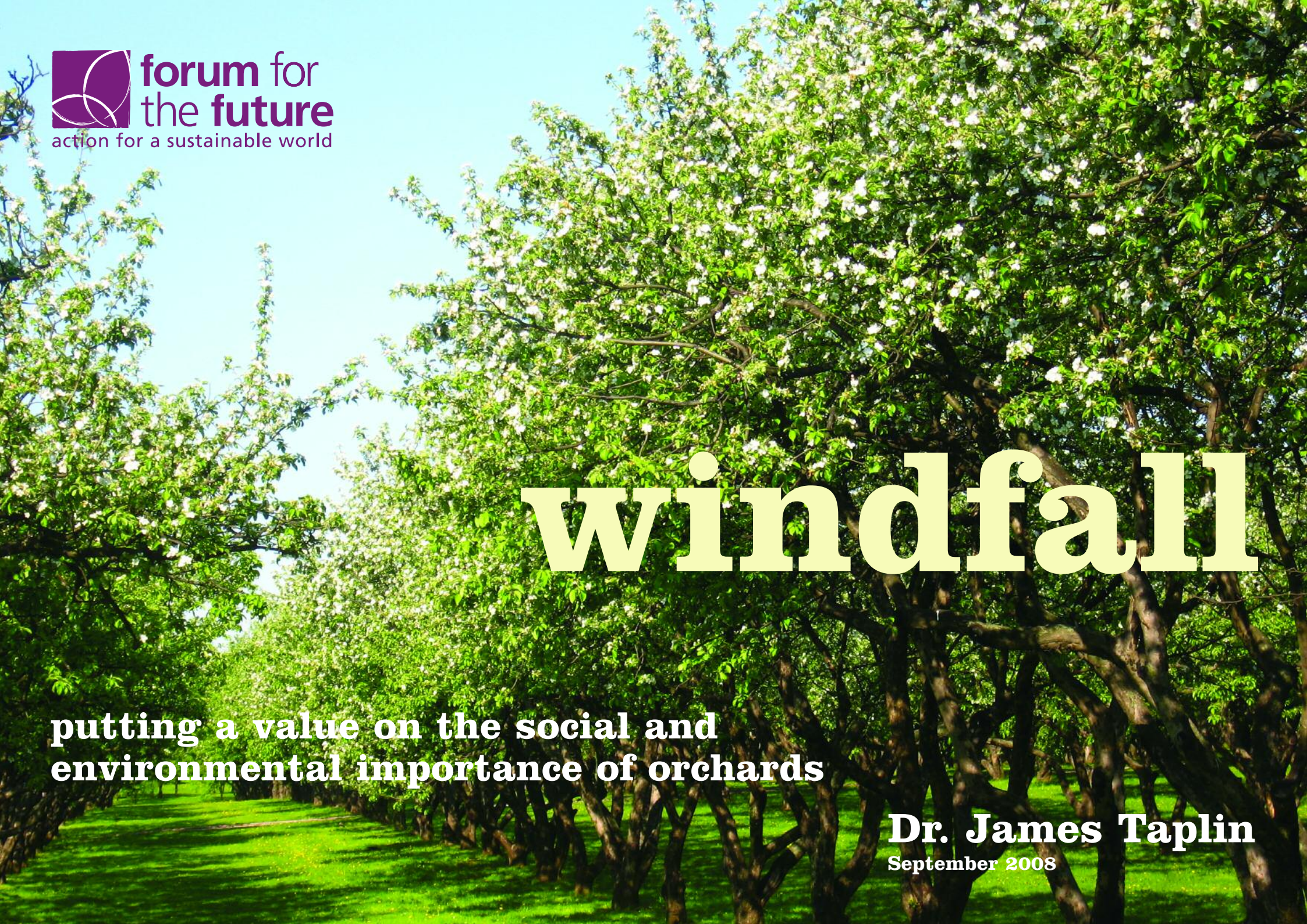

forum for the future
action for a sustainable world
windfall
putting a value on the social and environmental importance of orchards
Dr. James Taplin
September 2008

The Bulmer Foundation worked with Forum for the Future to derive a novel methodology for assessing the full total economic value of orchards in Herefordshire. This forms part of the wider Herefordshire Orchards Community Evaluation (HOCE) project, which was managed by the Bulmer Foundation on behalf of Herefordshire's Orchard Topic Group, and funded by a range of organisations headed by the European Agricultural Guidance and Guarantee Fund (EAGGF) and DEFRA through the Herefordshire Rivers Leader+ programme. The involvement of Forum for the Future in developing the methodology was specifically made possible through the support of Bulmers.

Special thanks are due to Dave Marshall of The Bulmer Foundation for his unflagging support, expertise and enthusiasm, and for valuable contributions from David Bent and Claire Skinner of Forum for the Future.

Forum for the Future – the sustainable development charity – works in partnership with leading organisations in business and the public sector. Our vision is of business and communities thriving in a future that is environmentally sustainable and socially just. We believe that a sustainable future can be achieved, that it is the only way business and communities will prosper, but that we need bold action now to make it happen. We play our part by inspiring and challenging organisations with positive visions of a sustainable future; finding innovative, practical ways to help realise those visions; enabling leaders to bring about change; and sharing success through our communications.

www.forumforthefuture.org

Registered office: Overseas House,
19-23 Ironmonger Row, London EC1V 3QN
Registered charity number: 1040519
Company limited by guarantee: 2959712

forum for the future
action for a sustainable world

The Bulmer Foundation

Date of publication: September 2008

Designed by The Good Agency

contents

background

What's the real value of an orchard? How do you put a price on biodiversity, tranquillity, or heritage? These were the sorts of questions that we set out to answer by exploring the total economic value of a sample of Herefordshire orchards.

This report explains the rationale and methodology of the study conducted during 2006 and 2007. Since the detailed results of the wider project are better explained by the many specialists who have conducted the workshops and field surveys, they will only be lightly touched on here. Instead, we focus more on the broader learning and implications of the study. For more information about the wider project and its findings, visit www.herefordorchards.co.uk.

introduction

Trees, woodlands and forests hold special significance for many of us, which makes it all the more surprising that we currently seem hell bent on chopping as many of them down as possible. In this, our actions appear to be at odds with our hearts – often because our heads are being turned by the popular current paradigm of traditional economics.

In the theory of the free market, the price of any good serves to equalise its supply and demand. This means that for any given price, the amount that suppliers want to sell is precisely matched by the quantity that consumers want to buy. Though the model requires some unlikely basic assumptions to be met to work perfectly, this theory nevertheless works well enough in reality for it to be used as a decision-making tool across most of the world.

So, everyone's happy, right? Well, no, not quite, because a glaring flaw in the theory is its erroneous assumption that price directly corresponds to value and can be used to define the optimal level of consumption of any given product or service. For a physical manufactured object, like a pencil, this may be broadly true, but for most social and environmental products and services it is not. The result is that anything without a price tag attached, like clean air, tranquillity, biodiversity or heritage, has zero value in economic decision-making and so is over-consumed. We can see the disastrous consequences of this all around us, from health problems brought on by smoggy cities and the over-consumption of clean air, to the hunting of species to extinction, to wholesale destruction of ancient rainforest for short-term timber and cattle-rearing, to cities paralysed by congestion.

In Herefordshire, as in many other parts of the UK, orchards are being grubbed-up to make way for new land uses which appear to have higher direct economic value associated with them – including grazing, and growing cereals and soft fruits – and as a result of the pressure for new housing.

Ordnance Survey figures suggest that similar pressures across England as a whole have caused the loss of 64% of orchard area since 1950[1], with loss rates in some parts of the country exceeding 90%[2].

The purpose of this project was to reassess the validity of these land-use decisions by looking beyond the basic economic value of orchards, and considering instead a measure of their total economic value. To do this, we chose six orchards, with differing characteristics, to assess in detail.

1. Comparing the 1950 agricultural census figure of 108,555 ha of Orchards with the 2006 Ordnance Survey figure of 39,600 ha
2. http://www.ukbap.org.uk/library/BRIG/SHRW/Consultation/PriorityHabitatsReviewConsultationReportAnnexes.pdf

total economic value

Though some would argue that environmental and social value should not be reduced to numbers, operating within a market economy requires us to put a financial value on attributes that fall outside conventional valuation, to determine their total economic value (TEV).

The TEV of an environmental resource is usually described as being made up of use and nonuse components. As the name suggests, use values (UV) are those that come from using the resource in some way, and are sub-divided into direct use values, indirect use values, and option values. On the other hand, nonuse values (NUV) have no personal exploitation associated with them, and are instead related to feelings of altruism (bequest values) and ethics (existence values).

Direct use values (DUV) flow from the consumption of products from the resource (e.g. apples, grazing, wood), or through deriving economic benefits from the consumption of its attributes, e.g. recreation or tourism revenue from people visiting it. Note that direct use values do not have to have an actual monetary payment associated with them – i.e. no money needs to change hands. For example, it is common to put a value on a free recreation site by looking at what people pay to visit it in terms of the cost of their transport to the site, and the value of the time they spend there.

Indirect use values (IUV) typically come from the (often unknowing) consumption of ecosystem functional benefits. So, for example, natural ecosystems like mudflats, marshes or mangroves, are excellent at protecting the coast and the infrastructure behind it by naturally dissipating the force of the sea. This protection factor has too often gone unrecognised in the past until it is too late, and expensive 'hard' engineering schemes have needed to be built to replace them (often at extensive cost). In our study, the orchards provide a variety of ecosystem functions – there is the climate regulation effect of carbon sequestration, and the regulation of both groundwater flows and chemical composition.

Option values (OV) can be thought of as insurance values – they are the value that comes from having the resource / asset on 'standby' and able to be used at some stage in the future. For example, when large drug companies buy up acres of rainforest and protect the tropical biodiversity, all (or a significant portion) of this expenditure is an option value payment – they don't want to use what is there now, but with increasing numbers of lucrative drugs coming from natural compounds, they want the option to be able to use these biological resources in the future.

Bequest values (BV) are those that an individual or society places on a resource or ecosystem for the sake of future generations. They are a kind of legacy value. An example is protecting habitats so that future generations can also enjoy them.

Existence values (EV) are different from bequest values, but it is often difficult disentangling the two since they are both somewhat emotive measures. The existence value is the value that an individual gets from simply knowing that a species or a resource exists, even though they themselves will never see or experience it. These sort of values (in conjunction with bequest values to some extent) have been used extensively by wildlife campaigners in fundraising – e.g. save the whale / panda / tiger / polar bear / etc. For the most part, the individuals responding to the call for cash will never get any use out of the resource or species in question, but merely knowing that they are out there is valuable to them.

So, in classical environmental economics, the total economic value (TEV) of an environmental resource is the sum of all these different sorts of value.

herefordshire orchards

In this study, we have used a triple bottom line approach: considering the economic, environmental and social components of orchards to calculate a good estimate of their TEV. This is a commonly used framework when looking at questions of total sustainability. However, we had to ensure that it provided enough of the total economic value as expressed in conventional valuation studies to provide the correct degree of validity, and to make sure that we weren't missing any critical issues.

The potential values of an Orchard from a TEV perspective are shown in Table 1:

Type of value	To the farmer	To wider society
Use values		
Direct use values	Apples Secondary products (e.g. cider) Firewood Grazing Shooting rights on land	Contribution to Herefordshire tourism Local recreation (continuous, seasonal or festival) Landscape and amenity values to local inhabitants Support for the local economy Shooting support – cover/nesting/food for birds
Indirect use values		Groundwater flow control Regulating chemical composition of the water Contribution to climate change
Option values	Direct use values and indirect use values into the future	
Non-use values		
Bequest values		Preserving cultural heritage for future generations Traditional habitat preservation
Existence values		Biodiversity enhancement or preservation

Research and consultation enabled us to identify the elements in Table 2 as being likely to be the most significant. They are grouped by sustainability category (environmental, economic or social) with their relation to the TEV framework listed alongside:

	Orchard attribute	Relationship to TEV
Environmental	Biodiversity Climate change Soil quality	Option and existence values to society, bequest values of the habitat Indirect use value to wider society of carbon flows into and out of the orchard Direct use value to farmer through supporting the crop, indirect use value to society through water impacts
Economic	Profit Local cash flows Draw for tourism	Direct use value to farmer of all products (less costs) Direct use value to wider society of improved economy Direct use value to local society of tourist spending (excludes the direct use value to tourists of their recreation)
Social	Three impacts unique to each location	These varied from orchard to orchard depending upon the views of local participants in the community workshops. However, inasmuch as they tended to be related to cultural heritage and amenity and leisure, they were a mixture of direct use and bequest values.

putting a value on the attributes

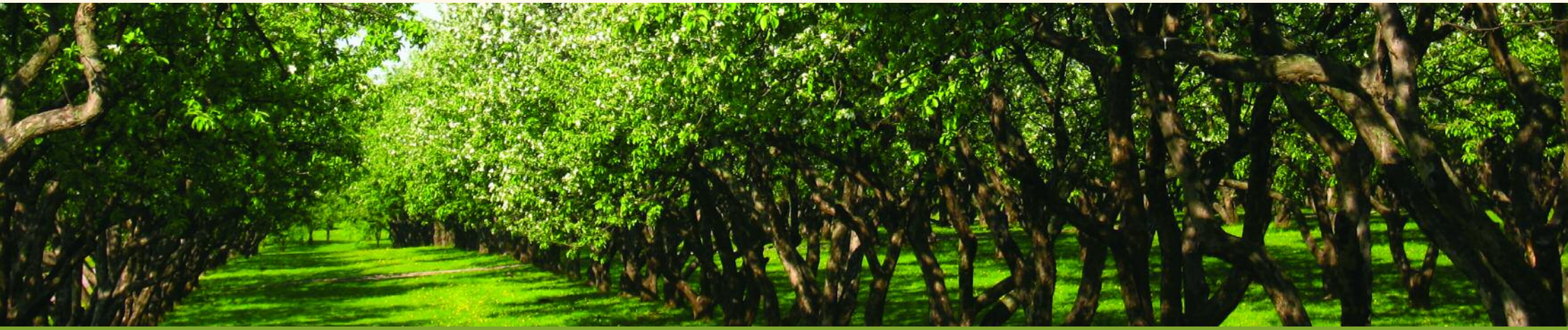
Since many social and environmental attributes are not paid for explicitly in markets, environmental economics has spawned a whole new branch of research around novel valuation procedures – ways of putting a financial value on things that don't have a direct market price (and which many would argue are essentially unquantifiable). The techniques they use to do this are either revealed methods or stated methods, and both have their limitations and drawbacks.

Revealed methods use peoples' actions and spending-decisions within the market to reveal their preferences for environmental goods and services and the implicit price that they put upon them. So, for example, the travel cost method combines the physical cost of travel to a resource (e.g. a free-entry woodland) with an estimated value of the time people choose to spend in visiting it to determine its total 'value' to society.

Similarly, the price people are willing to pay for houses is often used to calculate the value of particular environmental attributes such as clean air, or tranquillity. This technique is known as hedonic pricing, and it assumes that the market value of a house is determined by the bundle of attributes that go into it – physical (size, postcode, etc), social (local amenities, schools, pubs, parks, etc), and environmental (air quality, noise, etc). So, by defining each of these characteristics for every house, and then comparing properties which are identical in all but one respect, its possible to see how a change in that characteristic affects the price – and therefore what value people place upon it.

Stated preference methods, as the name suggests, rely upon asking people what value they place on an unmarketed resource – either in terms of what they would be willing to pay to get more of it, or what they would be willing to accept in compensation to lose some of it. The most common techniques used in stated preference studies are contingent valuation, and contingent ranking.

In this study we use a variety of techniques but, because of time and resource constraints, have tried as far as possible to use revealed preference techniques and proxy market values (an economic payment which infers the value of a non-marketed resource). The key exception is for the social attributes of the orchards, which relied on community workshops to provide subjective stated values. The methodology for this is discussed later in the discussion of attributes seven to nine.



attribute 1: biodiversity

Valuing biodiversity is one of the most difficult challenges given its complexity and global significance. Most attempts at putting a value on it involve lengthy stated preference methods, and are highly case specific – meaning that there wasn't an appropriate ready-made source that we could tap into. We also lacked resources to do a necessarily detailed contingent valuation study ourselves.

We are able to compare biodiversity across the orchards from the many voluntary detailed field surveys that were performed as part of the study, but this in itself doesn't give us a measure of monetary value. There were also no species with dedicated special-interest groups associated with them that might give a proxy payment through membership fees. As for the trees themselves, we didn't find sufficient differences in prices paid by cider makers for different apple varieties to give us any insight into the market value for genetic diversity.

If there were such a thing as a total UK budget for biodiversity preservation, then it might have been possible to find the range of UK ecosystem diversities and their abundance, then use this to apportion a share of the total to an orchard based on its relative biodiversity 'score'. The closest measure we have to this is probably the spending on Biodiversity Action Plans, but these are generally targeted at marginal (natural) habitats and species, neither of which is applicable to orchards.

Given all of these problems, the simple solution was instead to look at what the government is willing to pay to 'protect' a type of habitat through the agricultural stewardship scheme. This is not, strictly speaking, a measure of biodiversity alone and incorporates a number of additional elements, possibly associated with agricultural production targets, recreation, and habitat protection. However, it serves as a differentiating proxy in the absence of other, more explicit values, and so long as any payments were subtracted from the market value to the farmer, there would be no double-counting.

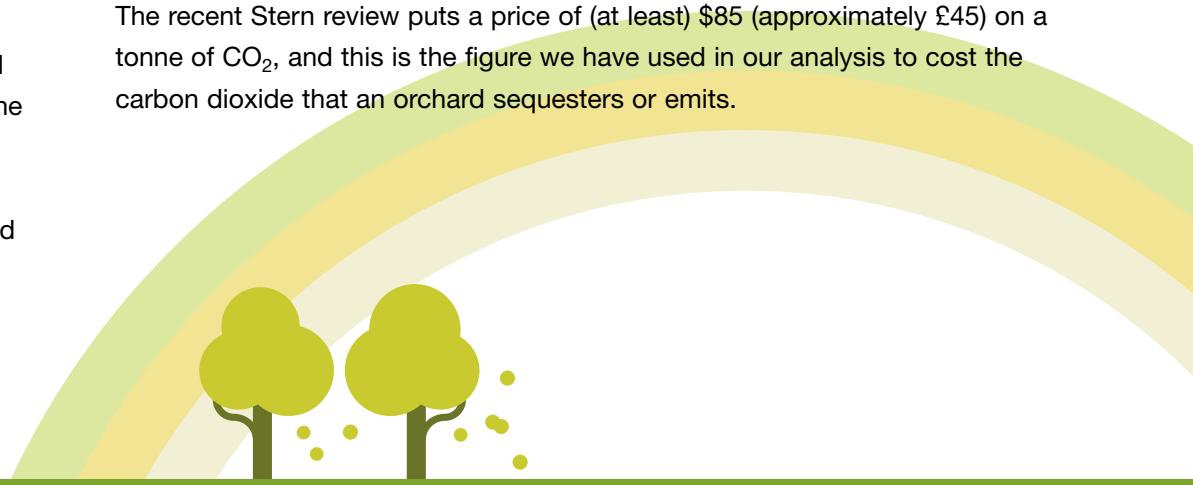
attribute 2: climate change

An orchard's contribution to climate change is determined by its impact on global atmospheric carbon dioxide equivalents. On the one hand, CO_2 is being removed from the atmospheric system and locked-up in the growing biomass of the apple trees and the accumulation of organic matter in the soil. On the other, CO_2 is being emitted through the burning of fossil fuels in the machinery used to run, maintain and harvest the produce.

To this we also added the impact of methane (another greenhouse gas), which is produced in the orchard through the digestive processes of the ruminants that graze there. Multiplying the volume of methane by 21 converts it to the volume of carbon dioxide with an equivalent climate change impact.

The net contribution to climate change is the annual volume of carbon dioxide (equivalents) removed from the global system minus that emitted. To put a value on these emissions (or removal) we use an estimate of the total external costs of a tonne of CO_2. The largest problem here is that there is no single value for this since estimations vary depending upon the range of the impacts that are included and peoples' perception of their significance. For example, a recent study by the Stockholm Environment Institute suggested that the social cost of carbon ranged between £0 – £1000 per tonne of carbon (£0 – £270 per tonne of CO_2) but that there was no theoretical maximum[3].

The recent Stern review puts a price of (at least) $85 (approximately £45) on a tonne of CO_2, and this is the figure we have used in our analysis to cost the carbon dioxide that an orchard sequesters or emits.



3. Stockholm Environment Institute (2005) Social Cost of Carbon – A Closer Look at Uncertainty

attribute 3: soil quality

Soil quality was thought to be most important in giving value to and from the productivity of the land, and in its impact upon water flowing through it. We came to the conclusion that the former impact would be (at least partially) captured in one of our other indicators – orchard profits – which incorporated the annual value of the crop.

A more difficult challenge was to determine the indirect use value that soil quality gives to society in the quality and flow rates of water delivered to the hydrological system. Short of creating a detailed topographical GIS model of the area, modelling rainfall, and then seeing how the location, slope, soil composition, vegetation cover etc of each orchard impacted water flows, there was no way of giving each orchard a unique soil quality assessment.

Instead, we looked for a simple proxy that would capture some of the value we were looking for, and found one in the organic payment scheme previously offered by a UK water board. This organisation had trialled a scheme (which folded due to limited take-up) of paying farmers in their catchment area £40 per hectare to switch to organic farming – the rationale being that the costs to them of cleaning the water flowing off each hectare were at least as high as this.

Our study wasn't sophisticated enough to measure the soil quality and contamination in each orchard, and then use this to somehow assign a unique soil quality value. Instead, we made the assumption that only organic orchards had indirect soil benefits to society of £40 per hectare.

attribute 4: profit

This is effectively the annual direct use value of the orchard to the farmer, and is the sum of the marketed economic products it provides (apples, firewood, grazing income, shooting rights) less the costs of producing them (labour, machinery, fuel).

Excluded from the valuation is the capital value of the land itself. This is because land values are derived from a number of factors related to the character and productivity of the orchard (which will already be captured elsewhere), and a number that are effectively opportunity values related to the size, location and possible alternative uses of the land.

attribute 5: local cash flows / local economic impact

Capturing the value of the orchard to the local economy was fraught with potential problems of double counting. For example, not only were we already looking at the contribution that the orchard makes to tourism, but we were also including any spending the farmer makes locally as part of the profit measure.

Nevertheless, we believe that an orchard further contributes to the local economy in ways beyond these most visible impacts. One way of measuring how it does this is to look at the value-added to the local economy through its economic presence. Employing local people may provide a value over and above the monetary value of the wages through intangibles such as security or respect. In addition, the spending that an orchard makes with local businesses on local labour or supplies may be worth more than its face value because it is putting cash into the local economy that can then be spent again on further local goods.

This re-spending is termed the local multiplier effect. It is a concept developed by the new economics foundation (nef), who have also developed a methodology for calculating how many times £1 spent locally is recycled around the local economy. For example, a pound is first spent with a local business (once), this local business employs local people and pays their wages (twice), these local people then spend their wages locally on other goods and services (three times).

Carrying-out a dedicated local multiplier study for each orchard was impossible within the project constraints. Instead, we researched other studies and then applied a highly conservative multiplier value of 1.4 to the spending that each orchard made locally.

attribute 6: draw for tourism

The tourist value of an orchard consists of:

1) Direct tourist spending (if any) on the orchard – e.g. entrance fees

2) A share of the direct tourist spending in the area of those tourists who are visiting specifically for the landscape features – e.g. accommodation, food, excursions, goods spend

3) A proportion of the value of the time and money that those tourists who specifically visit for the landscape features spend on getting there – e.g. the cost of fuel / train fares and the value of individuals' time.

Quantifying these values accurately would require travel cost and contingent valuation studies with tourists in the area of each orchard. There was insufficient resource for such methods here, and since none of the orchards had paying visitors, we concentrated specifically on direct tourist spending alone, and developed a proxy figure from published records.

The 2001 Herefordshire tourism report estimated that the value of annual spending significantly associated with landscape features was £129.6 million. The proportion of this total that can be assigned directly to orchards is hard to determine, but we made the assumption that since only 2.5% of Herefordshire's land is under orchard, the direct contribution they make to tourist revenue shouldn't be greater than this.

Sharing the resultant £3.34m of orchard revenue equally amongst the 3006 known Herefordshire orchards gives each a maximum contribution to tourism value of £1,078. However, in recognition of the fact that some orchards are more visible (or accessible, picturesque, etc) than others, we used expert (but subjective) guidance to adjust this value by a multiplier ranging from 0.1 – 2.

attributes 7 to 9: Social impacts

In addition to the three environmental, and the three economic attributes, we also held community workshops to determine the top three social attributes of each orchard.

Inhabitants local to each orchard (living within 1km) were invited to an early evening weekday workshop in their immediate area (either a pub, school, or village hall). On average, there were 23 local attendees (including the orchard farmer) at each of the six workshops, who were divided into three or four facilitated groups to discuss the role of the orchard in their communities and the values (if any) that it provided.

The community was specifically encouraged to think about the social functions of the orchard. Once the full range of impacts had been discussed in groups and reported back to all, each participant in the workshop voted for their top three. The monetary values of the other six attributes (environmental and economic) had been calculated before each workshop, and were presented to the attendees as a scale of other orchard values. Each group was then asked to place the three social attributes amongst the other six relative to their perceived value and importance. The average ranking derived by the group as a whole gave an idea of the potential value of each social attribute (using the ‘known’ values of the other attributes above and below on the scale).

caveat

It's possible that there could be some environmental or social economists who have struggled this far in the report and are now spitting in fury. It's therefore worth stating clearly that we are well aware of the multiplicity of issues with the methodologies that we have chosen, and specifically with the 'valuation' of social impacts. We know that they don't provide rigorously definitive estimates of orchard value, and that the workshop process didn't generate reliable economic valuations. The participants were not asked to state how much hard-earned cash they would actually be willing to pay to preserve their access to those attributes.

But, we also suspect that our estimation of most of the monetary values is deliberately too low to allow for some of the great uncertainty, and that the problems of bias in stated preference valuation techniques are so entrenched that the results from our methodology stand a good chance of being as accurate as many others. In this manner, our figures can be used to provide rapid indicative estimates of the attribute values and to compare the relative total values of the orchards in the study.

Besides, we also know that economics is from the head, whereas many social attributes (like peace and wellbeing) are from the heart and can never be accurately captured in money terms alone. This work seeks to explore the values, but also to open up debate and encourage a greater appreciation of the importance of 'place' to people.

results

As mentioned previously, this report is not best placed to discuss the major results in detail. However, table 3 gives a flavour of each of the six study orchards, together with the attributes and valuations placed upon them. For clarity, the attributes of each orchard have been ranked in decreasing order of value, and also colour-coded: blue = economic, green = environmental, and pink = social.

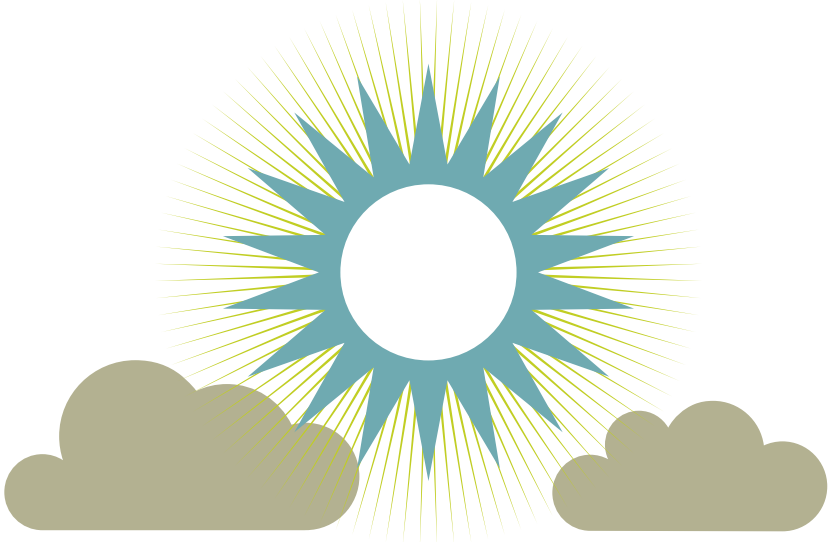
Table 3: Estimated social, economic and environmental attribute values for the six orchards studied.

Name	Bodenham Lakes		Half Hyde		Henhope		Salt Box		Tidnor Wood		Village Plum	
Location	Bodenham Lakes Nature Reserve		Castle Frome		Prior's Frome		Garnons		Tidnor		Man of Ross	
Type of orchard	Traditional		Traditional		Traditional		Bush		Traditional		Bush	
Farming method	Organic		Organic		Organic		Non-organic		Organic		Non-organic	
Area	2 hectares		3 hectares		4 hectares		5 hectares		10 hectares		6 hectares	
	Attribute	**£ / yr**	**Attribute**	**£ / yr**	**Attribute**	**£ / yr**	**Attribute**	**£ / yr**	**Attribute**	**£ / yr**	**Attribute**	**£ / yr**
Ranked 1	Enjoying wildlife and nature	2,586	Profitability	1,487	Profitability	4,879	Profitability	15,458	Cash flows in the local economy	18,340	Cash flows in the local economy	16,720
Ranked 2	Walking and exercise	1,990	Tourism	1,449	Conservation (Heritage)	3,963	Work/income	13,009	Like it being there	8,637	Climate Change	4,791
Ranked 3	Tourism	1,293	View	1,362	Cash flows in the local economy	3,047	Climate change	3,214	Climate change	5,402	Profitability	4,517
Ranked 4	Education	450	Wildlife	842	Enjoying Nature (quality of life)	2,331	Wildlife	2,869	Nice environment	5,402	Natural Beauty	4,500
Ranked 5	Biodiversity	450	Biodiversity	755	Biodiversity	1,000	Cash flows in the local economy	2,376	Biodiversity	2,529	Peace	4,500
Ranked 6	Cash flows in the local economy	257	Cash flows in the local economy	728	Climate change	417	Walking	2,376	Tourism	1,293	Wildlife	4,500
Ranked 7	Soil and Water	72	Soil and Water	121	Walking	288	Tourism	1,138	Soil and Water	405	Tourism	1,138
Ranked 8	Profitability	14	Climate change	95	Soil and Water	160	Biodiversity	0	Lack of knowledge	-7,500	Biodiversity	0
Ranked 9	Climate Change	-19	Road issues	-750	Tourism	108	Soil and Water	0	Profitability	-9,615	Soil and Water	0
Total		**7,093**		**6,089**		**16,193**		**40,440**		**24,893**		**40,666**
Profitability as % of total		**0.2%**		**24.4%**		**30.1%**		**38.2%**		**-38.6%**		**11.1%**

The social issues have been listed in the table under the headings that they were given by the communities, which may make them appear more varied than they are. In reality there are a number of common elements flowing through them.

The most obvious is the appreciation of wildlife and the value that people get from it. (Enjoying) Wildlife or Nature comes up as one of the top three social benefits for five of the six orchards. In terms of the type of value that it provides, it seems that most people are deriving direct value from the enjoyment of nature, but are also likely to be registering a degree of value from being able to bequest the resource to others or from simply knowing that the wildlife exists. Interestingly, the 6th orchard community, who simply valued the orchard being there, also expresses this existence and bequest value.

There are other direct use social benefits that are common to orchards – such as recreation and well-being. It's difficult to say precisely what the emotional values are that people get from walking in the orchards, but it seems likely that they relate to the physical well-being of exercise coupled with the spiritual well-being of the peace and tranquillity. Four of the six communities cite this as an important social benefit.



conclusions

1) Profits are a fraction of total value

Decisions that are made predominantly on the basis of profitability of an orchard will be uninformed at best, and may well be wrong in wider sustainability terms at worst. This is problematical, given the very small profit margins that many farmers operate under. As a consequence, direct annual profits take on a disproportionately significant influence, and may make alternative land uses appear to be more attractive, solely on the basis of their immediate yields.

As this study shows, however, the profitability of each orchard is never greater than 40% of the estimated total value, and in two instances it is negligible or negative.

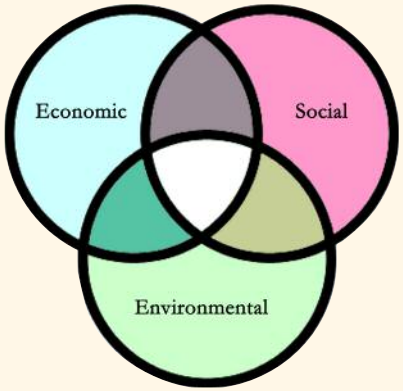
2) Issues are not discrete

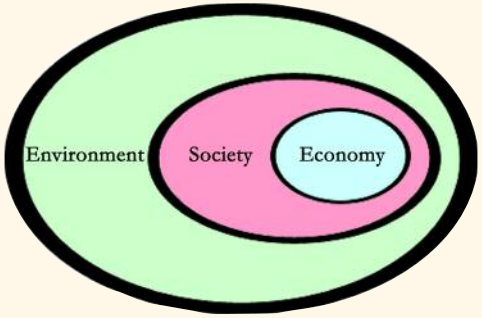
Whilst it's still common to talk about issues as if they were social, environmental or economic, in reality the relationships between the three are so interlinked that trying to make such distinctions is wrong. It's partially because of this that we now tend not to use the traditional sustainability diagram of three interlinking circles (top left) and instead refer to a nested system (top right). This takes the view that economics is a function of society, and both can only operate effectively within a successful environment.

This is clearly demonstrated in the critical 'social' issues that the workshops identified which, more often than not, have a strong environmental component – e.g. enjoying wildlife, natural beauty, conservation, and views.

3) Heritage and identity are important

In all but one case, communities kept within the upper boundary of values when placing social issues. This may indicate that they felt constrained by the scale and were unwilling to stray beyond the 'official' values, or it may be that they are generally pragmatists who still value hard economic certainty over softer social unknowns. Either way, the net result is that economic factors have the greatest





total value for five of the six orchards and in general make up approximately 50% of the total value.

Environmental values, on the other hand, score less highly overall. Again, one should be a little careful how you interpret this, given that we have deliberately chosen conservative proxy measures which are likely to underestimate total values. But the measures for biodiversity and soil quality used were also the only ones that were readily available – which says something about the state of our general understanding of environmental attributes in the UK. The result is that environmental values make up about 15% of the total (range = 6%-33%).

With environmental factors being somewhat underplayed, it's little surprise that the community workshops tended to rank social factors more highly (although, as discussed above, the two are closely interrelated). One of the methodological arguments against using the numbers from our study too strictly is that not asking communities what they would actually pay to preserve a social resource means that there is an incentive to over-rate its value. However, as an indicator of strength of attitudes, what the workshop results clearly show is that 'place' and its attributes are extremely important to communities.

This comes across in both the rankings, and in the types of social factors deemed important. All of the groups talked about the importance of heritage, peace,

solace, well-being, memories, or simply knowing that they were there as crucial attributes of orchards. Three of the groups went so far as to explicitly include this connection with the land as one of their top three impacts, but looking at the individual community responses shows that the sense of place is actually a dominant theme of the top-rated social factor for every orchard (other than Salt Box). So, for example, both 'view' and 'natural beauty' are concerned with the correct 'feel' that orchards give to the landscape and its traditional values.

4) Engagement builds value

One of the key benefits of this piece of work is not deriving numbers for orchard values, but in the new linkages and understandings that have been formed in communities as a result of it. Hundreds of people have been involved in one way or another – most of them in local communities who have been introduced to novel approaches and encouraged to see values beyond the obvious.

In all cases the participants learned about their shared interests and positions and looked at how they could do things differently as a community to improve the value for all. In at least one instance the farmer improved the access to the orchard when he discovered how much the community valued it. We hope that this kind of engagement in the role of orchards can be used as a template for a more equitable and informed national debate about our environment.

5) It's not all positive

It would be wrong to attempt to romanticise orchards, particularly traditional orchards, as perfect land uses with no drawbacks. Although our study suggests that the Herefordshire orchards we sampled had overwhelmingly positive impacts, there were occasional drawbacks. For example, one of the orchards had a marginally negative net impact on climate change (a consequence of the copious enteric emissions of the livestock that grazed in it).

More serious, however, were the negative social impacts. All six community groups were asked to identify bad aspects of each orchard alongside the positives and for two of the orchards, a negative issue was so significant that it was felt to be one of the top three social factors for the community.

The Tidnor Wood community felt that their lack of knowledge about the business and lack of access to the orchard was so important to them that they constituted a significant social cost to their way of life. It is excellent to note that this has already been addressed. A more complex issue was the interaction of the orchard and the traffic on the road running passed it, which the Half Hyde community felt was a significant social cost. Traffic and mud from the orchard impacted on the use of the road, but poor driving was also thought to be a more common negative impact on the orchard. The community experiences the resultant 'costs' of both these actions, hence the strength of local feeling, but it should be noted that the community is not so much protesting the cost of the orchard, as the cost to it.

6) No value doesn't always mean no value

Some of the attributes in the table appear to have no value – for example, soil quality and biodiversity at Salt Box and Village Plum orchards. This may be misleading – another problem with economic valuation, is that if you can't see how someone would actually pay for a resource (directly or indirectly), it is deemed to have no value.

The proxies that we have used to value soil quality and biodiversity are binary. That means that a value is available if an orchard has quality x but not if it has quality y. There are no subtleties of partial value in between, which means that those orchards that are not organic don't get the water quality payment, and those that are not traditional don't get the agricultural stewardship scheme payment. Since this means that no one is theoretically willing to pay the orchards for their soil and biodiversity attributes, economics says they have no value.

In actual fact, the biodiversity surveys conducted by volunteers found that every orchard had a rich abundance of bird, mammal, plant, reptile and invertebrate wildlife. One orchard even supported a species of lichen that was previously thought to be extinct in Britain, and attracted national media interest in its find. In reality, the assumption of zero biodiversity values for two orchards are unlikely to be true, and the fact that they appear to be so demonstrates a limitation of the valuation measures that we have used.

implications

So what does all of this mean for our orchards and our communities?

1. Current methods of economic valuation are flawed, and could be improved

This study shows that, in the case of orchards at least, economic decision-making as currently configured is unlikely to be serving our best interests – not at a national level, and certainly not at a local one when the strength of heritage and cultural identity becomes particularly important.

This may not in itself seem a surprising conclusion. But we believe that the novel way in which this conclusion was reached opens the door to better, more refined, approaches to resource use decision-making.

2. Communities do care and can be engaged

The strength of feeling and willingness to participate amongst the communities we worked with surprised all concerned, particularly the owners of orchards – and especially those whose orchards didn't have general public access. Understanding the pressures and drivers acting upon the different stakeholders helped community members see inter-relationships that they may not have recognised before, and seemed to build connections within the communities themselves. There's good evidence that effective engagement processes can empower people and help them contribute to better decision making. We believe this methodology has significant potential for further use in such engagement.

recommendations

What's needed next is for the broad themes of the study – that economics accounts for only a fraction of total economic value, and the importance communities attach to their land – to be heard by policy makers. We'd like them to explore better ways of recognising these factors and acting upon them accordingly. More than anything else, we'd like to be sure that decisions affecting our country are made from a position of informed strength rather than traditional ignorance.