
Discussion paper

Time and temperance

How perceptions about time shape forest ethics and practice



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Abstract

We each have perceptions of how much time we have left and what we should do with it. These perceptions have implications for our treatment of forests. We can no longer take the longevity of trees and forest ecosystems for granted. Our power to change our environment is irresistible. The prevailing ethic of maximising material wealth is sweeping aside natural forests. They simply cannot compete in terms of generating revenue per unit area with land use alternatives such as intensive agriculture or forest plantations. Treating our life and living ecosystems as if they were infinite does not make them so. We need to reformulate an ethic that has a better understanding of time. We need that ethic embedded in policies and institutions that are temporally aware and serve future generations. The latter have no advocate to plead their case. This paper takes a preliminary look at some questions that deserve our attention: What is time? How much time is left? Should we adopt a precautionary approach as a result? What is it worthwhile for us to do with time – what constitutes value within it? Does value change over time? Can we share values without sharing time? It concludes with some suggestions for changing our forest ethic (the rights and values that we ascribe within forestry) and for practical forest decision-making. It is also a call to personal and collective temperance.

*Like as the waves make towards the pebbled shore,
So do our minutes hasten to their end,
Each changing place with that which goes before;
In sequent toil all forwards do contend.
Nativity, once in the main of light,
Crawls to maturity, wherewith being crowned
Crooked eclipses 'gainst his glory fight
And time that gave doth now his gift confound.
Time doth transfix the flourish set on youth,
And delves the parallels in beauty's brow;
Feeds on the rarities of nature's truth,
And nothing stands but for his scythe to mow.
And yet to times in hope my verse shall stand,
Praising thy worth despite his cruel hand.*

(William Shakespeare)

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*As for mortals, their days are like grass,
they flourish like a flower of the field;
the wind blows over it and it is gone,
and its place remembers it no more.*

(Psalm 103.15-16 – The Bible)

1. Introduction

Our time is running out. Our perception of what time is, what lies beyond it, and how it relates to value have a profound impact on how we act. The time of natural forests is also running out in many places around the world. This paper explores how our perceptions of time affect what we do to forests. It suggests that it is time for a change in forest ethics.

Perceptions of time can shape what we value, and vice versa. Yet, the interactions are less predictable than we might imagine. There are at least six important considerations:

- What is time?
- How much time is left?
- If time left is uncertain, should we adopt a precautionary principle?
- What is it worthwhile to do with time – what constitutes value within it?
- Does value change over time?
- Can we share value without sharing time?
- Do we need to revise our forest ethic in the light of the above?

This paper explores each of these questions. Linking time with action is fraught with problems. It requires first that we link reality (e.g. what time is and how much is left) with our perception of that reality (e.g. how much we think we have left). It requires second that we link our perception of reality with our motivation for action (e.g. what we think it appropriate to do in that time). We often do not make these logical links. For example, we might or might not have long to live. Irrespective of this, we might be confident of our longevity (e.g. because we are young or believe in reincarnation etc.). Our resulting actions are far from predictable. We might conceivably invest in long-term projects such as sustainable forest management. We might alternatively put off investment thinking we have endless time, allowing the forest to go wild. We might even continue to liquidate the forest resource to invest in other options that make us more money. This paper examines whether we can plot a more reasoned course and build that into our understanding of forest ethics.

2. What is time?

The aim of this section is to show that our *perceptions* of what time is are an integral part of the *facts* of what time is. This is important, because it is our perceptions about time that determine the fate of the forest. For example, one perception about time is that our present is worth more than our future. So, a log that we can put on the campfire now is worth more than a log that will only exist ten years hence. This perception is questionable - as descendants ten years hence may argue as they vainly

search for fuel wood in a deforested landscape. Unlike facts, we can alter our perceptions of time through knowledge – but we need to ground our perceptions about time in an understanding of what time is.

The blockbuster theories of time can make it seem rather static and impersonal. For example, according to both quantum field theory and Einstein's general theory of relativity, physical time is 'a distinguished, one-dimensional sub-space of spacetime'. It is important to distinguish from the outset two characteristics of time. On the one hand, we can view time as an instant or 'spacetime location' in which physical events occur (Dowden, 2004). We take some of our decisions about forests from the perspective of particular instants in time. For example, in this instant we may wish to value future benefits from forests less than current benefits (a practice called discounting, to which we shall return). On the other hand, we can view time as a period or expanse in spacetime. We take other decisions about forests from a perspective of expanses of time – for example, when we talk about individual or species life spans and whether we should care about the future of the human race.

Spacetime encompasses these two viewpoints - being an infinite but flat continuum, but one in which we can also define points and straight lines. The presence of matter warps these points and lines in ways that bother physicists, but need not trouble our study of ethics (at least not yet). Our physical existence (like every other physical object) spans spacetime as a block in a way that is independently real. Some commentators have referred to time as a boundary condition on phenomena (Turetsky, 1998). Others find it more useful to think of time as the dimension along which processes operate. For example, Albert Einstein famously said:

"The only reason for time is so that everything doesn't happen at once."

However, time is more than just a static continuum or set of instants. Over the past century, there has been considerable progress in understanding some of time's contrasts. There is a contrast between static descriptions of time and temporal becoming (the reality of our present). There is a contrast between temporal occurrences and their unification into coherent histories (the reality of the coherence of individuals through time). There is a contrast between the predictability of temporal synthesis and the generation of novelty (the reality of our future being unknown). Three whole fields of academic study lie behind the progress in these three areas – the analytic, phenomenological and distaff traditions (Turetzky, 1998).

In terms of our perception, a striking feature is the process of continuous temporal becoming. Time moves and has tenses – past, present and future (Mellor, 1998). They differ. We can know the past and present in a concrete way – but the future only in a contingent way. The present is much more vivid than the past or the future – but not independent of them. Our past informs our present which in turn has consequences for our future. The present is our point of influence or access to spacetime and moves predictably across it.

Another striking feature of our perception of time is the way that it unifies temporal occurrences into coherent histories. The predictability with which our present moves across spacetime, and the predictability of the other physical entities in that spacetime, allow us to conceptualise what we experience. It gives us motivation to act. We can

learn from what the past and present teach us about reality in order to shape the future – space and time together give us meaning. Our perceptions about time matter.

A final striking feature of our perception of time is the novelty with which the future unfurls. We have some limited capacity to shape the future, or at least make predictions based on past patterns. But nothing completely dims the uncertainty with which the future comes.

What seems clear from recent analysis is that spacetime *can* be explained in tenseless and non-evaluative ways. For example, my writing this paper happens before you reading it – we do not need tensed verbs to explain this. Similarly, neither my writing nor your reading this paper is necessarily intrinsically good or bad – we do not need valuational terms to explain such things. Yet, some features of our conceptualisation of spacetime irreducibly require both tenses and values (Dyke, 2003). For example, you are reading this paper *now*. Furthermore, it is *good* that you are alive, not in serious pain and able to make the autonomous choice to read it – (see Das, 2003 based on Nagel, 1970). While we can explain certain characteristics of spacetime without the use of tenses or values, we cannot capture its full meaning.

The tenseless explanation of time anchors or serves as a truth-maker for irreducible tensed truths. In the same way, the value neutral explanation of reality is an anchor or serves as a truth-maker for those irreducible values. Tenses and values are necessary for us to learn from the past and improve the future. They make sense of our perceptions of reality and stave off chaos. They keep society from falling apart, ameliorate human suffering, promote human flourishing, resolve conflicts of interest in just ways and assign praise and blame, reward, punishment and guilt (Pojman, 2005). Tenses and a sense of value provide a reference point and meaning for our conceptions of the future. Our future is after all “all that remains of time, and the present is the vantage point from which we view it” (Price, 1993).

3. How much time is left?

So how much time is left? Answers exist at various levels. For example we can ask how much *time* is left (evidence points to its being infinite) - or we can ask how much is left for an individual or species or ecosystem.

At an individual level, we cannot be sure of our life span. Statistical probability suggests that someone like me will live to just over 75 (UNDP, 2004), probably less with the notorious and increasingly delicious Scottish diet. There may be life after death – but that is a matter of faith rather than scientific evidence. Not only does our lifespan seem short – it also *is* short in comparison with that of many trees. The fact that trees overlap several generations is a reminder of our own transience. We have little time left.

At the level of the human species, we also cannot be sure how much time is left. It is possible to calculate average mammalian species longevity or the common ancestor of extant primates from paleontological records (Tavare et al, 2002). But the human species is so technologically advanced that estimates of our demise are futile. Anyway, the past is a biased sample from which to draw conclusions, since our

survival of it provides a selective element. Our views on the potential of technology greatly influence our outlook. For technological optimists, for example, technology will be able to solve all the potential problems arising from current forest loss. While for technological pessimists the extent of the loss far exceeds the reparative powers of technology.

In fact, many potential menaces to our survival either involve or supersede conceivable technological advances (meteors, nuclear war, technological terrorism, climate change including ice ages, plate tectonics and volcanoes, infectious disease or a cascading collapse of systems, for example through climate change). We discuss below whether we should be concerned about the survival of our species – i.e. the survival of future generations. Here it will suffice to note that the survival of our species depends on the survival of the broader ecosystems (some of them forest ecosystems) of which we are part.

At the level of our forest ecosystems, time also seems short, as the continuously high rates of deforestation show (FAO, 2003). Should this concern us? In a previous paper, I have argued that we ought to extend moral consideration to trees. Indeed, we ought to extend it to all the species within forests (Macqueen, 2005). In part, we should extend this moral consideration because forest ecosystems contribute to satisfying human aspirations. In part, it is because trees are intrinsically valuable – however slight that value might be in comparison with humans or their aspiration. In part, it is because reverential stewardship is a necessary attitude to the survival of our living – and many would argue, spiritual – ecosystem that is neither of our making nor dispensable if our future generations are to survive.

Here it is appropriate to add weight to our moral consideration for trees, purely because of the discrepancy in our expected life span. The oldest living tree is a bristlecone pine named 'Methuselah'. Its rings suggest it is 4,767 years old – or 63 average Scottish human life spans. While most tree species live to only a small fraction of that age, we must still recognise that:

- The reproductive capacity of forest trees – one of the capacities in which intrinsic value is to be found – greatly exceeds our own in terms of spread over time;
- The usefulness of tree products and services to humans (their instrumental values) must be summed across the multiple generations of humans with whom they coexist – they cannot be valued purely on an individual basis;
- The contribution of trees to ecosystem resilience is extensive over time – but is not quickly adaptable to rapid anthropogenic change – for example human-induced climate change.

The longevity of trees and related ecosystem dynamics and their fragility in the face of rapid change demands special moral consideration. Mankind has deforested approximately one half of all the world's forests since the dawn of agriculture 8000 years ago and the rate of deforestation is still high (FAO, 2003). There is now good evidence that climate change is human induced (IPCC, 2001). Climate change is already having a discernable effect on natural ecosystems (Parmesan and Yohe, 2003). Based on mid-range climate warming scenarios, scientists estimate that 15-37% of species may be committed to extinction as the climate envelope within which they can survive migrates or shrinks (Thomas et al., 2004). Loss of forest areas and

species within those areas will both decrease ecosystem resilience and add to the release of carbon dioxide and global warming. There will be disproportionate impacts on the world's poor (Simms et al. 2004). In order to control escalating levels of carbon dioxide we will require not only best case strategies for the reduction in emissions but also a halt to deforestation and an ambitious afforestation programme (Bass et al., 2000). Our interactions with forests are not ethically neutral at least in part because they affect how much time we as a species, and especially the poor groups within our species, have left.

Even if our concerns were solely anthropocentric, our ephemeral lives and the uncertainty over the survival of us and our future generations should prompt concern for the ecosystems on which we depend. Beyond the many important national and international policies and institutions that attempt to ensure conservation and sustainable management, we need to ask whether the unfurling scenario of forest loss is one that we can live with. Negotiators have built the precautionary approach into many multilateral agreements and national policies to deal with such uncertainty.

4. If time left is uncertain, should we adopt a precautionary approach?

The precautionary approach is a presumption against unregulated or even regulated activity when there is a lack of clear evidence about its impact. It is adopted when there is a risk/uncertainty about the outcome. This distinguishes it from preventive measures when the outcome is clear. The precautionary approach counters the presumption in favour of development. It has its most famous articulation in Principle 15 of the Rio Declaration on Environment and Development (1992):

“In order to protect the environment the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”

More recently, it has a somewhat harder expression in the Earth Charter (2000) endorsed by the IUCN. Among several clarifying statements is one which states that we should:

“Place the burden of proof on those who argue that a proposed activity will not cause significant harm and make the responsible parties liable for environmental harm.”

Natural forests ought to be a prime candidate for the application of the precautionary approach. As one moves from a consideration of plantation monocultures to natural ecosystems there is a huge increase in complexity. There is corresponding decrease in available information. Both augment uncertainty. For example, in the rain forests of the Amazon, specialists estimate that there are 55,000 species of higher plant, 22% of the world's total (Capobianco, 2001). In one of the only systematic attempts to classify Amazonian woody plants, the initial estimates of 1,200 species in 1993 greatly underestimated the final tally of nearly 2,200 woody species six years later (INPA, 1999). Complex forest ecosystems may (or may not) be more stable in the face of change but their removal is certainly less easily reversible.

States jealously guard their sovereign control over commercially valuable forests. Apart from specific conservation areas (to which we will return), decision makers have often thought it expedient to treat all forest types as timber factories. The precautionary approach was absent in the 1992 Non-legally Binding Authoritative Statement of Forest Principles for a Global Consensus in the Management, Conservation and Sustainable Development of All Types of Forest. Nor was it present in the 1992 International Tropical Timber Agreement (ITTA), the Convention on Biological Diversity (CBD) programme of work on forests or the deliberations of the United Nations Forum on Forests and its predecessors (Cooney, 2004). That is not to say that there was no concern for conservation or sustainability within the timber industry – many articles refer precisely to these concepts. Rather, it was the case that where there were uncertainties over long-term impacts, commercial growth in the timber industries and agricultural land use alternatives trumped the precautionary approach.

At the same time, voluntary principles used in processes that certify sustainability have placed considerable emphasis on the precautionary approach. For example, the Forest Stewardship Council (FSC) principle 9 states that “Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach” (see Cotter et al. 2000). There is clearly a considerable policy gap between industrial growth and sustainability. This gap has its origins in different ethical perspectives about time and what has value within it.

The short time horizon of many decision-making bodies – such as national democratic governments – presents an interesting conundrum. In answer to the question ‘How much time is left?’ a politician’s response might be ‘the time until the next election’. Political survival is a much shorter-term venture than even the human life span or that of the human species. There is strong pressure to adopt a short time horizon (or high discount rate). The temptation is to liquidate resources and encourage current consumption. Such an approach builds the vital feel-good factor within any current electoral period. Less attractive is the option to conserve resources and encourage sacrifice to ensure sustainability beyond the next election. This temptation can quickly align governments with commercial interests (for example in agreements such as the ITTA) rather than with those advocating stricter environmental sustainability for future generations who are yet to cast their vote. It is for this very reason that a precautionary approach is particularly important in decisions taken by sovereign states.

If we are to adopt a precautionary approach – as this analysis of forest ethics suggests we must – we will need to be as clear as possible about what it is worthwhile for us to do with time.

5. What is it worthwhile for us to do with time - what constitutes value within it?

Some commentators have argued that the infinity of time means that nothing (neither entities nor actions) has value. Put simply, if the future is infinite, it is impossible to increase or decrease the total amount of value – which always remains infinite. So, it does not matter what we do (Smith, 2003).

Aside from the emotional distaste for such a theory, we can object on three counts. Firstly, while it may not matter what we do from an infinite perspective, this is not the perspective we have and on which we base our moral truths. It would certainly matter to my immediate neighbour if I felled a tree across his house roof. Moreover, it would matter to my descendants if I destroyed the resource on which their livelihood depended. Both our own life expectancies and the prospects for species and ecosystems are finite.

Second, we cannot aggregate values on a single scale, as Smith seems to suggest. We derive some of the more substantial elements of value in non-reducible categories (see Table 1). The extinction of the human species would lead to the cessation of some of those value categories – even if other intrinsic value categories continued ad infinitum.

Third, the infinity of the universe is not as certain as Smith would have us believe. It is just a theory and one to which a number of significant traditions protest (e.g. many of the world's religions). If ever there was a rationale to invoke the precautionary principle, this is it. While time itself may be infinite, it would seem prudent that we treat it as finite (as indeed our individual life span, and perhaps that of our species seems to be). Even if it were infinite, why not maximise what is valued in finite time – as long as this does not adversely affect the remainder of infinite time?

We noted earlier that there are certain irreducible moral truths that we require to make sense of/order our finite existence and the non-moral facts within it. For example, we know we exist and we can see that other people exist (non-moral facts). But we also assert that our shared humanity gives grounds for equitable treatment (moral truth). Similarly, we can see that trees have the inherent capacity to reproduce over much longer timeframes (non-moral fact). But we also assert that interfering with such reproduction is not morally neutral, even if there are many moral priorities that might require us to do so (moral truth). These moral truths exist because of our temporal perspective and experience (what some might call belief) about the way the world operates. They therefore evolve. For example, our growing realisation of the degree of genetic overlap between us and other organisms have strengthened moral arguments based on our interconnectedness and the intrinsic value in all living organisms.

Our understanding of what constitutes value within life has had a considerable period over which to evolve. There is the impression that new insights have been rare – which suggests that our understanding of value is rather solid. Classical conceptions of value in life still hold great currency. The earliest records of human belief note:

- an awareness of mortality and the consequent pressure to spend time wisely in the short-term;
- divine revelation and widespread social agreement over what was valuable (good and bad) and;
- a connection between current existence and an afterlife – however constituted.

Many major faith traditions continue to uphold this viewpoint.

In the fifth century B.C. Socrates identified the need for people to discern through logic life's 'end' in itself rather than 'things that were a means to that end'. Plato found these ends in the harmony between reason, the emotions and the appetites.

Aristotle spoke in terms of a life lived in accordance with virtue – a balance between opposing vices (Grayling, 2003). These views presuppose that humans have intrinsic value and that utility to humans forms the basis for derivative values. The prominence of human interest in decision making still holds – even if it is an impoverished vision of what human interest is (Macqueen, 2004).

In the middle of the 20th century, authors began to broaden the concept of intrinsic value to embrace other living organisms (Macqueen, 2005). Our evolving understanding of value in life might therefore incorporate broad instrumental categories of human aspiration, adjusted to accommodate our intrinsic value and that of non-human, but morally considerable others (e.g. other living organisms and God or spirits). Non-sentient beings clearly share only the categories of value that do not require sentience. If we include the contribution of forests within such a framework of value, we arrive at something like Table 1.

Table 1. Overview of forests’ contribution to what is valuable

What is valuable	What diverse forests may contribute to value
1. Identity, faith and culture	Forest stewardship contributes to our identity, cultural diversity and spirituality
2. Intellectual and aesthetic appreciation	Forest landscapes provide intellectual stimulation and aesthetic appreciation
3. Creativity and fulfilment of endeavour	Forest management provides various opportunities for creative endeavour
4. Social relationships and networks to share life	Forest-based societies and relationships support a framework of social and environmental justice
5. Present and future security within living ecosystems	Forest ecosystems ensure environmental stability through adjustments to biological diversity
6. Subsistence for all life according to its needs	Forest products and services sustain interdependent living organisms

We list from a forestry perspective what it is appropriate for us to do with time in the right hand column of Table 1. This should provide an ample agenda for any forester.

What bears stressing is that these categories of value are irreducible. To put it another way, each category has a value scale that is entirely its own. We cannot measure any category on the scale of another category. Category 6 is perhaps the most familiar, in which we measure utility on scales of capital or economic utility – often translated into monetary figures. But there are also separate ways in which we measure value relating to security, social affiliation, creativity, aesthetics and identity. Trying to measure each of these value categories on a financial scale would be like trying to measure income on a scale of aesthetic beauty or profit on a scale of friendship. We can do it, but the results are without meaning. For this reason, we should measure choices by their broader consequences over time (measured on separate value scales) not solely on their utility expressed in monetary terms (see section 6). We need to complement economists with other types of value expert in order to assess meaningfully the impact of choices over time. This is not as far fetched as it might seem. Even for categories such as aesthetics, there are bodies of expertise and scales that can readily be adapted (Bürger-Arndt, 2005). Indeed there are already ranges of composite indicators that extend scales of well-being far beyond economic utility (Anielski and Soskone, 2004).

6. Does value change over time?

Should future values (goods and harms) count for less than present values – as in the widespread practice of discounting? We are interested to know what the consequences of using discounting are – rather than restricting our assessment to the utility of discounting. Consequentialism looks beyond utility to assess also the impacts on sources of intrinsic value, including impacts on non-human entities.

We discount future values when we perceive what happens in the future to be less valuable than what is happening now. We do not always discount future values, but the practice is common. Moreover, the discount rate often depends on the size of group. For example, society might decide that we should conserve an area of forest. This is equivalent to giving it a zero discount rate – society considers the future as important as the present. But a hungry family within the forest might want to clear it to grow food for their immediate need. This is equivalent to giving it a high discount rate.

However widespread the practice of discounting, it does not constitute a fact or an ‘is’ from which we can surmise what we ought to do, as some commentators have suggested (Pearce et al. 2003). Discounting value over time is a choice we make to achieve an outcome we want. Some early commentators expressed distaste for the results of discounting – for example, Frank Ramsey (1928) famously stated:

“Discounting is a practice which is ethically indefensible and arises merely from the weakness of imagination.”

Over the past decade or so more philosophers (Parfit, 1984; Broome, 1992; Atfield 1997) and economists (Pearce et al., 1989; Price, 1993) have rejected the various grounds for discounting:

- The parsimony reason – that discounting is a simple approximation of the way value functions vary over time – is *rejected* because simple does not make it right. Perceptions of changing values over time present a “wonderful kaleidoscope of robustly non-exponential functions” (Price, 1993).
- The democratic reason – that the majority of present people want their generation and current priorities to take precedence over future generations and later priorities – is *rejected* because there is no representation for future generations whose views are equally valid.
- The probability reason – that current goods are better than future goods because there is a risk that many of the possible future goods may not come to pass – is *generally rejected* because lack of certainty about which future goods will come to pass does not mean that they are any less valuable when they do. Note that this rejection probably assumes a broadly stable environment and in some specific circumstances, this is unlikely.
- The opportunity cost reason – that current goods are more valuable because we can reinvest them now to generate additional future goods and/or compensation for those who missed out through early consumption – is *generally rejected* because we rarely fully reinvest goods nor make compensation payments.

- The diminishing marginal utility reason – that predictably better-off future generations will find diminishing value to be had from their goods – is *generally rejected* because unending growth and predictable inflation are not likely scenarios – nor is the value for some goods open to marginal change (e.g. the existence of a species).
- The unreasonable sacrifice reason – that true concern for the well-being of future generations would require an unreasonable sacrifice of well-being in current generations – is *rejected* except where one generation would have to take an unfair burden of responsibility.
- The special relations reason – that it is quite legitimate to favour close relatives over unknown or distant generations – is *rejected* because while it may be understandable from a personal perspective, it is not possible as a collective perspective within one generation – or as a collective perspective across generations.

Attfeld’s analysis (1997) bears quoting in full:

“But all this strongly suggests that unqualified conventional discounting is unjustifiable; that sheer time-preference, supposedly the central justification for discounting, is no justification at all; and that, other things being equal, impartiality between times and between generations is morally mandatory, at least where serious interests are at stake.”

Economists have responded to this serious critique of discounting. Some have argued for time-varying discount rates based on people’s actual behaviour (Frederick et al. 2002), on an improved treatment of uncertainty (Weitzman, 1999; Gollier 2002) or in order to make some concessions towards sustainability (Chichilnisky, 1996; Li and Löfgren 2000). Some authors hold that these “overcome the ‘tyranny’ of discounting which is so widely noted by philosophers and environmentalists” (Pearce et al. 2003), but this position is unconvincing. Price (2005) notes a major problem to do with aggregating different value components over time (some of which may not be discountable) into a single protocol. He argues that citizens should not let marginal improvements (not discounting the future as heavily as was formerly practised) deflect them from pursuing the more demanding perfect solution. This perfect solution is not discounting at all for time lapse – but rather, calculating how predicted circumstances might affect present equivalent values. What we should do is to disaggregate distinct components of value – some of which we can discount and some which we cannot (such as the extinction of our own or other species through climate change). Price (2005) concludes:

“On the whole, high discount rates should not be sustained through time. But in many circumstances their application cannot logically be sustained even in the short term. Whatever the time scale, discounting as a means of evaluating and selecting projects is hostile to the ethic underlying sustainability.”

We interpreted Table 1 as if there are at least six irreducible categories of value intrinsic to or derived from, forests. Being irreducible, we must treat these categories of value independently in economic analyses. One major problem is that we cannot readily, or at least confidently, convert many of these values into numerical indices in a comparable manner (see Macqueen, 2001). Nevertheless, we examine in Table 2

whether value in any of these categories might warrant a special case discounting treatment.

Table 2. The grounds for discounting of different forest-related values

What diverse forests contribute to value	Cases for discounting
Forest stewardship contributes to our identity, cultural diversity and spirituality	No grounds for discounting except those of changing marginal utility – and forest scarcity for future generations may increase the value of forests linked to identity, cultural diversity and spirituality
Forest landscapes provide intellectual stimulation and aesthetic appreciation	No grounds for discounting – it would be immoral to presume anything but equivalent aesthetic needs in future generations
Forest management provides various opportunities for creative endeavour	No grounds for discounting except that of (negative) inflation – since forest scarcity for future generations may increase the value of opportunities for creative outdoor activities
Forest interactions and competing claims inform a framework of social and environmental justice.	No grounds for discounting – it would be immoral to presume that future societies need less social interaction or social and environmental justice
Forest ecosystems ensure environmental stability through adjustments to biological diversity	Some not very convincing arguments for discounting (on grounds of probability) where carbon storage by forests is one of several options to reduce carbon dioxide levels (see in text).
Forest products and services sustain interdependent living organisms	Some arguments for discounting: on grounds of opportunity cost, predictable diminishing marginal utility or commercial uncertainty in commercial forestry where current reinvestment from sale of products/services will exceed the value from deferred investment (see in text).

In many instances in which poverty is extreme, short-term survival legitimately outweighs future benefits (e.g. cutting down trees to plant crops). We might misinterpret such a situation as one that has a high discount rate. Instead, all that it indicates is that, in some extreme circumstances, the present value of one course of action outweighs all future benefits – whether or not we discount those future values. Life-threatening values demand attention – wherever they occur now or in the future.

For some commercial (financial) values in forestry, there may be grounds in project comparisons for discounting over short time periods for trivial material changes (e.g. in timber prices). Opportunity cost or predictable diminishing marginal utility or commercial uncertainty can sometimes seem to justify simplistic discounting functions over time.

In relation to climatic stability, Fearnside et al. (2000) argue that when we cut fossil fuel emissions, immediate and permanent benefits occur. But when we plant trees or defer deforestation, the benefits are neither immediate nor certainly permanent. There is a risk that future environmental disasters such as fire or policy change may cancel out climate benefits. They therefore require a discount rate or short time horizon. Fearnside et al. (2002) propose a zero discount rate but 100 year time horizon as a pragmatic solution. Their case is that carbon storage in trees should clearly not be treated on a par with carbon stored in unused fossil fuels – but neither should carbon stored in trees have no value. This is a dubious argument in part because we may also

have to reverse current reductions in fossil fuel emissions in the future – they are no more secure than forests. We should deal with risks to forest options as such, by looking at probability distributions of outcomes (including the fact that fire-destroyed forests may regrow). If we widely adopt limited time horizons, we exclude all but a vanishingly small proportion of future climate change costs and benefits. We also might end up justifying (say) burying nuclear waste in containers guaranteed to remain safe for just 100 years!

In summary, we have seen that for several trivial commercial calculations we can justify non-identical discounting rates. And for many of the non-trivial changes associated with changes in forest land use – such as the exclusion of indigenous peoples from their customary land, the elimination of species in conversions to agriculture, the loss of wilderness and aesthetic beauty - zero or even inverse discounting should be the rule and explicit assessment of predicted circumstances the procedure.

7. Can we share values without sharing time?

Forest ethics discriminates between options that affect different categories of value over time. To do this it requires scales based on utility (utilitarianism) or broader consequences (consequentialism). I have argued above that consequentialism is to be preferred. I have argued also that multiple scales of value are necessary. We must base the scales by which we assess choices on their consequences within different value categories. In assessing consequences, Mill (1971) suggested that the “first principle of morals” is equality. Some dispute this on the grounds that we are not all equally endowed – but there is no time here to argue the case. Bentham (1838) had established the general rule “everybody to count as one, nobody for more than one”. This first principle (if it is valid) holds not only for spatial distribution of consequences, but also for their temporal distribution – to provide us with a basic theory of justice. In other words, we should base our choices on an assessment of the distribution of consequences on the basis that equal interests count equally, whether they are studied now or in future centuries. Rawls (1972) makes the important addition that justice involves tackling inequalities so that the least advantaged benefit most. In other words, we cannot sacrifice the few to serve the interests of the many. Of course, when we extend our understanding to non-human values in consequentialism we must also introduce some appropriate weight for the consideration of non-humans.

Justice is a considerable challenge even among generational contemporaries. Between generations, it runs into even greater problems. In such situations, we have to assess the values for people with whom we do not share time. Some of these problems might sidetrack us. For example – if we adopt a total consequentialist outlook we must choose between various ways of adding up future consequences. If we adopt a total consequentialist outlook and add up each person’s value we may find that an expanding population could more than compensate for substantially diminished well-being, which seems absurd (the ‘Repugnant Conclusion’ objection of Parfit, 1984). But if we adopted an average consequentialist outlook – measuring future value as the average across the population – we might find that future value is unaffected by the almost complete extinction of our species (Broome, 1992). Authors have proposed

various new methods such as number damped consequentialism as a result (Blackorby and Donaldson, 1984; Ng, 1986).

The process gets more complicated if we insist on multiple value scales. Suppose future generations were enormously materially wealthy and lived in a pristine beautiful environment, but could only do so through social structures amounting to dictatorship – would this be better than poverty and environmental degradation but with social freedom?

More problematic still is a conundrum that has been termed ‘the Non-Identity Problem’ (Parfit, 1983). When we evaluate the impact of current actions on future people, we can rarely compare like with like in terms of actual people. Even the smallest changes in current choice will influence future sequences of events. The result is that the people who might exist within one of our possible choices would almost certainly not exist if we made a different choice (see Parfit, 1983). Nevertheless we can still assert that, if the same number of lives were lived either way, it would be bad if one set of people are worse off than another set of people might have been.

It is worth coming back to earth with the observation that we would not (even if we could) actually calculate the consequences of each of our actions on a daily basis. Except for decisions of enormous consequence, we operate either by instinct or by formulated policies and practices that shape our customs and habits. It is more important that a correct understanding of the future guides our policies, practices, customs and habits than that we have the calculus to add up the real consequences of innumerable future generations on many different value scales!

One short-hand route to a correct understanding of the future is the use of the term sustainability. Barry (1999) proposes that sustainability is adequate as a necessary condition of intergenerational justice. He gives a specification for sustainability:

“There is some X whose value should be maintained, as far as it is in our power to do so, into the indefinite future. This leaves it open for dispute what the content of X should be.”

(Barry, 1999)

In the case of forests, the X in question might involve the multiple categories of value that I have described above. This would sit comfortably with a widely-accepted formulation of the World Commission on Environment and Development on sustainable development:

“...development that meets the needs of the present without compromising the needs of the future.”

(World Commission on Environment and Development, 1987)

A problem that plagues the implementation of sustainability is that individuals have a natural preference for things close to them. Popular proverbs capture this reality. It is instructive that by far the most widely used proverb on the Internet is “first come, first served” followed much less frequently by “better late than never” (Very Happening, 2005). The time preference elements of these are an understandable response to

uncertainty and mortality. We also frequently display a spatial preference - the not in my back yard syndrome. The tendency is to put immediate relationships, benefits and impacts above distant ones. While understandable, trying to meet every need of every individual immediately would create a chaotic world. To avoid the worst excesses of rampant individualism there are two options open to us – governed or voluntary temperance.

In terms of governed temperance, we spontaneously group and develop rules to provide guarantees of equity between individuals and stability for deferred consumption. Our problem is that our systems of governance only have representatives of the current generation. So, we are still highly prone to favour the present over the future. Eloquent arguments for introducing representatives of future generations in major decision making processes have so far failed to interest those whose interests are served by rules/protocols that favour the current generation (Attfield, 1997).

In terms of voluntary temperance, there have been eastern Buddhist and Hindu traditions and parallel traditions in western monasticism (Henry and Swearer, 1989). One proponent of monastic life writes:

“The main thrust of monastic life has always been the inner transformation of the person. Slowly and gradually, through prayer and meditation, through being with God in silence, there comes about a change of heart, a new way of seeing things. Then out of this quiet centre flows a different way of life, no longer self-centred and competitive, but naturally more inclined towards harmony, respect for others, towards being in the world with care and gentleness.”

(Bednar, 1979)

The monastic tradition in the west has remained perhaps the greatest haven of ‘temperance’ one of the four Christian ‘cardinal virtues’ (alongside prudence, justice and courage). Plato described these virtues many years earlier:

“Wisdom is the chief and leader: next follows temperance; and from the union of these two with courage springs justice. These four virtues take precedence in the class of divine goods.”

(Saunders, 2005).

In addition to benefits for future generations, temperance also offers current benefits, although it is beyond the scope of this paper to discuss what these might be. But far from being widely embraced by decision makers and the populace at large, traditions of temperance are increasingly under threat from consumerism. We have already noted that short time horizons in personal and political decision-making tempt us towards discounting and have unfavourable outcomes. These same pressures eschew self-discipline (or temperance) towards an appreciation of the quality of life in favour of:

- short term increases to the quality of life through ultimately unsustainable consumption and recreation
- immediately useful attempts to extend the quantity of life (reduce car accidents, smoking-related diseases etc.).

If we are to be serious about sustainability we will need to inculcate both a personal integrity towards temperance/sustainability and an institutional architecture that is able to encourage it. We need to reinsert collective and individual temperance (including the enjoyment of it) into our vision of development.

8. Do we need to revise our forest ethic in the light of the above?

The preceding paragraphs introduce our perceptions of time and its impact on forests. They have argued that we need an antidote to our preferences for what is 'close' if we are to achieve sustainability and intergenerational justice. The search for such an antidote is particularly pressing for the forest sector where long time frames and fragile ecosystems are the norm. This paper holds out collective and individual temperance as an alternative vision for development.

Table 3 below sets out some possible modifications that we need to make to our forest ethic, policies and institutions in line with this vision:

Table 3. Adjustments to our forest ethic in the light of perceptions on time.

Area of concern	A forest ethic that is temporally deficient	A forest ethic that is temporally aware	Required change in practice
Forest values	Assign utilitarian forest values based on current commercial use	Assign different irreducible value categories of both utilitarian and intrinsic values summed over multiple generations	Develop robust scales for at least six categories of value and a simple system for factoring in use for multiple generations
Treatment of risk	Treat natural and plantation forests as competing and equally replaceable resources based on principles of free market economics – discounting future values	Treat natural forests with a precautionary approach (vis-à-vis plantation forests) based on principles of sustainability – giving present equivalent values to carefully predicted future circumstances	Develop policies that distinguish adequately between different types of forestry and promote strict sustainability in natural forests – requiring full calculations of current present values for predicted outcomes in environmental impact assessments
Forest rights	Assign rights to use dependent on technological capacity to maximise material value per unit area of forest per unit time	Assign rights to use as equitably as possible within generations, contingent on capacity for sustainable stewardship across generations	Develop forest land allocation, tenure and resource use systems with transparent criteria for the capacity for sustainable management
Governance of rights	Establish institutions that are democratically accountable over short election time frames for delivering the above	Establish institutions that are democratically accountable – but with autonomy and long time frames, with a mandate for unpopular sustainability – clear of short term political electioneering and vested commercial interest	Establish forest institutions that have a strong sustainability mandate and the autonomy from political and commercial vested interests to carry that mandate out
Equity	Dismiss concerns over equity within or between generations in favour of free competition and efficient and growing resource use	Promote greater equity in the appreciation and use of forests across multiple value scales – with strict adherence to rules of sustainability and intergenerational justice	Develop criteria and institutional mechanisms for the representation of future generations in processes of land allocation and use – at both national and international levels

9. Conclusions

It is quite certain that our individual time will run out. But time for our species, or for forest ecosystems on which our species depends, need not. We could sit transfixed in the headlights of our own mortality or the destruction of the world's remaining ecosystems. Alternatively, we could scramble to accumulate material goods while destroying forest resources on which future generations could otherwise depend. Neither strategies are worthy of humanity. Within the forest sector, we could continue to search out ethics, policies and institutions that will deliver collective and individual temperance. For example in the decision we take about forests:

- discriminate carefully between forest and land use types, adopting (and subsidising) a precautionary approach to interventions in complex natural forests
- ensure that all of the categories of value are considered in determining forest and land use – not just values linked to short term material wealth
- determine not to discount at all for time lapse – but calculate predicted circumstances for forest and land use at net equivalent value in different value categories
- allocate land and forests on the basis of equity within and across generations – with priority for sustainable management, not technological capacity to generate short term financial value
- strengthen institutions that are free from political and commercial vested interest and that have equity and sustainability as core mandates. In practice, this might mean favouring local institutions over centralised ones
- develop criteria for the representation of future generations in decision making and institutional procedures through which that representation can inform decision making

Contemplation of time directs us to value in life and forests what we cannot own – show temperance in what we can (temporarily) – and leave a legacy of human sustainability.

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