Proceedings 6th National Conference of the Australian Forest History Society Inc, Michael Calver et al. (eds)

The influence of forests on the economic well being of human communities

Sarah Lumley
University of Western Australia, Nedlands, WA

Peer reviewed contribution

Keywords: intangible, well being, value, Australia, indigenous, economic

ABSTRACT: Humans have lived in or near forests since the evolution of our race began. Today, with most of the human population living in an urban environment, we tend to forget the influence of forests, past and present, on the well being of the human race. This paper has a particular focus on how forests have affected the economic well being of communities dependent upon them. The nature of the economic benefits conferred by forests, from a general historical perspective, is briefly assessed by way of introduction. Major topics considered in this paper are the historical value of forests to humans, and the economic relationship between Australian forests and Australian communities. The links between forests and indigenous, colonial and post-colonial communities are assessed, along with a range of economic issues. The interpretation of 'economic' well being, and the different perspectives of what it encompasses are examined as the communities using the forests, and their relationships with them, change over time.

1 INTRODUCTION

The economic relationship between humans and forests is longstanding, complex and poorly understood. Our primate ancestors evolved in forests, where our closest primate relatives remain. When our ancestors began to leave closed forest canopies to walk upright in a more open vegetated landscape, most did not discard their atavistic relationship with forests. Many *homo sapiens* returned to the forests, where they were completely dependent on the ecosystem for their non-monetary economies. All over the world where forests remain, there are people who are wholly or partly dependent upon them for their economic well being. In many cases the relationship relies upon farming small plots of land within a forest ecosystem. These plots are referred to as forest gardens.

McConnell (1992) states: 'Forest garden farms may be as old as the human race itself. They originated in prehistoric times along jungle-clad river banks and in the wet foothills of monsoon lands' (p.1). While being adapted to different ecosystems, forest garden farms continue to exist in environments that remain sufficiently forested to support human populations. The economies of such populations often have no cash component unless there is external trade with other, cash oriented, communities. Cashless systems are economies nonetheless, for economics is not about money but, in neo-classical terms at least, about the allocation of scarce resources between competing ends. Money is merely the common yardstick for measuring value. However, as we shall see, this can work against genuine valuation of the environment in general, and of forests in particular, when money, price and value become confused (Lumley 1999).

In Asia and the Pacific forest garden economies persist in India, Malaysia, New Guinea, the Philippines, Indonesia and Sri Lanka. Even in natural-resource poor nations like Nepal, there is a strong economic relationship between remaining forests and human communities (Adhikari et al 2004). In Uttar Pradesh in Northern India, it has been recognized that forest ecosystems have a wide range of benefits for local communities. This is especially true for those benefits based on biodiversity where: ' … this diversity is of different kinds and has the potential to cater to human well-being in multifarious ways' (Chopra and Kumar 2004, p.135).

There is concern at the global level about continuing deforestation around the world, and its potential for serious impacts on human and non-human well being in the long-term. Deforestation is often viewed as being an incidental post-colonial legacy in developed countries like Australia and in less-developed nations, where land was initially alienated for commercially oriented agricultural export production. In the Philippines, for example, deforestation began as a result of hacienda establishment for the sugar cane export industry. Currently a major cause of ongoing deforestation in the Philippines is the legal and illegal logging of upland forests for timber exports (Lumley 2002). In 1991 eight thousand people died on the Philippines island of Leyte following a cyclone that triggered massive landslides on denuded slopes. Local contemporary sources attributed the death and damage to 'the logging of the dipterocarp forests' (CDRC 1991). Areas of forested land are also sometimes cleared by landless farmers striving for subsistence. In addition to concerns about logging practices in Asia, there is also concern about forest clearing in the Amazon nations, for alienation of the vast Amazon forests has the potential to negatively affect communities globally as well as locally (Wood and Porro 2002). Developed Western nations are also still clearing their forests, and Australia is significant among such nations, having one of the highest forest clearing rates in the world (CSIRO 2001).

The sustainability of current forest use and the non-financial impacts of forest loss on the well-being of human communities is becoming increasingly politicised. As well as the growing recognition of non-commercial environmental values to human communities, the complex and increasingly controversial sustainability debate has brought attention to the multitude of interconnected issue that influence the relationship between forests and human well-being (Lumley and Hercock 2000). Financial and non-financial economic values and their importance to past, present and future communities are discussed in more detail below. The main discourse of this paper concerns historical and current aspects of forest values in Australia, set in a global context.

2 FOREST VALUES

As mentioned above, the economic contribution of forests to human well being can be financial or non-financial. Financial contributions are measurable and quantifiable because they have a market price. In economic terms such contributions are tangible. However, the natural environment makes a significant, immeasurable, non-financial economic contribution to human welfare. This contribution is part of the intangible economy. In a comprehensive essay on global environmental value Pearce (1998) discussed a range of forestry issues, including deforestation rates, from an economist's perspective. In this essay, Pearce identified a number of economic intangibles, including non-use values and the value of forests as carbon sinks to mitigate human induced climate change. Greenhouse gas absorption by forests is one classic, global economic contribution that forests can make to human well being. Others are more location specific.

Forests provide a range of 'ecosystem services' to populations around the world. In less developed countries the main understanding of forest values is drawn from the role of forests in livelihood systems. In developed nations like Australia, timber production, and recreational activities are generally viewed as the main contribution of forests to human welfare. At the eleventh World Forestry Congress held by the United Nations Food and Agriculture Organization (UNFAO) in Turkey in 1997, Arnold (1997, p.1) identified the following general categories as forest contributions to human welfare: Food, food security and health; Cultural and social values; and, Income and savings. Clearly, as a source of income and savings, forests provide employment and marketable forest

products of which, in Australia, the most financially rewarding has been timber for pulp, construction and furniture making. Other saleable forest products include pharmaceuticals, forest plants and minerals. Tourism and recreation services directly associated with forest use are also marketable products. On balance however, the contribution of forests to human welfare is largely intangible. There are numerous immeasurable economic values associated with soil and landscape protection; water quality and water supply; conservation and biodiversity protection; aesthetics; bequests for future generations and, perhaps, most importantly for indigenous people, culture and spirituality. All of these values contribute to the economic well being of human communities in Australia.

The problem of intangibles being unaccounted for in 'economic' assessments such as those using cost-benefit analysis has been well known but inadequately addressed for some time. Barbier *et al* (1994 p. 99) comment:

> If current rates of biodiversity loss through forest degradation and conversion are 'excessive', it is because important economic values are disappearing as a consequence of this loss in biodiversity. This may be occurring because current policy and management decisions affecting forest resource use are not taking these values into account.

In the Commonwealth Government's *Handbook of Cost-Benefit Analysis* it is specifically stated that: '… **not all costs and benefits are amenable to dollar quantification** and those that are not (the intangibles) are easily, but **wrongly**, overlooked' (Department of Finance, 1994, p. xi, my emphasis). This handbook has special sections on 'Valuing non-marketed outputs' (p. 22), and 'Valuing intangibles' (p.24). In the preface it is stated that: 'The Handbook is intended for use by all of those involved in appraising and evaluating projects and programs which carry **major resource implications**' (p.iii, my emphasis again). Such appraisals and evaluations facilitate choice between options, projects and policies, with those of perceived, but not necessarily quantified, greatest value being preferred.

The intangible values associated with the standing forest, and the negative externalities resulting from logging it, such as degraded water quality and supply, land degradation, and biodiversity loss, are unlikely to be accounted for at all, much less quantifiably valued, despite this being a mandatory requirement of CBA both in economic theory and in the Government's CBA Handbook. Forest values are thus extremely vulnerable to the misuse of economic decision making tools (for more comment on CBA and forest values please refer to the Appendix).

As Grove-White (1997) recognises, the issue of valuing intangibles is both controversial and unsatisfying. There has long been a push to use surrogate pricing techniques to try and quantify such intangibles. While the most important step is clearly in **recognising** the plethora of intangibles associated with forests and the way they enhance human-well being, there is not a rule, even in neo-classical economics, that requires their quantification. Grove- White (1997 p. 30) states:

> …where **controversial** issues are concerned, appropriate fresh approaches seem more likely to lie in the direction of institutional reform aimed at enriching and refining open political debates about public values, than in the worthy but increasingly unrewarding search for 'objective' methodologies of the kind hitherto urged, with the most constructive of intentions, by economists of the neo-classical school.

Another issue that has been the subject of rich debate and controversy in the public arena has been the issue of logging old growth forests. The conflicts arising from this debate are strongly associated with different perceptions of forest values. The public generally perceives 'old growth' forests to be imbued with even greater intangible values than other forests. This is, in part, because 'old growth' forests are deemed to be richer in biodiversity, more steeped in culture and spirituality, more a part of a primordial landscape, and venerable in their size and antiquity. This notwithstanding, the term 'old growth' is not subject to rigorous definition. For example, the 'tall tuart forest' currently being mined in south west Western Australia, and discussed in more detail below, is generally perceived by the public to be old. However, in terms of the old Australian forests generally, it

is young and it is mainly regrowth forest. The tuart trees are representative of a species that was once spread across the entire region but now survives only in fragmented pockets in the more southern reaches of its original range. Clearly the trees are highly valued being, among other things, tall and symbolic of what many may see as a lost past.

Controversy about logging old growth forests, and defining what is meant by 'old growth', has flared both in Australia and in the USA (Australian Heritage Commission 1997; Booth 1994). Such is the importance of this debate, particularly in evoking an emotional response and hence an expression of perceived value, that in 2004 it led both the Commonwealth Government of Australia and the Labor opposition to focus last minute election policy on the bilateral Regional Forests Agreement (RFA) for timber harvesting in Tasmania. This move was due to an increasingly hostile conflict between forestry workers, who feared they would lose their jobs, and conservationists and the public, who feared that Tasmania's remaining 'old growth' forests would be felled. The Government won the day by making a commitment both to the preservation of timber workers' jobs and to the remnant forests, securing the support of the powerful timber workers' union in an unprecedented victory for a conservative federal government.

While the Commonwealth Government's powerful Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2000) does not list 'old growth forests' among its definitions, the State Government of Western Australia defines them thus: ‘forests dominated by mature trees and with little or no evidence of any disturbance such as logging, road building or clearing’. (Government of WA 1998). The variability in definitions for old growth forests was recognised by Apiolaza (2004) in a brief paper attempting to clarify the issue in the context of Tasmania's RFA debate. According to Apiolaza the Commonwealth definition, coined by the Joint ANZECC/MCFFA National Forest Policy Implementation Sub-Committee is as follows:

> Forest that is ecologically mature and has been subjected to negligible unnatural disturbance such as logging, roading and clearing. The definition focuses on forest in which the upper stratum or overstorey is in the late mature or overmature growth phases’ (p. 1).

A less wordy form of this definition is used in Tasmania, as follows: ‘old growth forest is ecologically mature forest where the effects of disturbances are now negligible (*ibid*). Clarification of what consitutes 'old growth' forest does not completely diffuse the debate about which forests should be preserved because of their innate intangible values. Clearly the Ludlow tuart forest in Western Australia is not an old growth forest, but it is tall and highly valued by the wider community. So if 'tall' trees are valuable, how is 'tall' defined? According to Apiolaza ‘Tall trees are, well, tall. Giant trees may not be so tall but they are quite fat. How big do they need to be so they are considered giant? The policy of *Forestry Tasmania* is to consider any tree taller than 85 metres or larger than 280m^3 as a giant/tall tree’ (Apiolaza 2004, p.2).

3 FORESTS IN AUSTRALIA

In Australia’s more recent history forests have never been plentiful, although in prehistoric times its arid interior was covered in rich rainforests. In the 1780s, when Australia was colonized by Europeans, only ten percent of the continent was forested, while a further 23 percent was covered with woodland. By the 1980s, however, about fifty percent of the forests and woodlands had been cleared (Smith 1994). At the time of European settlement indigenous people, who had inhabited the continent for more than 50,000 years, lived in every type of ecosystem represented in Australia including forest, woodland, grassland, desert, riverine and coastal environments. Some indigenous people used fire-stick farming to establish park-like landscapes attractive to animals such as kangaroos, which were a major protein source in their diet. Other indigenous people adapted, and adapted to, their environment in different ways. However, their impact on the landscape and on the flora and fauna within it was relatively minor compared with the impact of European settlement in the last 200 years. Because of Australia’s isolation from other landmasses a distinct flora and fauna

developed, among which there is a high degree of endemism that can be region or location specific. This is, in part, due to local adaptations that result from landscape and climate variability across the country (Commonwealth of Australia 1994).

Australia's indigenous people based their entire economy on their environment. While there is believed to have been trade between communities, there was no cash economy. In modern terms, pre-colonial indigenous economic well-being depended entirely upon economic intangibles. People who lived in or near forests had a detailed appreciation of their locale and they used their specialist knowledge of the forests, for example, to harvest plants for fibre, medicine and food, and bark for shelter, clothing and canoes. The forests also provided spiritual and cultural values. Indigenous knowledge of the forests was, and still is, a precious economic resource. As Raven (2004) states:

> Indigenous peoples sit in a precarious position – the need to protect and conserve our knowledge as a cultural expression – and for some the desire to share knowledge of ecological and medical importance (p.1).

After European settlement, forests were generally viewed in a different context. The economic system in Australia underwent a radical metamorphosis, changing rapidly from an intangible economy to a market economy, with commodities that were largely valued by price. Forests were again used for many different purposes, but they were not valued highly as living ecosystems. Some forests were cleared for pastoral and crop land, some were felled to feed smelting furnaces in the goldfields, and some were logged for timber. Forests continued to make a significant contribution to economic well being. They provided employment, fuel and building materials, and the cleared forest landscape made way for agricultural production. The predominantly financial use of forests came to be seen as their mainstream value, and this view of forests is only now slowly changing, as the intangible values of 'ecosystem services' and their other unpriced contributions to human welfare are recognised.

While both the pre-colonial and colonial uses of forests contributed to the economic well being of human communities, in a post-colonial era the way Australian forests were used for over 200 years came to be viewed as unsustainable. The public controversy over the signing of Regional Forests Agreements (RFAs) in a number of states, including Western Australia and, more recently, Tasmania, has revealed that many people now recognise numerous intangible values of forests, particularly old growth forests, and wish to retain what is left. Lumley and Hercock (2000) state of Western Australia:

> In 1999, as a result of public feeling about the signing of the RFA, and of disagreements within the Liberal party, dissenting members formed an independent splinter group – the Liberals for Forests (p. 243).

As the relationship between forest loss, soil erosion, deteriorating water supply and quality, dryland salinity, exotic and emergent diseases, and biodiversity loss become more widely understood, the intangible values of forests in the context of economic well being are more frequently recognized. As early as 1919, some intangible forest values were acknowledged by law and policy makers. In a recent article focusing on 14 forest values, Lee and Abbott (2004) documented the increasing frequency of references to each value in Western Australian government forest management policy documents from 1919 to 1999.

4 FORESTS IN SOUTH WESTERN AUSTRALIA

Forests in the south west of Western Australia are of particular interest to human well being from both historical and current perspectives. According to the Biodiversity Unit (Commonwealth of Australia 1994): 'Australia's plants and animals are among the most diverse in the world and some areas have globally outstanding species richness, such as … the South West Botanical Province of

Western Australia' (p.15). Australians should be somewhat dismayed then, to learn that at a global level, south Western Australia is considered to be a 'biodiversity hotspot' in terms of endangerment of endemic flora and fauna. Of the plant species found here, 72.9 percent are endemic to the region (Conservation International 2004). These include the trees jarrah (*Eucalyptus marginata*), marri (*Corymbia calophylla*), wandoo (*E. wandoo*), karri (E. *diversicolor*), yellow tingle (*E. guilfoylei*) and red tingle (*E. jacksonii*), all of which may be found in a jarrah forest ecosystem (WAFA, 2003). Of the various forest systems in the south-west, the jarrah forests, with their massive jarrah trees, and their species diversity, would probably be considered to have made the greatest contribution to the economic well being of human communities in pre-colonial, colonial and post-colonial times. Before European settlement, the Jarrah forests were intrinsic to the welfare of the Nyoongar people who were simultaneously dependants and custodians of the forests. Many Nyoongar people remain in the south-west today, but their cultural and economic relationship with the Jarrah forests has been disrupted and fragmented by subsequent economic uses of the forests.

While estimates of the original area of Jarrah forests varies from 2.8 million hectares (Government of Western Australia 1998) to 3.9 million hectares (WAFA 2003), it is generally agreed that in the 175 years since European colonization of the region, about 50 percent of the Jarrah forests have been removed. This clearing was initially, and predominantly, to make way for agriculture, but was also, and more recently, to supply the timber industry. This industry, feeding mainly sawlogs to local timber mills, made tangible economic contributions to neighbouring communities through employment and sales. However, as is often the case with environmental resources, the removal of these forests has reduced the economic well being of many people in the wider Western Australian community, including indigenous people. This is because deforestation has adversely affected landscape values, agricultural productivity, soil quality, water quality and supply, biodiversity, and other intangible values now and in the long term. In addition, mining extractions from forests, particularly of mineral sands, while earning financial and employment benefits for some local people and the mining sector, also have the potential to reduce forest values.

One example of forest mining that has caused considerable controversy and debate is the extraction of heavy mineral sands from a unique endemic tuart forest in Ludlow, just inland from the coast between the popular south west tourism towns of Bunbury and Busselton. It has been claimed by a number of conservation and community groups, including the Wilderness Society, the Busselton-Dunsborough Environment Centre, the South West Environment Centre, and the Margaret River Environment Centre, that mining there for heavy mineral sands will destroy the tuart trees (*Eucalyptus gomphocephala*) which can grow to 40 metres tall. In addition, it is argued that mining will also damage the biodiverse ecosystem supported by the forest, which includes vulnerable, rare and endangered species such as Carnaby's black cockatoo, the brush-tailed phascogale and the bush wallaby (Friends of the Tuart Forest 2004a). The Ludlow-Wonnerup Tuart Forest was identified in the National Trust of Australia's Rare and Endangered List in August 2002 (National Trust of Australia 2002). The local press reported in August 2004 that the state government had agreed to the Ludlow forest mine before it had received official approval from the Environment Minister. It was also claimed that there had been a lack of consultation about community concerns for the tuart forest (Macrae 2004).

The Ludlow tuart forest case illustrates well the problems associated with the valuation of forests and the misuse, misunderstanding or failure of standard evaluation tools to accommodate the full range of economic values and their influence on human well being. Apart from ecosystem service and biodiversity values, the Ludlow tuart forest is known to have significant social, culture and aesthetic value to indigenous people and the wider community. According to Friends of the Tuart Forest (2004b, p. 1):

> 'The Tall Tuart Forest of Ludlow is part of the tribal lands of the Wardani people, and is an area of special significance to their culture.' And '… was used … as a gathering point for tribal meetings with other people from the Bibilmum Nation such as the Koreng, Wilmen, Minang, Balla Ding and Piblemen. When such meetings took place the different tribes camped around a common elders' circle with each tribe … pointing towards the direction of their tribal lands.'

The Ludlow area came under European influence in the 1820s which initiated conflict between indigenous and Western perceptions of the values from the tuart forest. The new arrivals perceived such values to be embodied in the use and sale of the wood, and in the cleared forest land for agriculture. For the indigenous people the value of the forest was in its continued existence. Violence simmered for a while and then erupted into the massacre of 250 indigenous people on their tribal lands in 1841 (Friends of the Tuart Forest 2004c). The colonial era, established by Frederick Ludlow's residence in the area from the 1830s, had begun in earnest, and the dominant perception of forest values to human well being changed from being spiritual, cultural and nourishing, to being focused on the commercial price of wood. In the post-colonial era this began to change slowly. However, the perceived commercial value of mineral extraction appeared, in 2004, to be the main decision making criterion for use of the forest, despite public opposition.

5 TOURISM IN SOUTH WESTERN AUSTRALIA

Tourism makes a significant contribution to the Western Australian economy, and tourism is experiencing particularly strong growth in the state's south west, especially when compared with forestry. In 2002/2003 the South West Region of Western Australia contributed six and a half per cent of the Gross State Product (GSP). In 2001/2002, 79 percent of the GSP from timber was sourced from that region, comprising 79 per cent of hardwood production value, drawn from extant forests and plantations, and 78 per cent of softwood production value, from plantations. The total financial value of forestry operations in the region was $69.7 million, compared with a Gross Regional Product (GRP) in 2002/2003 of $5,350 million. In contrast, *domestic* tourism in the region contributed $398 million to the GSP in 2001, comprising 15.5 per cent of GSP in domestic tourism (RDC, 2003). In 2001/2002, seven percent of the GSP for mining, with a value of $1,855 million, was attributable to the minerals sector in the South West Region. However, most existing mining in the region takes place on pastoral land and not in forest ecosystems. Mining income represents a more significant dollar value than both extractive forestry and domestic tourism. However, *international* tourism is not included in the tourism figures above, and both the domestic and international markets for environmental and forest based tourism are expected to grow significantly. Available comparative figures for total domestic and international tourism expenditure in the region demonstrate a steady growth from $500 million in 1999/2000 to $531 million in 2002/2003 (South West Development Commission 2004). A large proportion of all tourism expenditure remains within the region, shared among numerous service providers. However, one concern about income from the extractive industries is that much of it leaves the region, particularly if that income accrues to a small number of companies, and especially if those companies are owned outside the state or outside the country.

While south west tourists tend to take in the coasts, wineries and local towns in their travels, forest related tourism is almost imperative for the visitor. In terms of its purely financial contribution to economic well being, forest tourism has become more important than extractive forestry, and has the potential to overtake extractive minerals, while being completely sustainable if properly planned, unlike the extractive industries. If all the intangible values associated with the forests of the south west were taken into consideration, their total economic value would be found to have a very significant impact on economic well being in the region. Such intangible economic value would almost certainly outweigh the extractive commercial value of forests from both minerals and timber.

Nature based tourism in the south west forests is likely to increase in importance as the timber industry in the region is wound down. In November 2003 the 'Tree Top Walk' in the Valley of the Giants, located in the Walpole-Nornalup National Park, and run by the Department of Conservation and Land Management (CALM), won the international British Airways Environmental Experience Tourism Award. This is likely to increase the exposure of the forests to both international and domestic tourism (CALM 2003).

While techniques in economics, known as shadow pricing, have been developed in an attempt to place a monetary value on intangibles, especially environmental intangibles, no comprehensive study has been conducted on the south west forests. Many would view such an attempt as being unviable, especially since the intangible contributions of old growth forests to the economic well being of people are so complex and extensive. Pearce (1981) when discussing different approaches to the valuation of intangibles states: 'A third approach abandons the attempt to put money values on intangibles' (p.56). Many people would view this as a sensible approach, believing that it is not necessary to use a monetary yardstick to appreciate the value of intangibles.

The south west forests are not the only forests in south Western Australia to have a significant value to human communities. There are some areas of urban forest and bushland that enhance economic well being. Such areas include Bold Park near suburban Floreat, and Kings Park, on the fringe of the city of Perth. In the case of Kings Park, an attempt was made to use shadow pricing to assess the value of its urban forest. Clinkaberry (1998), who used a technique known as contingent valuation, estimated the value of the Kings Park bush land to be worth $266,268,500 annually. While contingent valuation, like any willingness to pay survey technique, is subject to controversy, this result is indicative of the magnitude of the value that people place on the Kings Park forest. As Clinkaberry (*ibid*) stated: 'it was obvious that contingent valuation is an economic tool that has the potential to facilitate policy making, but probably not as a strict measure of economic value' (p.70).

Ironically, some of the plant species that are so highly valued by visitors to Kings Park are the same species that have become scarce in other areas as a result of commercial activities in their range. The jarrah, tuart and marri trees that have been the subject of controversy about mining and forestry activities in the south west are all features of Kings Park. The Western Australian Tourism Commission (WATC 2004) makes a point of promoting the presence of such trees in its publicity material. It states in a brief bicycle day trip guide to Perth:

> Take the Kings Park (Perth's Botanic Gardens) route to experience the natural beauty of the bush settings right on the edge of the city. … You'll discover several wildflower gardens and a tuart lawn before crossing the striking Water Garden Valley and entering the captivating cathedral of the Marri Woodland.

6 CONCLUSION

Forests have had a strong influence on the economic well being of human communities throughout history. In the days when there was no financial economy, the relationship between forests and people was clear and direct. Today forests continue to influence the well being of humans, especially in countries like Australia. However, with the advent of economies that used money as the yardstick for value, the overall benefits of forests became less easy to identify, and society became increasingly focused on monetary ways of valuing forests. While economic theory and government processes recognise the need to account for intangible values when forest policy is developed, this has rarely been translated into a full economic evaluation of the environment, and the costs associated with damage to forest ecosystems. In addition, as people moved into large urban communities, at one remove from their natural environment, the wider value of forests became obscured to ordinary members of society.

In Australia, as environmental problems and their connection to disappearing forests become better understood, and as concepts of sustainability become embedded in government discourse and policy, the benefits of forests to human communities are more specifically acknowledged. Land degradation, fresh water scarcity, biodiversity loss, emergent diseases and climate change are recognized as some of the impacts of forest loss and fragmentation. In some areas, such as in the south west of Western Australia, forest tourism is slowly replacing timber-based forestry as a source of employment and income for local communities. The spiritual, cultural and aesthetic values of forests to indigenous and non-indigenous people are gradually being understood. However, there is the need for a new paradigm that acknowledges humanity's historical relationship with forests, and

their past and future influence on the well being of the human race. This paradigm must not confuse money with value, and must explicitly include intangible values without the need for their quantification. Without such a paradigm, recognition of the significant influence of forests on the economic well being of human communities will remain marginalised and poorly appreciated.

APPENDIX: NOTES ON FORESTS, CBA AND DISCOUNTING

While the problem of valuing intangibles and externalities pervades all decision making about natural resource management (and health and social welfare), it poses extra difficulties for forest management policies. Simply put, this is because one of the commonly used techniques in cost-benefit analysis (CBA) is the practice of discounting. It is beyond the scope of this paper to discuss the complex economic theory underlying discounting, however its effects are briefly outlined as follows: In CBA all possible flows of costs and benefits from a particular option are summed on an annual basis for the life of that option (or project), and then (usually) subjected to discounting to produce its net present value (NPV). The NPV is the basis for decision-making. The higher the NPV, the more 'valuable' the project.

The choice of what discount rate to apply is the subject of complex theory in its own right. While that theory will not be explored here, it must be noted that the discount rate is expressed in **real** not **nominal** terms. In other words, the discount rate is quite separate from the issue of inflation, and relates to time preference not to inflationary prices changes. Thus the rate of inflation must not be included in discounting and does not influence it. This is often misunderstood in the application of discounting to NPV derivation, which compounds the problems associated with discounting and CBA.

The outcome of discounting is to weight future costs and benefits at a lower value than present costs and benefits, to reflect present time-frame returns. For this reason, cost-benefit analysis is often viewed as being biased against forest conservation. Simply put, the present is assumed to be more valuable than the future. By way of illustration, the following scenario can be used: A government has the option of logging an old growth forest for timber, or preserving the forest, and establishing a timber plantation. If we were to conduct a CBA on the two choices, using discounting to estimate the Net Present Value of each option, the plantation is likely to have a negative (highly undesirable) NPV. This is because trees must be planted now, incurring up front costs, and harvested in the future, with the estimated harvest value discounted from the time of harvest to the present. Conversely, logging the old growth forest realises immediate financial returns, with tree planting or other significant costs occurring in the future (and thus being discounted). This will yield a highly positive (very desirable) NPV.

Unfortunately, using one of the other commonly accepted measures of value in project assessment does not get around the problems associated with discounting. The IRR (internal rate of return), which is sometimes used instead of NPV, also employs a discount rate, with IRR being equivalent to the discount rate at which the NPV is zero (Pearce, 1981; Bannock et al, 1992). Thus problems inherent in discounting are embedded in both NPV and IRR. At first glance, using the project's average weighted cost of capital (WACC) might seem to resolve the problem. However, this does not offer escape from discounting either, since WACC also uses an interest (discount) rate, where the 'marginal cost of capital on a discounted cash flow basis may be used as the minimum level of return in assessing investment projects' (Bannock et al, 1992, p. 56). Cost-benefit analysis is based on the tenets of welfare economics. While CBA is sometimes used to assess the benefits of social projects involving issues such as transport infrastructure, health and education, decisions to proceed are made because the social benefits of such projects are recognised. In such cases, the least expensive option is preferred to not proceeding when the financial returns of all options are negative. However, in the case of forestry and other projects involving environmental resource use, a profitable option is often compared with an unprofitable option, and the social and intangible costs and benefits of both options are not accommodated. As Pearce and Turner (1990) state … 'discounting affects the rate at which we use up natural resources. The higher the discount

rate -- the rate at which the future is discounted -- the faster the resources are likely to be depleted' (p. 211). Barbier et al (1994) comment: 'Market failures are considered endemic to forestry because of the long gestation of tree species (which are therefore subject to greater uncertainties and higher discount rates) … (p. 104).

REFERENCES

Adhikari, Bhim; Di Falco, Salvatore and Lovett, Jon. C. 2004. Household characteristics and forest dependency: Evidence from common property forest management in Nepal. *Ecological Economics* 48: 245-257.

Apiolaza, Luis 2004. 'Forestry in Tasmania - Definitions'. http://forestry.uncronopio.org/definitions.html

Arnold, J.E. Michael 1998. Social dimensions of forestry's contribution to sustainable development. XI World Forestry Congress, Vol. 5, Forestry Department, United Nations Food and Agriculture Organisation. http://www.fao.org/montes/foda/wforcong/publi/v5/

Bannock, Graham; Baxter, R.E. and Davis, Evan. 1992. *The Penguin Dictionary Of Economics*. Harmondsworth: Penguin Books

Barbier, Edward B., Burgess, Joanne C., and Folke, Carl. 1994. *Paradise Lost? The Ecological Economics Of Biodiversity*. London: Earthscan.

Booth, Douglas 1994. *Valuing Nature: The Decline and Preservation of Old-growth Forests*, Maryland: Rowman and Littlefield.

CALM 2003. Nature Base. Tree Top Walk wins British Airways tourism award. Media statement. Perth: Government of Western Australia.

CDRC. 1991. Uring disaster blamed on denuded forest. *CDRC Bulletin Update* No.3, November. Quezon City: Citizens Disaster Rehabilitation Center.

Chopra, Kancham and Kumar, Pushpam 2004. Forest biodiversity and timber extraction: An analysis of the interaction of market and non-market mechanisms. *Ecological Economics* 49: 135-148.

Clinkaberry, Leslie 1998. Contingent valuation: Is it a valid tool for environmental assessment? Unpublished Honours thesis. Crawley: The University of Western Australia.

Commonwealth of Australia 1994. *Australia's Biodiversity. An Overview Of Selected Significant Components.* Canberra: Biodiversity Unit, Department of the Environment, Sport and Territories.

Commonwealth of Australia 2000. *The Environment Protection and Biodiversity Conservation Act 1999*, Canberra: Australian Government Publishing Office.

Conservation International 2004. Biodiversity Hotspots in South West Australia. Washington DC: Center for Applied Biodiversity Science. http://www.biodiversityhotspots.org

CSIRO 2001. *Australia. State Of The Environment*. Canberra: CSIRO, Commonwealth of Australia.

Department of Finance 1994. *Handbook Of Cost-Benefit Analysis*, Canberra: Australian Government Publishing Service.

Friends of the Tuart Forest 2004a. Stop Cable Sands. The Ludlow tuart forest ecosystem. Busselton: Friends of the Tuart Forest. http://cablesands.com/ecosystem.html

Friends of the Tuart Forest 2004b. Stop Cable Sands. Indigenous history. Busselton: Friends of the Tuart Forest. http://cablesands.com/indighist.html

Friends of the Tuart Forest 2004c. Stop Cable Sands. European history. Busselton: Friends of the Tuart Forest. http://cablesands.com/europhist.html

Government of WA 1998. *State of the Environment Report 1998*, Perth: Government of Western Australia.

Grove-White, Robin 1997. The environmental 'valuation' controversy: Observations on its recent history and significance. In Foster, John (Ed) *Valuing Nature? Economics, Ethics and Environment*, London: Routledge.

Lee, K.M. and Abbott, I. 2004. Precautionary forest management: A case study from Western Australian legislation, policies, management plans, codes of practice and manuals from the period 1919-1999. *Australian Forestry*, 67 (2): 114-121.

Lumley, Sarah 1999. Interpreting economics, rhetoric and sustainable development: Some implications for policy development. *Australian Geographer* 30 (1): 35-49.

Lumley, Sarah 2002. *Sustainability And Degradation In Less Developed Countries: Immolating The Future?* Aldershot and Burlington: Ashgate.

Lumley, Sarah and Hercock, Marion 2000. Locational and socio-economic variation in public perceptions of economics and the environment. *GeoJournal* 51: 235-244.

Macrae, Travis 2004. 'Call to arms among tuarts'. Busselton: Busselton-Dunsborough Mail, 4 August 2004.

McConnell, D.J. 1992. *The Forest-Garden Farms Of Kandy, Sri Lanka*. Rome: Food and Agriculture Organisation of the United Nations.
National Trust of Australia 2002. 'Heritage alert. Ludlow-Wonnerup tuart forest. National Trust reminds Western Australian government regulators to focus on the objectives of their legislation', Media release. Perth: National Trust of Australia (WA).
Pearce, D.W. 1981. *Cost-Benefit Analysis*. London and Basingstoke: Macmillan.
Pearce, David 1998. *Economics And Environment. Essays On Ecological Economics And Sustainable Development*. Cheltenham and Northampton: Edward Elgar.
Pearce, D.W. and Turner, R.K. 1990. *Economics Of Natural Resources And The Environment*. London: Harvester Wheatsheaf.
Raven, Margaret 2004. Application of the 'public domain' to indigenous knowledge and western scientific knowledge. Paper presented to the Conference on Bridging Scales and Epistemologies: Linking Local Knowledge and Global Science in Multi-Scale Assessments. Alexandria, Egypt. 17 –20 March.
RDC 2003. Statistical snapshot of Western Australia. Perth: Regional Development Council of Western Australia. http://www.regional.wa.gov.au
South West Development Commission 2004. Tourism - South West Region, Perth: Government of Western Australia. http://www.swdc.wa.gov.au
Smith, David 1994. *Saving A Continent. Towards A Sustainable Future*. Sydney: University of New South Wales Press.
WAFA 2003. *The World's Only Jarrah Forest. Reversing The Decline*. West Perth: The Western Australian Forest Alliance. http://wafa.org.au/aboutjarrah.htm
WATC 2004. 'Active outdoors'. Perth: Western Australian Tourism Commission. http://www.westernaustralia.com/en/Destinations/Itineraries/Active+Outdoors.htm
Wood, Charles H. and Porro, Roberto (eds) 2002. *Deforestation And Land Use In The Amazon*. Gainesville: University Press of Florida.