN programme. This site contains a large number of downloadable articles, working papers and other documents.

London Group on Environmental Accounting

<http://ww2.statcan.ca/citygrp/london/london.htm>

The London Group on Environmental Accounting was created in 1993 to provide an informed forum for practitioners to share their experience of developing and implementing environmental satellite accounts linked to the economic accounts of the System of National Accounts. It convened its first meeting in March 1994 in London, England. Successive meetings have been held in Washington, U.S.A. in 1995, Stockholm, Sweden in 1996, Ottawa, Canada in 1997, Fontevraud, France in 1998 and in Canberra, Australia in November, 1999. The next meeting will be held in Voorburg, Netherlands. Participation includes representatives from statistical offices and international organizations. The meetings are hosted voluntarily by participants one at a time and each has provided facilities and secretarial functions for the meetings. A Papers and Proceedings volume has been compiled after each meeting. This site provides information about the London Group on Environmental Accounting.

Organisation for Economic Co-operation and Development (OECD)

<http://www.oecd.org/env/online.htm>

This site contains a number of documents that can be downloaded or ordered from OECD, including those dealing with environmental and economic policies, economic aspects of biodiversity, trade and environment, environment and transport, environment and energy, climate change, sustainable consumption and production, taxes and other economic instruments for environment and biodiversity.

Overseas Development Institute

<http://www.odi.org.uk/publications/intro.html>

The Overseas Development Institute is Britain's leading independent think-tank on international development and humanitarian issues. Its mission is to inspire and inform policy and practice which lead to the reduction of poverty, the alleviation of suffering and the achievement of sustainable livelihoods in developing countries. It does this by locking together high-quality applied research, practical policy advice, and policy-focused dissemination and debate. ODI works with partners in the public and private sectors, in both developing and developed countries. work centres on five research and policy programmes: Poverty and Public Policy, International Economic Development, Humanitarian Policy, Rural Policy and Environment, and Forest Policy and Environment. This site contains information about ODI's programmes, as well as a large number downloadable reports and working papers.

Resource Accounting Network for Eastern and Southern Africa (RANESA)

<http://www.ranesa.co.za/>

A number of institutions collaborated over the past few years to support research work and capacity in development and use of natural resource accounts in Africa. Following pilot projects in Botswana and Namibia, the USAID Regional Center for Southern Africa funded a regional natural resource accounting (NRA) project involving three countries in southern Africa: Namibia, Botswana and South Africa. The said project is now in its second year of operation and is coordinated from the University of Pretoria and the Directorate of Environmental Affairs in Namibia. In late 1997, a group of environmental economists from several countries in eastern and southern Africa came together at to a workshop to develop a strategy and plans for furthering NRA efforts in the region. The workshop produced a proposal for establishing a network for NRA in E&SA choosing the name: Resource Accounting Network for E&SA (RANESA). The objective of this network is to consolidate ongoing initiatives and enhance capacity in NRA. This site contains information about RANESA, as well as a number of documents that can be downloaded.

Resources for the Future (RFF)

<http://www.rff.org>

RFF is a nonprofit and nonpartisan think tank located in Washington, DC that conducts independent research – rooted primarily in economics and other social sciences – on environmental and natural resource issues. This site contains a large number of downloadable articles, working papers and other documents.

Russian Chapter of ISEE

<http://www.ulb.ac.be/ceese/STAFF/safonov/ISEERC.htm>

This site provides information about the Russian Chapter of the International Society for Ecological Economics (ISEE).

South Asian Network for Development and Environmental Economics (SANDEE)

<http://www.sandeeonline.com/>

SANDEE is a new network that hopes to bring together analysts from the different countries in South Asia to address environment-development problems. SANDEE's mission is to strengthen the capacity of individuals and institutions in South Asia to undertake research on the inter-linkages among economic development, poverty, and environmental change and to disseminate practical information that can be applied to development policies. This site contains information about SANDEE.

Sustainable Economics Network (SEN)

<http://www.geocities.com/wwfsen/>

The SEN is an informal group of professionals interested in the use of economic tools to achieve nature conservation. It was established on November 26, 1999 among a few WWF colleagues. The SEN aims to improve the effectiveness of conservation work through appropriate application of economic approaches. Three objectives are: 1. Increase the economics capacity by developing and applying economic methods and skills to conservation priorities, including training and capacity building; 2. Enhance the effect of specialized expertise in conservation organizations through professional support, peer review, and skills and information sharing; 3. Promote the vision of sustainable development and the practice of sustainable economics to key audiences. This site presents information about SEN.

United Nations Environment Programme (UNEP) Economics and Trade Unit

<http://www.unep.ch/etu/>

The Economics and Trade Unit (ETU) is one of the five units within UNEP's Division of Technology, Industry and Economics. It works in four areas: Research - On major environment and trade issues and on practical ways to integrate these policies for sustainable development; Capacity Building - To enhance countries' capacities to develop mutually supportive environment and trade policies; Consensus Building - Through raising awareness, consultation and dialogue. ETU finds areas of shared perception and approach among stakeholders; Partnerships - To build synergies with other organisations working in the environment-trade domain. This site contains information about UNEP's Economics and Trade Unit.

United Nations Environment Programme (UNEP) Financial Services Initiative

http://www.unep.ch/etu/finserv/fin_home.htm

The Financial Services Initiatives (FSI) are based on voluntary commitments by the financial industries. UNEP has played a catalytic role in the development of these initiatives, which are run by the sectors themselves. UNEP has launched several initiatives, promoting sustainable development and environmentally sound business practices. This site provides information about the FSI.

USSEE United States Society for Ecological Economics

<http://www.ussee.org>

This site provides information about USSEE, a regional node of the International Society for Ecological Economics (ISEE).

ValuAsia: Benefits Transfer for Southeast Asia

<http://www.geocities.com/valuasia/>

A free, searchable archive for benefit transfer, emphasising Asian studies. The ValuAsia Archive encourages less developed and developing countries in Southeast Asia, such as the Philippines, to consider the environment in policy development and decision making endeavours. The ValuAsia Archive accomplishes such an endeavour by being a conveniently ready database of environmental valuation studies focusing on primary studies from Southeast Asia and from other countries. It also encourages the proper use of benefits transfer, to help narrow the information gap that hinders policy makers from fully considering environmental factors in decision-making. Such an effort would also increase the use of environmental valuation in decision-making. The ValuAsia Archive is open to future additions and/or revisions of whatever information it contains. It is envisioned to provide intelligent and practical solutions and answers to environmental valuation problems and needs of Southeast Asia.

World Bank Environmental Economics and Indicators

<http://www-esd.worldbank.org/eei/>

Several major focus areas are presented on this site. Green Accounting includes the widely noted new estimates of national wealth (the wealth of nations with four component parts), and the policy-linked measures of genuine savings. Environmental Valuation presents several documents with applications of environmental economics to project analysis, especially valuation of environmental impacts. Environmental Policy presents a report of what has been attempted world-wide by national governments and international institutions to foster the use of economic, regulatory, and institutional instruments to better manage the environment as well as a policy matrix that identifies four sets of different policy instruments. New Initiatives include a multi-year program on trade, macro-reform and the environment, a project on how to mainstream environment into the World Bank's Country Assistance Strategies, economic valuation of cultural heritage, a project on policy instruments for sustainable development, and a study of linkages between poverty and the environment. Several publications are available in electronic versions. This site contains downloadable articles, working papers and other documents. Books and other publications may also be ordered through the site.

World Resources Institute (WRI)

<http://www.wri.org/wripubs.html>

The World Resources Institute provides information, ideas, and solutions to global environmental problems. Its mission is to move human society to live in ways that protect Earth's environment for current and future generations. Its program meets global challenges by using knowledge to catalyze public and private action. Its

goals are to: Reverse the rapid degradation of ecosystems, assuring their capacity to provide the goods and services on which human well being depends; Halt the changes to the Earth's climate caused by human activity; Catalyze the adoption of policies and practices that expand prosperity while reducing the use of materials and generation of wastes; Guarantee people's access to information and decisions regarding natural resources and environment. This site contains a large number of downloadable articles, working papers and other documents.

WWF Macroeconomics for Sustainable Development

<http://www.panda.org/resources/publications/sustainability/mpo/>

The objective of this programme is to analyze the impact of macroeconomic practices, and to promote alternative approaches that integrate environmental and social concerns into macroeconomic planning and application. This site contains information about the Macroeconomics for Sustainable Development Programme.

4 INDEXES

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