ISSN 1327-8231

ECONOMICS, ECOLOGY AND THE ENVIRONMENT

Working Paper No. 184

Ecosystem Services: A Re-examination of Some Procedures for Determining their Economic Value

by

Clem Tisdell

December 2012

THE UNIVERSITY OF QUEENSLAND

ISSN 1327-8231

WORKING PAPERS ON ECONOMICS, ECOLOGY AND THE ENVIRONMENT

Working Paper No. 184

Ecosystem Services: A Re-examination of Some Procedures for Determining their Economic Value[1]

by

Clem Tisdell[2]

December 2012

[1] This is a revised version of notes prepared for a lecture given at Minzu University of China, Beijing, in October, 2012

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

The *Economics, Environment and Ecology* set of working papers addresses issues involving environmental and ecological economics. It was preceded by a similar set of papers on *Biodiversity Conservation* and for a time, there was also a parallel series on *Animal Health Economics*, both of which were related to projects funded by ACIAR, the Australian Centre for International Agricultural Research. Working papers in *Economics, Environment and Ecology* are produced in the School of Economics at The University of Queensland and since 2011, have become associated with the Risk and Sustainable Management Group in this school.

Production of the *Economics Ecology and Environment* series and two additional sets were initiated by Professor Clem Tisdell. The other two sets are *Economic Theory, Applications and Issues* and *Social Economics, Policy and Development*. A full list of all papers in each set can be accessed at the following website: http://www.uq.edu.au/economics/PDF/staff/Clem_Tisdell_WorkingPapers.pdf

For further information about the above, contact Clem Tisdell, Email: c.tisdell@economics.uq.edu.au

In addition, the following working papers are produced with the Risk and Sustainable Management Group and are available at the website indicated. *Murray-Darling Basin Program, Risk and Uncertainty Program, Australian Public Policy Program, Climate Change Program* :http://www.uq.edu.au/rsmg/working-papers-rsmg

For further information about these papers, contact Professor John Quiggin, Email: j.quiggin@uq.edu.au

Ecosystem Services – A Re-examination of Some Procedures for Determining their Economic Value

ABSTRACT

The importance of taking account of the total economic value of ecosystems is stressed and the possible reasons why the Millennium Ecosystem Assessment (2005) emphasised the importance of ecosystem services for biodiversity conservation is discussed. It is suggested that the Millennium Ecosystem Assessment does not give enough attention to the disservices association with some ecosystems nor to the comparisons of the value of alternative ecosystems. Reasons why it is important to estimate the total economic value of ecosystems are outlined. It is argued that the economic valuation of ecosystems is of little value unless it compares the economic value of alternative ecosystems or forms of land use. Most published economic valuations of ecosystems fail to do this or only do it to a very limited extent. The cost of replacing ecosystem services if an ecosystem is lost is sometimes used to value its services. In most cases (but not all cases), this tends to over value the loss. This is illustrated using some simple graphs. There is also the further complication that if one type of ecosystem is replaced by another form of land or aquatic use, some ecosystem services may continue to be supplied, possibly in reduced quantities or qualities. In such cases, assuming that the pre-existing services are totally lost and need to be replaced completely overstates the economic value lost, or in other words, the value of retaining an existing ecosystem.

Keywords: biodiversity conservation, cost of replacement method of valuation, economic valuation of ecosystems, ecosystem services, Millennium Ecosystem Assessment, total economic valuation.

JEL Classifications: Q01, Q51, Q57.

Ecosystem Services – A Re-examination of Some Procedures for Determining their Economic Value

1. Introduction

The existence of organisms depends on the nature of their environments and (except less so for primary producers) relies heavily on the presence of other organisms, other species and so on. This is particularly so of species present in environments that are unmanaged or little managed by humans and which are high in the food chain. Conserving such species may require the preservation of their whole web of ecological dependence and interdependence. This is likely to necessitate the conservation of complete (or only slightly altered) ecosystems. An ecosystem has been defined as "a community of organisms, interacting with one another, plus the environment in which they live and with which they also interact as a pond, a forest" (Delbridge, 1981). Losses of ecosystems or their dramatic alterations are significant sources of biodiversity loss. This is probably why the Millennium Ecosystem Assessment (2005) (which is concerned primarily with biodiversity change) places most emphasis on the conservation of ecosystems.

In this article, I'll first of all outline some of the points made in the Millennium Ecosystem Assessment (2005) and critically assess these. Subsequently, I'll discuss the economic valuation of ecosystems and raise some issues needing to be resolved, such as all the services provided by a particular ecosystem may not all be lost when it is replaced by another one. The economic value of the particular ecosystem should not be assessed in isolation but should be considered in relation to alternative ecosystems or forms of land use

2. Some Points Raised in the Millennium Ecosystem Assessment about Ecosystem Services

The Millennium Ecosystem Assessment (2005, pp. 33-37) lists several services which are provided by ecosystems and supplies notes about trends in their enhancement or degradation. These services have been classified into four categories.

1. Provisioning services

2. Regulating services
3. Cultural services
4. Supporting services

Provisioning services cover mainly material benefits to human-beings (for example, provision of food and fibre), regulating services encompass environmental services that are of value to humans, cultural services include spiritual and religious values and supporting services include such services as nutrient and water recycling. This list of services (together with examples) is presented in Table 1. While this classification brings attention to ecosystem services that are likely to be valued, the assessment does not give much attention to their comparative value. Furthermore, the report makes no mention of disservices to human beings which are associated with some ecosystems. For example, some ecosystems provide breeding grounds for pests. For example, mosquitos breed in swamps and transmit malaria. Protected areas often harbour wild animals which attack the crops and domesticated animals located near such areas. Some ecosystems are a source of fires which cause economic damage, and economic losses are associated with damaging floods associated with unregulated river systems. Furthermore, some unmanaged ecosystems hinder transport and communication. Therefore, it needs also to be recognised that ecosystems can generate negative effects which human beings try to limit by engineering and other means. Usually, both benefits and costs to human beings are associated with particular ecosystems and changes to these. It could therefore, be claimed that the Millennium Ecosystem Assessment is not very balanced because it focusses mainly on the benefits from such systems.

Table 1 Types of services provided by ecosystems according to the Millennium Ecosystem Assessment (2005)

Category of service	**Examples**
1. Provisioning services	Food/fibre; genetic resources; biochemical, natural medicines and pharmaceuticals; ornamental resources; fresh water
2. Regulating services	Air quality regulation; climate regulation; water regulation; erosion regulation; water purification and waste treatment; disease regulation; pollination; natural hazard regulation.
3. Cultural services	Cultural diversity; spiritual and religious values; knowledge systems; educational values; inspiration; aesthetic values; social relations; sense of place; cultural heritage values; recreation and ecotourism.
4. Supporting services	Soil formation; photosynthesis; primary production; nutrient cycling; water cycling.

Source: Based on Millennium Ecosystem Assessment (2005, Table 2.2, pp. 33-37)

The Millennium Ecosystem Assessment does not provide much guidance on the economic valuation of ecosystems nor does it make substantial concrete suggestions on how ecosystems might be optimally managed, changed or conserved. If alternative ecosystems or forms of land use are possible, it does not indicate how the best alternative should be chosen. It is true that the Millennium Biodiversity Assessment (2005, Table 5.1, pp. 78-80) lists goals and targets which it considers to be desirable, but these seem to be opinion-based or consensus-based

3. The Importance of Determining the Total Economic Values of Ecosystems

It is often believed by members of the public that only those uses of land (and other resources) providing income have economic value. The income received from using these resources is counted as a part of gross national production. This, however, overlooks the fact that many desired services are provided by land (and aquatic areas) yield no income or little income. This is because some of their services are unpriced or under-priced. For example, wetlands may appear to some people as wastelands and of no economic value. However, they may be breeding grounds for fish, a refuge for significant birdlife, cleanse water of pollutants and provide protection against coastal surges.

It follows that the actual private income received from a parcel of land or a portion of the biosphere is usually not a measure of its **total economic value**. Ideally, in considering whether to replace an unmanaged ecosystem (say a forest) with a managed ecosystem (for example, farming of a particular kind or tree plantations) account should be taken of the comparative total economic value of the alternatives. This is likely to reduce a possible bias in replacing natural or unmanaged ecosystems by managed ones.

Note that measuring the total economic value of natural ecosystems is of little practical significance in itself. Its main purpose would appear to be to drive home the point that such ecosystems have greater economic value than is commonly perceived. From a practical point of view, it is very important to compare the total or social economic value of possible alternative ecosystems or land and aquatic uses in an area. This involves social cost-benefit analysis. The form of land use or pattern of land use yielding the highest social net benefit will be optimal from an economics standpoint.

In principle, this procedure will enable an optimal local or regional pattern of land use to be determined. However, it may not enable a global optimum to be obtained because it is based on partial analysis. The whole may be greater than the parts because of the complexity of environmental and ecological systems (Simon, 1962). Nevertheless, consideration of the total economic value of alternative uses (non-uses) of the biosphere would seem to be a step forward.

In the rest of this article, I'll mention some economic valuations of ecosystems which have been published and outline some issues involving the economic valuation of ecosystems that require more attention, particularly from comparative point of view.

4. Some Published Economic Valuations of Ecosystems

One of the earliest estimates of the annual value of ecosystem services was published by Costanza *et al*. in 1997. This estimate, not surprisingly, turned out to be higher than global gross product. From their estimates, it seems that the total annual value of the flow of services from croplands and rangelands is a lot less than that from natural or little managed biomes, such as those in marine areas. Costanza *et al.* (1997) estimated that the annual value of the world's ecosystem services in 1994 was about US$33 trillion. Ninan (forthcoming) adjusted this figure for inflation. The adjusted figure amounted to US$50 trillion in 2011. Thus, the estimated global annual economic value of services supplied by ecosystems is huge. However, the incomes obtained from ecosystems are lower than their total economic value, especially in the case of natural or little managed ecosystems because many of these services are not marketed or only partly marketed.

Dayuan Xue and Clem Tisdell (2001) estimated the value of ecological services from Changbaishan Mountain Biosphere Reserve in Northeast China. This article valued the ecological services generated by this reserve at 10 times its economic value should it be used for regular timber production.

The categories of ecological functions for which numerical estimates of their economic value were made are shown in Table 2. Estimates were mostly based on the cost of replacing these ecological functions by engineering and other human-produced solutions. No specific values could be estimated for the value of genetic diversity protected by the reserve.

Table 4.2 Categories of ecological functions and their valuation methods.

Function category	Function indicator	Valuation methods	Calculation path
Water conservancy	Reducing surface runoff	Alternative cost	Water amount x actual cost of reservoir's construction
Soil protection	Controlling erosion	Opportunity cost	Avoided eroding land area x opportunity production per unit area
CO_2 fixation	Reducing greenhouse effect	Production cost	Amount of fixed CO_2 x afforestation cost
Nutrient cycling	Accumulating nutrients	Alternative cost and market price	Maintained nutrient amount x market price of fertilizer
Pollutant absorption	Absorbing SO_2	Alternative cost	SO_2 amount x engineering control cost
Disease and pest control	Avoiding diseases and pests	Alternative costs	Forest area x chemical control cost

Source: Xue and Tisdell (2001, p.473)

Some of the economic values generated by this biosphere reserve are not included in the calculations by Xue and Tisdell (2001). Changbaishan Mountain Biodiversity Reserve is, for example, used for ecotourism. Xue *et al.* (2000) used the travel cost method to estimate its economic value for this purpose. This value is considerable and is likely to increase with the increasing involvement of Chinese in domestic tourism.

A useful feature of this study is that it provides economic values for alternative land use, namely that of conserving the reserve as now or alternatively opening it up for regular timber production. Its value for regular timber production is assumed to be equal to the average profit from timber production in China as a whole. Thus a net benefit transfer method was used. But this value might in fact be higher or lower in this reserve than in China as a whole. Furthermore, even with regular timber production, some ecological values (services) may still exist, albeit at reduced level. These values will be greater if low impact logging or similar is practised.

5. More Attention Needs to be Given to Some Comparative Issues Involved in Ecosystem Valuation

Some of the methods used for the economic valuation of services provided by ecosystems are not very reliable measures of economic value. This is, for example, true of the cost of replacement method which has been used by Xue and Tisdell (2001) and by others. Use of this method can overstate the value of services provided by an ecosystem. This can be illustrated by some examples.

In Figure 1, x_n, represents the annual volume of water provided by an ecosystem, and line DEF indicates the extra value that human beings put on the supply of this water. In total, they value this total supply by an amount equivalent to the hatched area. The cost of supplying this water by alternative means (e.g. by a dam or pipeline from elsewhere) is shown by the line MC and its supply is supposed to cost ¥OM per unit. Therefore, the total cost of supplying x_n of water will be equal to the dotted area plus the hatched area. Thus, the economic value of this water will be over stated by an amount equal to the dotted area because the loss in economic value if all water supplies disappear due to a change in the ecosystem will be equivalent to the area of the hatched quadrilateral. A further problem is that when the ecosystem is changed, not all water supplies may be lost. For example, supplies may be reduced to x_r annually. In that case, the total loss in the economic value of this water service will be equal to the area of quadrilateral GHFE.

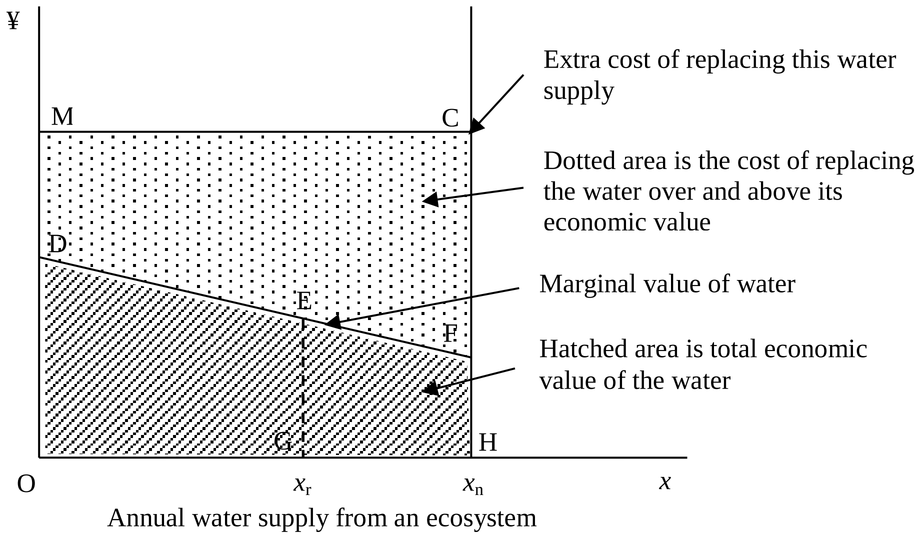

Figure 1 An illustration that the cost of replacement of an ecological service can overstate its economic value. In this case, the economic cost of replacing the water supply exceeds the economic value of the water supply

In some instances, also an ecological service is not fully demanded. In the case illustrated in Figure 2, the extra value placed on water is shown by line DNF. Even if the water supply is free, a maximum quantity of water of x_2 is demanded. The supply $x_n - x_2$ of water from this ecosystem has no economic value. If line MNC represents the per unit cost of replacing this water, it will be optimal to only replace x_1 of the water if all the water supply from the area is lost. When the ecosystem disappears, this will result in an economic loss of an amount equal to the area of rectangle OGNM (the cost of supplying water by alternative means) plus a stemming loss equivalent to the area of triangle GFN. This is a lower economic loss than would be incurred by replacing the whole water supply x_n. This estimate of replacement costs will overestimate the economic burden of losing all the water supplies (provided by the ecosystem) by an amount equivalent to the dotted area in Figure 2.

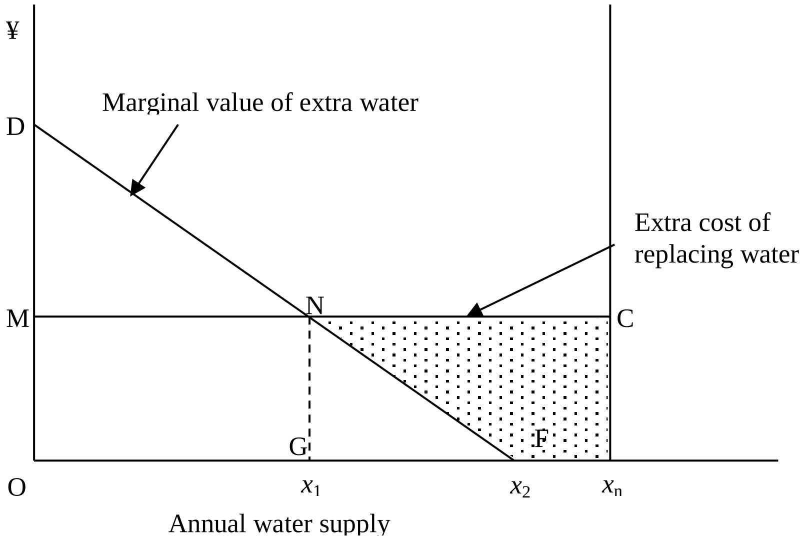

Figure 2 Another case in which the cost of replacement method can overstate the economic value of an ecological service. The dotted area represents the excess of the cost of replacing water compared to its economic value.

Of course, there are some situations in which the cost of replacement would be an accurate measure of an ecological service. Such a case is illustrated in Figure 3. There line DF represents the extra value of water from the ecosystem and MC is the per unit cost of supplying it by other means. A cost equivalent to the dotted area will be incurred if the ecosystem disappears and **all** water supply is lost. However, this may not be so. If x_1 of water continues to be supplied by the changed ecosystem, then the additional cost incurred as a result of the changed ecosystem is equivalent to the area of rectangle GHCN **not** the area of rectangle OHCM. This shows the complexity of the problem, and the need to do comparative analysis.

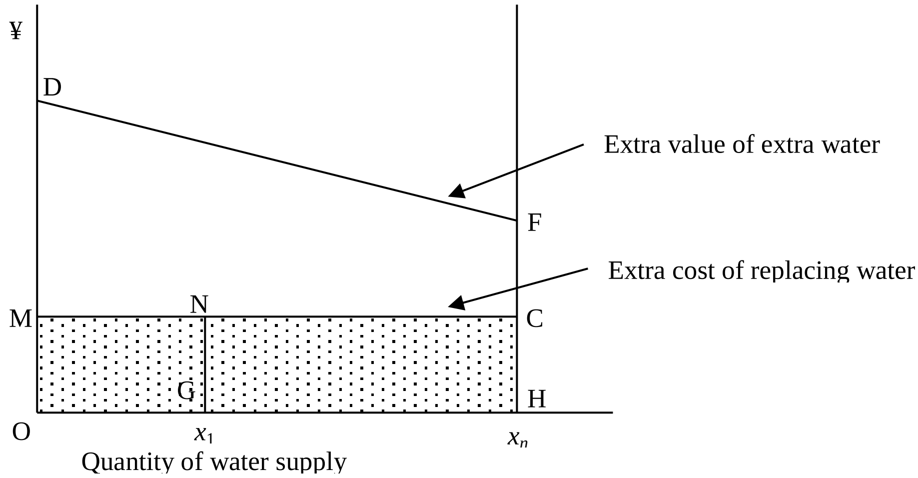

Figure 3 **An illustration that the cost of replacement method can sometimes provide an accurate measure of economic value of an ecosystem. However, whether it does so depends on what services are provided by the changed ecosystem. In the case shown, the cost of replacing lost water is less than its economic value.**

6. Concluding Comments

It is important to complete economic valuations of ecosystems because some ecosystems which appear at first sight to have little economic value in fact have a high economic value when their unpriced and under-priced services are taken into account. These valuations have significant implications for the optimal use of terrestrial and marine areas. However, methods for economic valuation of alternative ecosystems need further development. This was illustrated by showing that the application of the cost of replacement method of valuing ecological services associated with an ecosystem can provide misleading estimates of the economic value of these services.

However, the science of evaluating ecosystems is relatively new and undoubtedly progress will be made in improving methods of economic valuation of ecosystems. The study of ecosystem services is very popular at present. The Millennium Ecosystem Assessment (2005) probably helped to increase interest in this subject and just recently (2012), Elsevier launched a new journal entitled *Ecosystem Services*. There is considerable scope for advancing our knowledge of this subject and for devising practical methods for determining the optimal use of land and marine areas, taking into account the value of ecological services.

References

Costanza, R., d'Arge, R., de Groot, R. and et al. (1997). The value of the world's ecosystem services and natural capital. *Nature*, **387**, 253-260.

Delbridge, A. (1981). *The Macquarie Dictionary*. Macquarie Library, St Leonards, NSW, Australia.

Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Biodiversity Synthesis*. World Resources Institute, Washington, DC.

Ninan, K. (forthcoming). *Valuing Ecosystem Services - Methodological Issues and Case Studies.* Edward Elgar, Cheltenham, UK and Northampton, MA, USA.

Simon, H. (1962). The architecture of complexity. *Proceedings of the American Philosophical Society*, **106**, 467-482.

Xue, D., Cook, A. and Tisdell, C. A. (2000). Biodiversity and the tourism value of Changbai Mountain Biosphere Reserve, China: A travel cost approach. *Tourism Economics*, **6**, 335-357.

Xue, D. and Tisdell, C. (2001). Valuing ecological functions of biodiversity in Changbaishan Mountain Biosphere Reserve in Northeast China. *Biodiversity and Conservation*, **10**, 467-481.

PREVIOUS WORKING PAPERS IN THE SERIES

ECONOMICS, ECOLOGY AND ENVIRONMENT

For a list of working papers 1-100 in this series, visit the following website: http://www.uq.edu.au/economics/PDF/staff/Clem_Tisdell_WorkingPapers.pdf or see lists in papers 101 on.

101. Knowledge and Willingness to Pay for the Conservation of Wildlife Species: Experimental Results Evaluating Australian Tropical Species, by Clem Tisdell and Clevo Wilson, May 2004.
102. Antarctic Tourists, Wildlife and the Environment: Attractions and Reactions to Antarctica, by Clem Tisdell, May 2004.
103. Birds in an Australian Rainforest: Their Attraction for Visitors and Visitors' Ecological Impacts, by Clem Tisdell and Clevo Wilson, May 2004.
104. Nature-Based Tourism and the Valuation of its Environmental Resources: Economic and Other Aspects by Clem Tisdell, May 2004.
105. Glow Worms as a Tourist Attraction in Springbrook National Park: Visitor Attitudes and Economic Issues, by Clem Tisdell, Clevo Wilson and David Merritt, July 2004.
106. Australian Tropical Reptile Species: Ecological Status, Public Valuation and Attitudes to their Conservation and Commercial Use, by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, August 2004.
107. Information and Wildlife Valuation: Experiments and Policy, by Clem Tisdell and Clevo Wilson, August 2004.
108. What are the Economic Prospects of Developing Aquaculture in Queensland to Supply the Low Price White Fillet Market? Lessons from the US Channel Catfish Industry, by Thorbjorn Lyster and Clem Tisdell, October 2004.
109. Comparative Public Support for Conserving Reptile Species is High: Australian Evidence and its Implications, by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, October 2004.
110. Dependence of public support for survival of wildlife species on their likeability by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, October 2004.
111. Dynamic Processes in Contingent Valuation: A Case Study Involving the Mahogany Glider by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, November 2004.
112. Economics, Wildlife Tourism and Conservation: Three Case Studies by Clem Tisdell and Clevo Wilson, November 2004.
113. What Role Does Knowledge of Wildlife Play in Providing Support for Species' Conservation by Clevo Wilson and Clem Tisdell, December 2004.
114. Public Support for Sustainable Commercial Harvesting of Wildlife: An Australian Case Study by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, December 2004.
115. Endangerment and Likeability of Wildlife Species: How Important are they for Proposed Payments for Conservation by Clem Tisdell, Hemanath Swarna Nantha and Clevo Wilson, December 2004.
116. How Knowledge Affects Payment to Conserve and Endangered Bird by Clevo Wilson and Clem Tisdell, February 2005.
117. Public Choice of Species for the Ark: Phylogenetic Similarity and Preferred Wildlife Species for Survival by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, March 2005.
118. Economic Incentives for Global Conservation of Wildlife: New International Policy Directions by Clem Tisdell, March 2005.
119. Resource Entitlements of Indigenous Minorities, Their Poverty and Conservation of Nature: Status of Australian Aborigines, Comparisons with India's Tribals, Theory and Changing Policies Globally by Clem Tisdell, March 2005.
120. Elephants and Polity in Ancient India as Exemplified by Kautilya's *Arthasastra* (Science of Polity) by Clem Tisdell, March 2005.
121. Sustainable Agriculture by Clem Tisdell, April 2005.

122. Dynamic Processes in the Contingent Valuation of an Endangered Mammal Species by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, April 2005.
123. Knowledge about a Species' Conservation Status and Funding for its Preservation: Analysis by Clem Tisdell, June 2005.
124. Public Valuation of and Attitudes towards the Conservation and Use of the Hawksbill Turtle: An Australian Case Study by Clem Tisdell, Hemanath Swarna Nantha and Clevo Wilson, June 2005.
125. Comparison of Funding and Demand for the Conservation of the Charismatic Koala with those for the Critically Endangered Wombat *Lasiorhinus krefftii* by Clem Tisdell and Hemanath Swarna Nantha, June 2005.
126. Management, Conservation and Farming of Saltwater Crocodiles: An Australian Case Study of Sustainable Commercial Use by Clem Tisdell and Hemanath Swarna Nantha, August 2005.
127. Public Attitudes to the Use of Wildlife by Aboriginal Australians: Marketing of Wildlife and its Conservation by Clem Tisdell and Hemanath Swarna Nantha, August 2005.
128. Linking Policies for Biodiversity Conservation with Advances in Behavioral Economics by Clem Tisdell, August 2005.
129. Knowledge about a Species' Conservation Status and Funding for its Preservation: Analysis by Clem Tisdell, August 2005.
130. A Report on the Management of Saltwater Crocodiles (*Crocodylus porosus*) in the Northern Territory: Results of a Survey of Pastoralists by Clem Tisdell, Clevo Wilson and Hemanath Swarna Nantha, September 2005.
131. Crocodile Farms and Management of Saltwater Crocodiles in Northern Territory: Results of a Survey of NT Crocodile Farmers Plus Analysis of Secondary Information by Clem Tisdell, September 2005.
132. The Environment and the Selection of Aquaculture Species and Systems: An Economic Analysis by Clem Tisdell, October 2005.
133. The History and Value of the Elephant in Sri Lankan Society by Ranjith Bandara and Clem Tisdell, November 2005.
134. Economics of Controlling Livestock Diseases: Basic Theory by Clem Tisdell, November 2006.
135. Poverty, Political Failure and the Use of Open Access Resources in Developing Countries by Clem Tisdell, November 2006.
136. Global Property Rights in Genetic Resources: An Economic Assessment by Clem Tisdell, November 2006.
137. Notes on the Economics of Fish Biodiversity: Linkages between Aquaculture and Fisheries by Clem Tisdell, November 2006.
138. Conservation of the Proboscis Monkey and the Orangutan in Borneo: Comparative Issues and Economic Considerations by Clem Tisdell and Hemanath Swarna Nantha, March 2007.
139. Economic Change and Environmental Issues: Policy Reforms and Concerns in Australian Agriculture, by Clem Tisdell, April 2007.
140. Institutional Economics and the Behaviour of Conservation Organizations: Implications for Biodiversity Conservation by Clem Tisdell, March 2007
141. Poverty, Policy Reforms for Resource-use and Economic Efficiency: Neglected Issues by Clem Tisdell, May 2007.
142. The State of the Environment and the Availability of Natural Resources by Clem Tisdell, May 2007.
143. Economics of Pearl Oyster Culture by Clem Tisdell and Bernard Poirine, July 2007.
144. The Economic Importance of Wildlife Conservation on the Otago Peninsula – 20 Years on by Clem Tisdell, November, 2007.
145. Valuing the Otago Peninsula: The Economic Benefits of Conservation by Clem Tisdell, November 2007.
146. Policy Choices about Agricultural Externalities and Sustainability: Diverse Approaches, Options and Issues by Clem Tisdell, November, 2007.
147. Global Warming and the Future of Pacific Island Countries by Clem Tisdell, November 2007.

148. Complex Policy Choices about Agricultural Externalities: Efficiency, Equity and Acceptability by Clem Tisdell, June 2008.
149. Wildlife Conservation and the Value of New Zealand's Otago Peninsula: Economic Impacts and Other Considerations by Clem Tisdell, June 2008.
150. Global Property Rights in Genetic Resources: Do They Involve Sound Economics? Will They Conserve Nature and Biodiversity? By Clem Tisdell, August 2008.
151. Supply-side Policies to Conserve Biodiversity and Save the Orangutan from Oil Palm Expansion: An Economic Assessment. By Clem Tisdell and Hemanath Swarna Nantha, September, 2008.
152. The Orangutan-Oil Palm Conflict: Economic Constraints and Opportunities for Conservation by Hemanath Swarna Nantha and Clem Tisdell, October 2008.
153. Economics, Ecology and the Development and Use of GMOs: General Considerations and Biosafety Issues by Clem Tisdell, October 2008.
154. Agricultural Sustainability and the Introduction of Genetically Modified Organisms (GMOs) by Clem Tisdell, February, 2009.
155. Notes on Biodiversity Conservation, The Rate of Interest and Discounting by Clem Tisdell, April, 2009.
156. Is Posner's Principle of Justice an Adequate Basis for Environmental Law? by Clem Tisdell, June 2009.
157. The Sustainability of Cotton Production in China and Australia: Comparative Economic and Environmental Issues By Xufu Zhao and Clem Tisdell, June 2009.
158. The Precautionary Principle Revisited: Its Interpretations and their Conservation Consequences by Clem Tisdell, September, 2009.
159. The Production of Biofuels: Welfare and Environmental Consequence for Asia by Clem Tisdell, September, 2009.
160. Environmental Governance, Globalisation and Economic Performance by Clem Tisdell, November 2009.
161. Managing Forests for Sustainable Economic Development: Optimal Use and Conservation of Forests by Clem Tisdell, February 2010.
162. Comparative Costs and Conservation Policies for the Survival of the Orangutan and Other Species: Includes an Example by Clem Tisdell and Hemanath Swarna Nantha, May 2010.
163. Notes on the Economics of Control of Wildlife Pests by Clem Tisdell, May 2010
164. Are tourists rational? Destination decisions and other results from a survey of visitors to a North Queensland natural site – Jourama Falls by Clem Tisdell, June 2010.
165. Conservation Value by Clem Tisdell, June 2010.
166. The Influence of Public Attitudes on Policies for Conserving Reptiles by Clem Tisdell, July 2010.
167. Core Issues in the Economics of Biodiversity Conservation by Clem Tisdell, July 2010.
168. The Survival of a Forest-Dependent Species and the Economics of Intensity of Logging: A Note by Clem Tisdell, August 2010.
169. A Case Study of an NGOs Ecotourism Efforts: Findings Based on a Survey of Visitors to its Tropical Nature Reserve by Clem Tisdell, August, 2010.
170. Sharing Nature's Wealth through Wildlife Tourism: Its Economic, Sustainability and Conservation Benefits by Clem Tisdell, August, 2010
171. Economic Growth and Transition in Vietnam and China and its Consequences for their Agricultural Sectors: Policy and Agricultural Adjustment Issues by Clem Tisdell, September, 2010.
172. World Heritage Listing of Australian Natural Sites: Effects on Tourism, Economic Value and Conservation by Clem Tisdell, October, 2010.
173. Antarctic tourism: Environmental concerns and the importance of Antarctica's natural attractions for tourists by Clem Tisdell, October 2010.
174. Sustainable Development and Intergenerational Equity: Issues Relevant to India and Globally by Clem Tisdell, November 2010
175. Selective Logging and the Economics of Conserving Forest Wildlife Species e.g. Orangutans by Clem Tisdell, September 2011.

176. Economics, Ecology and GMOs: Sustainability, Precaution and Related Issues by Clem Tisdell, September 2011.
177. Economics of Controlling Vertebrate Wildlife: The Pest-Asset Dichotomy and Environmental Conflict by Clem Tisdell. September 2011
178. Ecotourism Experiences Promoting Conservation and Changing Economic Values: The Case of Mon Repos Turtles by Clem Tisdell, June 2012.
179. Sustainable Development Planning: Allowing for Future Generations, Time and Uncertainty by Clem Tisdell, June 2012.
180. Biodiversity Change and Sustainable Development: New Perspectives by Clem Tisdell, June 2012.
181. Economic Benefits, Conservation and Wildlife Tourism by Clem Tisdell, June 2012.
182. Conserving Forest Wildlife and other Ecosystem Services: Opportunity Costs and the Valuation of Alternative Logging Regimes by Clem Tisdell, June 2012.
183. Sustainable Agriculture – An Update by Clem Tisdell, December, 2012.