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# Perceptions of tree disease mitigation: what are people willing to pay for, and what do they actually get?

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## Abstract

Some problems found in stated preference approaches to environmental valuation are particularly serious in valuing tree disease. Respondents seem to include regulating and supporting service values, which they are ill-qualified to do. Cultural service values for respondents are distorted by the questionnaire itself, making them invalid for the population over whom valuations are aggregated. The element of citizen valuation can be captured in contingent referenda, but this too tends to include inappropriate elements. More reliable benefit estimates are derivable from actual day-to-day purchase of cultural services, transferred to the context of tree disease.

**Keywords:** tree diseases, landscape, economic valuation

## Introduction

In recent years waves of tree diseases have surged across Europe, encouraged by international movement of plant material and by climate change. Some pathogenic organisms known for decades have mutated into more aggressive forms that threaten both commercial and environmental aspects of forestry.

Costing disease and valuing mitigating measures require assessment of impact on wooded landscapes, as perceived by the public. Such assessments have become part of the general discourse of environmental economics. Applications also exist to the visual effects on trees of insect attacks (Crocker, 1985) and disease (Mourato, 2010).

Over many years, strong criticisms have been made of contingent valuation and similar methods, as used for environmental issues. This has particularly been so when issues are emotive, provoking strong stakeholder reaction. The specifics of tree disease sharply focus many problems encountered in applying stated preference approaches. This paper revisits the problems, as I have presented them over 20 years, but in a tree disease context. It does not review problems of stated preference systematically, but concentrates on some major issues that have been neither widely recognised nor resolved.

## The set of included values

In the 1980s a major UK forestry controversy was afforestation of Scotland's Flow Country. A questionnaire on willingness to pay to *stop* this fundamental landscape change was designed to expose some problems with the approach. The results appear in table 1. As it happens, one principal species, lodgepole pine, is that most seriously affected by *Dothistroma pini*. One possible result of the disease would be to reverse the landscape effect of afforestation.

Table 1. Willingness to pay to prevent afforestation of the Flow Country

Components included in value	Aggregate value (£million)	Proportion of initial value
All ...	67 900	100%
less doubled-counted values ...	-7 500	-11%
less intrinsic values ...	-16 600	-24%
less regulating/supporting values	-20 500	-30%
Cultural service values ...	= 23 300	34%
for those with prior knowledge ...	3 062	4.5%
at pre-information level ...	1 724	2.5%
adjusted to geographical zones	307	0.5%

Source: modified from Price (1999a)

The total willingness to pay, about £68 billion, was then about 10% of the UK's GNP, which raises questions about what respondents were actually valuing. They were asked to allocate willingness to pay across several ecosystem services now widely recognised (Watson and Albon, 2011). Among these, double-counted values are treated later. Intrinsic values are experienced by members of the ecosystem themselves. They are the least-understood of values, and cannot, of their nature, be properly assessed by humans. Regulating services include ecosystem influences (Kittredge, 1948) that improve environmental conditions as through watercourse or atmospheric regulation. Supporting services, like nutrient recycling, underpin general ecosystem functioning. MacDonald (2010) suggested that, because they only support the other services, as supplied by other elements of the ecosystem, including supporting services may also double-count values. The validity of valuations of regulating services is addressed later. Only the cultural service values represent what should really be sought from the public, that is, their valuation of the visual impact of ecosystem change.

### Information bias

But the question is now raised, as to how many respondents were actually in a position to value any of these services, even the cultural ones. In particular, for a landscape rarely visited by the general public, how many would be affected by personal experience? At this time, much was made of "passive use values", accruing to those who would not visit physically, but who would be psychologically affected by *knowing* that a landscape was threatened by change, or that it had been preserved from change.

Such values, of course, cannot be experienced by people ignorant of a landscape's existence, or of any threats to it: they would, in practice, remain "blissfully unaware", whether change proceeded or not. To establish what the relevant population was, respondents were asked if they knew about the Flow Country. Some respondents do not wish to appear ignorant, or may explore false memories of a place that have been constructed by exposure to the questionnaire. An attempt was made to uncover such a bias, by asking what characteristics respondents associated with the Flow Country: it became evident that many were actually thinking of The Low Countries (Netherlands and Belgium). Adjusting for the majority who it seemed did *not* know the Flow Country further reduced the value legitimately attributable to the landscape preservation. Also, respondents who genuinely knew the Flow Country were concentrated in Scotland and to a lesser extent in the rest of the UK, with no-one from elsewhere knowing the place at all. Aggregating the values from the questionnaire only over the proportion of "aware" population within each origin led to further reduction in legitimate value.

A contention often made in contingent valuation's early days was that respondents needed information about species or habitats under threat, before their willingness to pay would be valid. This was given in my own questionnaire, with the rather typical result, that valuations

almost doubled after information had been imparted. But this “informed state” exists only among participants in the questionnaire: the pre-information values better represent the wider population, to whom valuations are aggregated. Nowadays a political point is also made, that the population “has a right to know”.

de Bruin et al. (2014) recently obtained survey evidence that information about tree disease really does affect people’s perceptions and priorities (and presumably, if asked, their willingness to pay). Such informing of the public may appear part of the democratic process. But imparting knowledge, particularly of a scientific kind:

- ❖ affirms in the respondent’s mind an “expert” role, which nonetheless is based on a thimbleful of knowledge, by contrast with ...
- ❖ ... real subject experts, who would probably, after a lifetime’s work on ecosystem services, acknowledge that they knew very little. Nonetheless these are the best people to judge the physical significance of regulating and supporting services. Questionnaires to the public can only reveal *perception* of regulating and supporting values, not the values actually delivered by a complex web of processes. Who, among respondents, actually knew the welfare significance of a tonne of CO<sub>2</sub> in the atmosphere? None!
- ❖ By presenting scientific facts, it legitimises focus on “non-cultural” valuation, whereas cultural values are actually the ones on which the respondents have legitimate expertise, based on their own intuitive perception – the values which in fact these investigations should reveal.
- ❖ It actually creates unhappiness in the minds of respondents, by notifying potential bad outcomes of which they might never have been aware. In a pilot survey of responses to a red squirrel conservation programme, negative feelings if the programme failed were: guilt for not supporting the programme [1 respondent]; sadness for the impoverished resource [12]; sadness for the squirrel [7]; anger at human apathy [4] (Price, 2001). Admittedly, there could have been no escaping the catastrophic landscape consequences of, say, Dutch elm disease in the UK. But is it possible that the effect of *Dothistroma* – which mostly slows growth in some crops, and kills others that are usually well out of the public view – might pass almost unnoticed, except if attention is drawn to it?
- ❖ Perhaps most seriously, the process of “informing” creates a respondent body which is a tiny subset of the relevant population, but is thereby made precisely unrepresentative of that population. And yet the subset’s distorted values will, in the normal course of stated preference valuations, be rolled out to the un-informed population (Price, 1999a).
- ❖ Even an “informed” population is likely over time to lose the focus created by the method of informing. Sensationalist newspaper information of the kind “Dieback disease will devastate England’s landscape!” creates this week’s environmental cause. Perhaps next week readers will have forgotten it, and the values it transiently constructed.
- ❖ If a right to be informed exists, information should be given on *all* environmental issues. Otherwise a questionnaire will focus concern ...

## **Symbols, apple-pie values and citizens**

Giving information about one particular issue, species or habitat “headlines” it as a conservation priority. An inkling of the importance of symbolic effects is given by an exploration of motivations for willingness to pay, as expressed through another pilot questionnaire (Price, 2001). In table 2, response II evades the question actually asked, which did *not* offer to maintain genetic resources intact: *Rafflesia* is being used as a peg on which to hang a general concern. Response III arises from distrust of the questioner’s integrity, yet evinces willingness to pay for something fictitious that nonetheless acts as an emblem of conservation. Response IV relies on a perception that the questioner is, by contrast, someone who knows what is important. Response V is reflexive, turning welfare back on the individual’s psyche, rather than on the importance of the conservation issue in question.

Table 2. Reasons for giving a passive use value for *Rafflesia arnoldii*

Reason for giving this value for the species	Number of responses
I I knew about the importance of this species	2
II I believe that genetic resources should be maintained intact	9
III I suspected that this species does not really exist	6
IV I thought you would not have asked these questions if it wasn't important	4
V I want to be seen as someone who is concerned about nature conservation	2
VI I didn't know anything about it	13

Concerns about such responses have motivated increasing use of follow-up questions such as: “How confident are you that your valuation is approximately correct?”; and “Is this valuation *actually* for this disease, or were you *really* giving your value for ALL diseases?” (cf. Hanley et al., 1998). While giving insight into the valuation process:

- ❖ Follow-up questions may seem to challenge the respondent’s integrity or competence, thereby provoking some hostility.
- ❖ Exploration gives an indication of how wrong the original answer might have been, but *not what the right answer is*.
- ❖ The originally given value may become an anchor-point, from which departures, if any, are made only conservatively.
- ❖ Headlining of an issue, and questioning motivations and perceptions, do change *real* perceptions ...
- ❖ ... but perhaps only temporarily, only while the questionnaire remains in near memory;
- ❖ ... and only for the respondents themselves, again. By informing a subset of the population, sensitising them to a particular issue, encouraging reflective thought, we make them precisely atypical of the population across which the extracted values are later aggregated.

Raising issues may also engage “apple-pie and parenthood” values – those values which “every right-thinking person subscribes to”, and (in the frequent experience of those applying questionnaires) on which they will put no willingness to pay. The quintessential response – “How can you possibly put a money value on a child’s life or health?” – evinces a belief in lexicographical values (Sagoff, 1988). The contention is that certain values – justice, beauty, and perhaps health – always take precedence over personal consumption values of the kind implied in willingness to pay questionnaires.

In practice, of course, society makes such trade-offs, through budgets for legal aid, national health services, art and landscape conservation. No unbiased person advocates that the entire national economic effort should be used to save one child’s life, not least because other lives would thereby be forfeited. Nonetheless, exploratory questioners may face descriptive responses such as “This place means the world to me! As it is, as it always was.” There *are* landscapes containing pine, perhaps threatened by Dothistroma, Scots pine especially, which may have personal significance. Ruskin’s words – “The first thing which I remember as an event in life was being taken by my nurse to the brow of Friar’s Crag on Derwentwater” – are engraved on a memorial stone below pine trees, and apparently on the hearts of many later observers who have felt a kinship to *this place*. But the persistent questioner might rejoin: “You say that, but would you really give up everything, to keep this view for yourself?” And there are two lines of replying to such follow-ups.

Take an infertile hillside in Scotland or Wales, planted with lodgepole pine, as was once customary, to a boundary unsympathetic to topography. If the question is: “What would you be willing to pay to achieve beautiful re-landscaping of this forest?” the lexicographical response might be “I will pay nothing – because I feel passionate about beauty!” But, should the question be: “What would you be willing to pay to prevent disease killing trees in this forest?” the response might be “I will pay nothing! I also feel passionate. But about tree health, not beauty.” Although such conflicting responses might be expected when deliberative democracy is used in place of economic valuation, there is no way of weighing what the importance of intransigent passion might be, when revealed only through the filters of culture and personality.

And so we return to what underlies responses to values articulated with non-negotiable ethical force. When the questioner asks “You say that, but would you really give up everything, to keep this view for yourself?”, the moral high-ground response might be “No, but I want other people to be able to enjoy it too.” The consumer is transformed into a public-spirited citizen.

In this context, contingent valuation questions have been recast as though within a political realm. “What would you be willing to pay for ...?” is transmuted into “Would you vote for a programme to control this tree disease effectively, if that required an increase of £ $X$  in taxation?” Varying the value of  $X$  in such a “contingent referendum” allows identification of the value at which the electorate would be split equally between paying and not paying the tax, at which point the benefit of disease prevention is taken to equal the tax. Typically, such formats elicit higher values, with fewer protest bids from those having lexicographic mind-sets (Ovaskainen and Kniivilä, 2005).

But, while eliciting an effective willingness to pay where other formats fail, the meaning and validity of the responses may be questioned (Price, 2006). What should the truly good citizen desire? Logically, it should be the best interest, the maximum welfare, of the aggregate of all citizens: “the greatest good to the greatest number ... for the longest time” (Pinchot, 1910). If, however, citizens are valuing on behalf of other citizens, how do they know those citizens’ own values? To the extent that their motives are genuinely altruistic, they merely double-count what other citizens *themselves* say of their own values (see table 1). By contrast, the warm glow felt for supporting communitarian benefits, rather than personal consumption, are a genuine addition to welfare. In the seditious words of Larcom (1931), a hymn-writer who worked as a factory supervisor in the world’s most capitalist country:

The grass is softer to my tread  
*because* it rests unnumbered feet;  
sweeter to me the wild rose red  
because she makes the whole world sweet.  
[my emphasis]

Yet such values might equally accrue to all things that contribute to welfare. I am willing to pay something extra for a National Health Service that gives everyone the same access to health care as I could provide for myself by private insurance. But I would also pay something for everyone to be able to provide food – purchased as private consumption – for themselves and family: hence purchase of fair trade goods. If a communitarian premium exists, it applies to a wide range of economic goods, and to apply it only to the target of our particular evaluation is to tilt the playing field in its favour.

To avoid such distortions, contingent questions should include contextual directives such as: “Please answer from your own point of view: we shall ask other citizens for their own views.” And “We shall also be valuing effects on timber production, CO<sub>2</sub> levels etc., as another study: you need not consider them.” Arguably, by so doing we elicit genuine individual cultural

values, less trammelled by apple-pie and parenthood thinking, and by a falsely perceived need to value on behalf of the community. Why, after all, would anyone really vote for anything except their own best interest – given that such interest includes the interpersonal utility gained by providing benefit to others? Do people actually vote in a less self-interested manner than the way in which they make consumption purchases – which these days includes and probably always included an element of ethical consideration? With such modification and interpretation, contingent referenda do offer a better way of determining willingness to pay than do contingent valuations. They can be constructed as choice experiments that somewhat reduce headlining and symbolic responses.

### **Subjectivity or benefit transfer?**

Symbolic responses will nonetheless remain. The problem arises because all such approaches necessarily focus on *issues* rather than *welfare*; on *change*, not *states*; on *processes*, not *outcomes* (Price, 1999b). Of course, change and process are important: the long-lasting response to loss of English elm from the UK landscape through Dutch elm disease still affects those who witnessed it, not just because of a no-longer-existing idiosyncratic presence, but because of the process whereby loss occurred, and perhaps because of its perceived genesis in human negligence.

They *used to* stand alone, aloof, in sombre lustres,  
Englishly ungaudy in their lofty looks;  
parasol to languid sheep and cattle clusters,  
high-rise home for flocks of disputatious rooks;  
[my emphasis]

“*Used to ...*”. Not just the loss or the causes of loss, but the poignant comparison with a former state. But process can take too-important a role. Respondents to questionnaires are thereby encouraged to adopt this focus: “*I’m being consulted by the government about this process!*” is a mental state fixed upon what is presently occurring, rather than how others – future others – not consulted will feel about the outcome. The UK government’s own dispensation on discounting is but a pale facsimile of the oft-demonstrated tendency of individuals to discount hugely over a short period, as between decision and outcome. Shackle (1958) characterises the overwhelming importance of the moment in which decisions are taken thus. “There is for us a moment in being, which is the locus of every actual sense-experience, every thought, feeling, *decision* and action.” [my emphasis]. And so the values engaged and created through the process of consulting with decision constructors (who include respondents) take undue importance, compared with values experienced by the outcome bearers. It is the latter group with which cost–benefit analysis should largely be concerned.

Once again, decision constructors have values which should not be transposed to the outcome bearers. Repeated evaluations have demonstrated the effect of minority knowledge on scores ascribed to a view in North Wales, in which a castle features. The castle is first perceived as medieval (to which those who had known Welsh history might respond adversely), which elicits a positive response for its grandeur and picturesqueness. Once it is known that it dates from a later period, partly financed by profits of the slave trade, values change markedly. Final, informed values of “what is”, are conditioned by the process of “coming to be” (which few of the population, however, know about) and the by process of evaluation (which few, however, are involved in).

How can utilities be projected, without engaging the distorting results of process? The answer is, by getting as close as possible to day-to-day decisions on landscape value, divorced from a particular issue. Figure 1 shows cost of travel to five Welsh landscapes, manipulated by the once-popular travel cost method to give cash values (Bergin and Price, 1994). Landscape

quality was judged subjectively on a scale similar to that of Fines (1968), which had been in use, providing consistent results, over a period of 20 years (Price, 2012a).

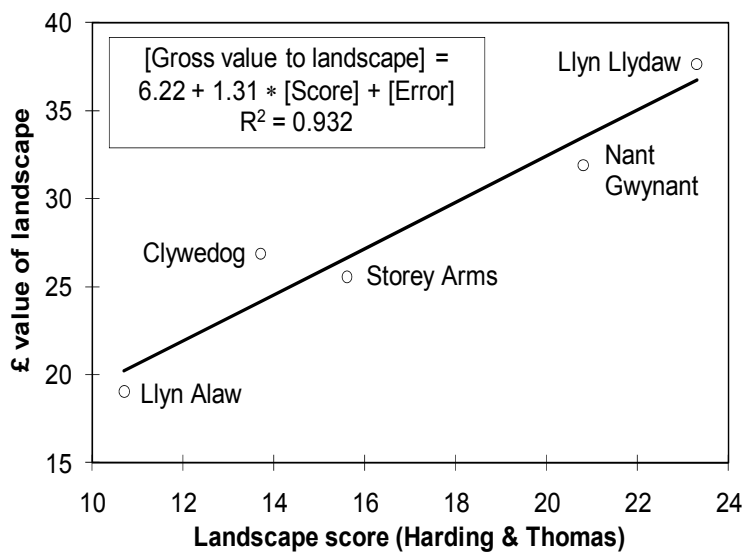


Figure 1. Revealed willingness to pay for landscape quality

Parallel but independent research by Henry (1998) has related expert judgement of landscape quality to house price.

Such monetary values for intervals of landscape quality could be transposed to the projected visual effect of tree disease. This is a process I have been advocating for 40 years (Price, 1976). Nowadays a similar process of transposition is advocated under the title “benefits transfer”. Perhaps if my paper had been titled, not “Subjectivity and objectivity in landscape evaluation”, but “Benefits transfer for cultural ecosystem services”, it might have been taken more seriously, and would now be a standard reference?

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