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RESEARCH

An Expression of Multiple Values: The Relationship Between Community, Landscape and Natural Resource

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To aid political and institutional decision making in the sustainable use of natural resources the value of ecological, socio-cultural and economic assets has increasingly been communicated in terms of monetary units. Despite reliance upon natural resources, the impact of human activities has now reached a stage where cumulative losses are forcing society to re-appraise the evaluation process and how to better incorporate these values in to the decision-making process. This paper examines the attributes of value held by natural resources within ecological, socio-cultural and economic value domains from the perspective of a rural UK community. Here we reflect upon the continued primacy of monetary valuation of natural resource using two approaches, a scaled preference-based value typology and a place-based map measure. We demonstrate that the societal relationships which inform the evaluation of natural resources are both multi-faceted and hierarchical. Moreover, whilst aware of the utilitarian character of society's relationship with natural resource, the societal value-for-natural-resource relationship is primarily expressed using social-ecological qualities. These results add weight to the call for a new approach towards natural resource evaluation and how these values contribute to the sustainability agenda. New methods of evaluation must adopt multiple values that extend beyond a solely economic-based commodification concern to encompass the human relationship with the resource itself. Wherein, a multi-faceted approach to attributing value to natural resource, set within an experiential framework, can provide a focal point for discussion and the decision-making process.

Keywords: Natural resource evaluation; Preference-based value; Map-based value; Value typology; Social-ecological systems; Economic value

Introduction

Despite human reliance upon natural resources and the capacity of ecosystems to provide essential goods and services (Vitousek et al. 1997; Haberl et al. 2007), the loss of biodiversity and degradation of ecosystems continues on a large scale (Butchart et al. 2010). The impact of human activities on the planet has now reached a stage where the continuation of the current Holocene epoch is being challenged to the point where a new epoch, the Anthropocene, has been proposed (Crutzen 2002; Steffen et al. 2007). In some cases planetary boundaries are being pushed beyond safe levels and pose an inherent risk for stable, functioning and thriving societies (Steffen et al. 2015). The resultant degradation of and cumulative losses in the natural resources that provide the flow of ecosystem goods and services are forcing society to re-appraise their evaluation and how their values can be better incorporated into institutional and societal decision making (Daly 1991; de Groot et al. 2002).

A growing awareness of neglecting the importance of the life-sustaining connection between the natural world, natural resources and societal decision-making processes has led to the development of the ecosystem services concept, which has become the leading paradigm exploring the human-nature relationship (Lele et al. 2013). Out of these discussions ideas of finitude, resilience, diversity, equity and sustainability arise. However, the underlying ideology remains one of valuing natural resource, where assessment of ecosystems, ecological process, and goods and services change ecosystem complexity and functions into the goods and services valued by humans (Costanza et al. 1997; Daily et al. 2000; de Groot et al. 2002). There have been and are numerous ongoing attempts to ascribe values to the nature – human wellbeing relationship (Lele et al. 2013). TEEB (The Economics of Ecosystems and Biodiversity) seeks to directly appraise the economic contribution of ecosystems and their inherent components to human wellbeing (TEEB 2010). IPBES (Inter-Governmental Platform on Biodiversity and Ecosystem Services) has a wider remit to conceptualize values of biodiversity and ecosystem services from a broad multidisciplinary point

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of view (Diaz et al. 2015). Initiatives such as these aiming to incorporate natural resources via the ecosystem services concept into institutional and societal daily decision-making have developed two broad paradigms of approach (Raymond et al. 2014). The instrumental paradigm focuses on the quantification of objective measurements and spatially identifying social values, categorising these in terms of rank, monetary units, or other commensurable values that allow aggregation. The deliberative paradigm seeks to obtain stakeholder perspectives on and opinions about objects of value without claim to objectivity (Kenter et al. 2014; Raymond et al. 2014).

This paper examines the attributes of value given to natural resources within ecological, socio-cultural, and economic value domains from the perspective of a rural UK community. It attempts this primarily through an instrumental route but reflects upon the continued primacy of the monetary valuation and the shortcomings of market-based values (Plieninger 2015) for natural resources. Taking two approaches – a scaled preference-based value typology and a place-based map measure – we investigate the multi-faceted nature of value through the relationship community holds with natural resource in a local landscape context. Here community describes a geographic situation where people meet their daily needs, with social and economic structure and a form of co-operatively engaged action such as local government (Brown et al. 2002). Landscape represents the place where natural resources exist; these natural resources become ecosystem goods and services when used by human society. Arguably, complex social-ecological systems can only be understood through a heterodox approach to science (Martinez-Alier et al. 1998; Spash 2012). Biological components are embedded within the physical world, like-wise the socio-cultural world is embedded within the biological and the economic world operates within the socio-cultural (Spash 2012).

Contemporary concepts of ecosystem valuation have primarily come from either ecological or economic disciplines, and many use money as a common metric to translate environment and anthropogenic environmental impacts for political and institutional decision makers (Hicks et al. 2015). Natural resources, ecosystem components, structure, and processes become synonymous with the monetary value that is given to ecosystem goods and services (Spangenberg and Settele 2010) and the commodification of nature (Schroter et al. 2014). However, natural and socio-economic systems and landscapes are the result of many layers of natural process and human intervention. They are complex, adaptive, living co-evolving systems, and evaluation should completely reflect ideas of interconnection and integration (Martinez-Alier et al. 1998; Spash 2012). Difference and incommensurability are also fundamental to any evaluation of system components, structure and process when described by ideas such as landscapes, communities, resource and service provision, diversity gradients, historical and cultural meanings (Martinez-Alier et al. 1998). Systems that include humans can also be thought of as reflexively complex, in that awareness and purpose are also system components and should be considered when explaining, describing, or forecasting their behaviour (Martinez-Alier et al. 1998). Correspondingly, there is a need for an interdisciplinary approach to the evaluation of human-natural resource dynamics (Costanza et al. 1999; Baumgärtner et al. 2008).

The Lexicon of Value

In terms of natural resources, the concept of value is complex. The concise Oxford dictionary, tenth edition, (Pearsall 1999) describes value as 'the regard that something is held to deserve; importance or worth'. Furthermore, the dictionary refers to a 'material or monetary worth'; value is ascribed units that express its 'regard, importance, usefulness or worth'. These units cover a wide lexicological range inter alia; 'principals or standards of behaviour; a numerical amount; a magnitude, quantity, or number; the meaning of a word' (Pearsall 1999). Through the act of evaluation, an estimation of importance or worth is carried out, a consideration of the 'value, quality, importance or condition' (Pearsall 1999).

Brown (1984) broadly summarises the conceptual sense of value as containing three elements: a preferential value, a numerical value, and a functional value. Values are also relatively abstract and situational; they hold spatial and temporal dimensions (Brown et al. 2002; Jorgensen and Stedman 2006), attitudes toward value are place specific (Jorgensen and Stedman 2006; Howley 2011), they imply internal, subjective, user-specific goals, objectives, or conditions (Farber et al. 2002), and preferences can vary between users, residents, outsiders, and policy makers (Leiserowitz et al. 2006). In such instances place-based social-ecological values can be seen as expressions of an underlying multi-dimensional network of factors involved in human-nature relationships (Convery et al. 2012). Values define or direct us to goals, frame our attitudes, and provide standards against which the behaviour of individuals and societies can be judged (Farber et al. 2002; Bardi et al. 2008).

In a definition of value that sought to encompass previous work on value typologies Schwartz and Bilsky (1987) describe values as: concepts or beliefs; about desirable end states or behaviours; they transcend specific situations; they guide selection or evaluation of behaviour and events; and are ordered by relative importance. Concepts of a preference related value directly involve choice and desirability, the placing of one thing before another because of some perception of 'better' (Brown 1984). In this context individuals assign value based on perception of the object under evaluation, their held values, preferences, and also the context of the evaluation (Brown 1984).

Schwartz (1992) emphasises that values are cognitive representations of three universal human requirements: biologically based organism needs, social interactional requirements for interpersonal coordination, and social institutional demands for group welfare and survival. Thus, the outward expression of a society's values can describe the underlying normative and moral frameworks used to assign importance and necessity to beliefs and actions (Farber et al. 2002). In many cases, however, underlying public attitudes appear to persist across generations

and link to deep-rooted societal and cultural forces such as the domination of nature viewpoint inherent in Judeo Christian tradition (Bieling et al. 2014; Manfredo et al. 2015). Behaviours associated with these values have the potential to limit the post-industrial shift towards a more biocentric and mutualistic view of nature (Schwartz 2006; Manfredo et al. 2015).

Community and Natural Resource

Concepts of a value preference need a context in which to express the value, held values or underlying values (Brown 1984). Ideas designed to connect held values with the landscape describe relationships where humans are considered as participative actors in the landscape; they live in it, work in it, visit it, and therefore value a landscape from this interactive perspective (Clement and Cheng 2011). Many environmental values have a spatial perspective that reflects commitment to a person's home and community (Brown et al. 2002). Sustainability of natural resources will ultimately depend upon those values, local attitudes, culture, behaviour, and planning. The importance of these values becomes more powerful when seeking to translate the value held by natural resources, which supports the generic processes of ecosystems services in a local cultural landscape context (Plieninger et al. 2014).

Socio-cultural values are expressed through cultural identity, belief systems, and attitudes that shape the normative and moral frameworks a society develops with the landscape that it creates and surrounds itself with (Farber et al. 2002; Sauer and Fischer 2010). A sense of place develops around the relationships and experiences humans have with natural resource, land, landscape, and ecosystems (Williams and Stewart 1998) and builds upon local knowledge and the connections people develop with their landscape (Borgstrom Hansson and Wackernagel 1999).

These experiences can be subjective, place specific and emotional (Schroeder 1996). Individuals can hold plural identities in different institutions, which may lead to different expressions of interest in their capacities as both consumers and citizens (Plottu and Plottu 2007; Kumar and Kumar 2008; Epstein et al. 2015). In such instances preferences may appear mutable and subject to change through, for example, education, advertising, peer pressure, or legislation (Farber et al. 2002). Society's approach to the evaluation of landscapes should reflect connections between community and the local ecosystem and respect the significance of local lifestyles being adapted to a place-specific context (Borgstrom Hansson and Wackernagel 1999; Flint et al. 2013; Raymond et al. 2013).

Schroeder (1996) suggests that to understand how people are related to environments we need to understand how people experience these environments. However, modern societies have become removed from the local landscape as natural resources support ecosystem goods and services that are increasingly supplied from distant ecosystems (Borgstrom Hansson and Wackernagel 1999). Signals that highlight the limits to human appropriation of natural resources and their ability to support the provision of ecosystem goods and services are lost, local lifestyles become less adapted to extant circumstances (Borgstrom Hansson and Wackernagel 1999). Values become generic rather than specific as community becomes distanced from the consequences of its actions. Observation of community incorporates the context and dynamics of society's direct relationships with landscape and land uses that influence the self-organisational properties and pattern formation of ecological systems (Haila, 1999; Flint et al. 2013). Currently, however, there are real challenges in terms of linking sustainability and effective natural resource management to the conventions of society and the institutions therein (Epstein et al. 2015).

Methods

Study area

The parish of Askham and Helton is located in Cumbria, in the north-west of the United Kingdom, the parish covers an area of approximately 18km^2, of which 84 per cent is classified as green space (ONS 2011) (**Figure 1**). Situated on the north-eastern edge of the Lake District National Park, the parish is a mixture of farmland, parkland, and open fell, much of which is unenclosed common land, with a predominately agricultural and forestry focus (Askham Parish Council 2010). Within the parish there are two villages, Askham and Helton, that are composed of 356 residents in 184 households, of which 164 are full time residences (ONS 2011). Study at the parish level provides an evaluative measure of community, a geographically defined area of local governmental administration. Within the parish boundaries local social and economic structures interact with the ecological components of the surrounding landscape as the people who live there provide for their daily needs.

Sampling

The study consisted of two elements, a preference-based value questionnaire and a map-based value measure. Both were presented as components of a parish council facilitated survey collecting views from residents to update the local Parish Plan through the compilation of a community assets list. All residents of the Askham and Helton parish were invited to attend open sessions in the village hall. The invitation to attend was communicated via the parish newsletter, posters displayed in the village shop and community notice boards plus a leaflet drop to all properties within the parish boundary. Sessions were held over a five-day period, morning, afternoon, and evening, weekdays and weekends, to provide opportunity for all residents to participate. Participants approached both the questionnaire and map-based exercise via an introduction sheet that provided background information, instructions for completion, and collected informed consent. The background information and instructions encouraged participants to consider their relationships with the local landscape characterised by thoughts of value. The described aim of the exercise, from a parish perspective, was to compile a register of parish assets, places, buildings and facilities that provide

Figure 1: Location of the study area, Askham and Helton parish, Cumbria in the UK; Askham and Helton parish identified by the red border.

and maintain social, environmental and economic benefit. Participants self completed both elements; first the preference-based value questionnaire, second the map-based exercise.

A preference-based value questionnaire

The questionnaire contained nine preference-based value statements, three within each value domain; socio-cultural, ecological, and economic. The technique used sought to quantify individual attitudes towards statements designed to reflect a range of underlying value concepts across the three value domains (**Table 1**). Statements describe a value typology contextualised to represent the relationship between community, their surrounding landscape, and the natural resources therein. The statements were constructed around descriptors used to express concepts of value associated with each value domain presented in Costanza and Folke (1997) and de Groot et al. (2002). Participants were asked to consider the qualities of their surrounding landscape, the areas, the buildings, and the facilities within it that contribute most to the three value categories, as described by the value typology, and rate how closely each suggestion agreed with their own views. Preference-based value was indicated using a 5-point Likert scale: 5 –

	Value preference statement	Underlying value basis	Value domain
1	A landscape that promotes vitality, physical and mental well-being.	Physical & mental health	Socio-cultural
2	A landscape that maintains local arts, customs, institutions, and characteristics.	Cultural diversity & identity	
3	Fair and equal access to all aspects of the surrounding landscape	Equity & equal allocation	
4	A landscape in which scarce and rare elements exist, now and in the future	Scarcity & Rarity	Ecological
5	A mixed landscape of meadow, mountain, woodland, river, and farmland	Complexity & Diversity	
6	A landscape that protects and provides long-term stability of the environment	Integrity & Resilience	
7	A landscape that provides resources for consumption, now and in the future	Sustainable & utilitarian	Economic
8	A landscape in which resources are produced efficiently and in large quantity	Efficiency & Maximisation	
9	Landscape that provides resources that can be exchanged for monetary value	Monetary valuation of goods, services & benefits received	

Table 1: A preference-based value typology; value preference statement, value basis, and value domain.

strongly agree, 4 – agree, 3 – neutral, 2 – disagree, and 1 – strongly disagree.

A map-based value measure

Following the preference-based value exercise, participants were introduced to a mapping element for soliciting place-based value. This approach allows participants to characterise value in the context of local knowledge and connection to the physical components of the surrounding landscape. The method utilised is adapted from a series of projects by Brown (2005) that sought to identify and map landscape values to investigate human–landscape relationships. Participants were asked to identify places which hold a high sense of value in each of the three described value domains within the Askham and Helton parish, three choices per value domain, and nine choices in total (**Figure 2**). Additionally participants provided a short descriptive sentence to capture the intended characteristics of each choice.

Analysis

A preference-based value questionnaire

Preference-based value statement data were non-normally distributed (Kolmogorov-Smirnov $p < 0.05$) so non-parametric statistical tests were used. A Kruskal-Wallis test explored difference in attitudes towards value held in the surrounding landscape. Using the 5-point Likert scale, scores by participant grouped by value domain were aggregated. Participant scores indicate strength of agreement in each value domain; scores could range from 3 to 15. *Post-hoc* analysis, using the Nemenyi test, identifies value domains where strength of agreement differs significantly. The Nemenyi test uses the sum of ranks instead of means for multiple pair-wise comparisons in a manner that parallels the Tukey test (Zar 2009).

Ranking using the sum of ranks further examined community attitudes toward landscape value. To explore the possibility of an attitudinal structure for preference-based value statements, a Kruskal-Wallis test sought to identify difference in the strength of agreement between the nine value statements. *Post-hoc* analysis, using the Nemenyi test, identifies preference-based value statements where strength of agreement differs significantly.

A map-based value measure

In contrast to the ideologically focused preference-based value statements, the map-based exercise asks participants to identify a physical and experiential reflection of the three value domain attributes, as defined by the preference-based value statements. This approach identifies value from a perspective of local knowledge and connection to the surrounding landscape.

Descriptive data characterises individual choices building primary groupings identified by specific landscape feature, area, building and facility within each value domain. Further consolidation into secondary level thematic groups builds a hierarchical model of participant's spatial responses to the value exercise. To explore the Askham and Helton parish community life-scape relationships, a Venn diagram visualises value connections. Intersections represent the connected nature of the community–landscape–natural resource value relationship.

Results

In total 37 responses were collected from full-time residents, these data describe a participation rate of 12.5 per cent from all residents, 15.2 per cent from households occupied on a full-time basis. Due to the small size of the local community, to ensure the anonymity of par-

ticipants, no detailed demographic data were collected. The relatively low participation rate suggests that these results may not describe a representative community view and precludes discussion regarding difference in experience based on specific demographic groups.

A preference-based value questionnaire

Responses to strength of agreement with the preference-based value statements, aggregated by value domain, were significantly different; $\chi^2 = 52.993$, df = 2, $p < 0.001$ (**Figure 3**). Based on participant evaluation of the preference-based value statements, parish residents express a higher

Figure 2: Completion of the questionnaire and map exercise in Askham village hall.

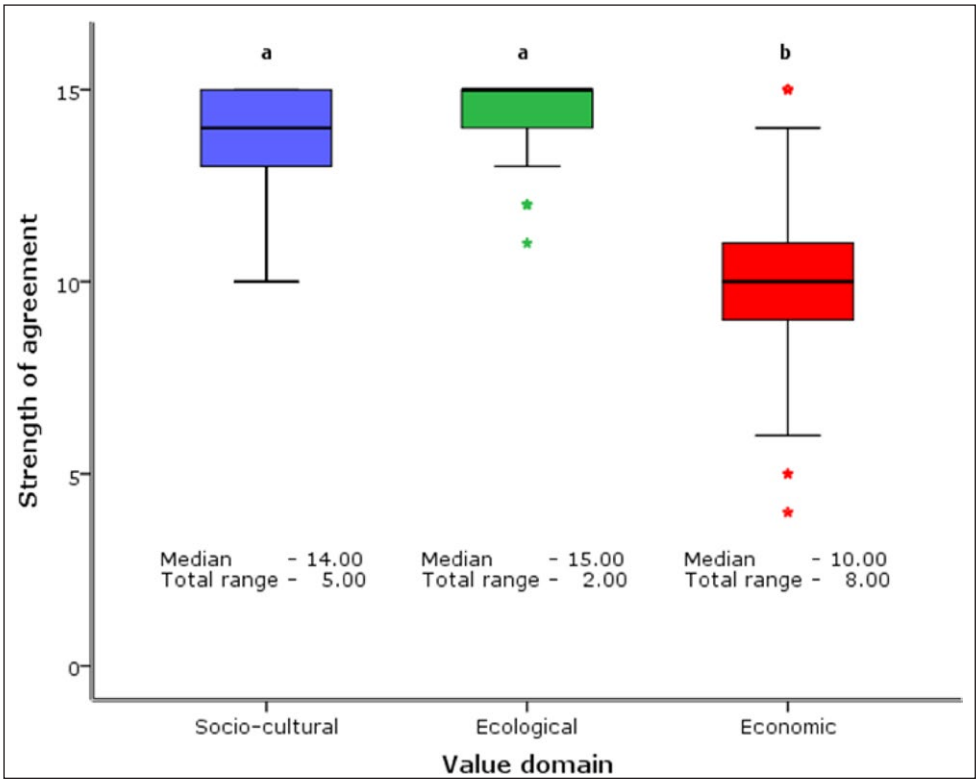

Figure 3: Difference in the strength of agreement between value domains, $\chi^2 = 52.993$, df = 2, $p < 0.001$; agreement scores for the three questions within each value domain are aggregated by respondent prior to analysis; N = 111. Black lines show medians, boxes show interquartile range and whiskers show total range (excluding outliers shown as stars). Letters denote homogenous subsets of value.

and statistically significant different level of agreement with statements that reflect underlying socio-cultural and ecological values when compared against statements that reflect underlying economic values.

Not only did participants show higher overall agreement with socio-cultural and ecological value statements, described by the median figures, the consensus about this expression of agreement was greater as evidenced by the smaller total range of these data: ecological value – 2.00, socio-cultural value – 5.00, and economic value – 8.00. The strength of participant consensus around agreement with socio-cultural and ecological value preference statements becomes evident when proportional data for participant expression of agreement is set against those of neutrality and disagreement (**Table 2**). Proportionally more than 92 per cent of participant responses express agreement with socio-cultural and ecological value preference statements, whilst only 44 per cent express agreement with economic value statements.

Ranking the individual preference-based value statements further demonstrates the strength of agreement around socio-cultural and ecological value statements over economic value statements (**Table 3**). Ecological value-based statements, which characterise the underlying values of complexity and diversity, integrity and resilience, and scarcity and rarity, occupy positions between ranks 1–4. Socio-cultural value statements, which characterise underlying values of physical and mental health, equity and equal allocation, and cultural diversity and identity, occupy positions between ranks 3–6. Economic value statements, which are used to characterise underlying values of sustainability and utilitarianism, monetary valuation of goods, services and benefits received, and efficiency and maximisation, occupy ranks 7, 8, and 9.

Value domain	Agree (%)	Neutral/Disagree (%)
Socio-cultural	92.8	7.2
Ecological	97.3	2.7
Economic	44.1	55.9

Table 2: Proportional data for strength of agreement responses by value domain. Participant responses for individual statement responses have been combined in to two groups, agree and neutral/disagree, for each value domain.

Participant strength of agreement with the nine individual preference-based value statements shows significant difference; $\chi^2 = 145.738$, df = 8, $p < 0.001$ (**Figure 4**). Parish residents express a higher and statistically significant level of agreement with statements that are characterised by socio-cultural and ecological values along with the economic value basis of sustainability and utilitarianism. Participant strength of agreement is of a statistically significant lower level for value statements that reflect the economic value basis of monetary valuation of goods, services and benefits received, and efficiency and maximisation statements.

The strength of a participant consensus around agreement is further evidenced, for all individual socio-cultural and ecological value preference statements as well as the underlying economic value of sustainability and utilitarian, when proportional data for participant expression of agreement is set against those of neutrality and disagreement (**Table 4**). Proportionally more than 83 per cent of participant responses express agreement with value preference statements 1–7, whilst 73 per cent express a neutral view or disagree with statements 8 and 9.

A map-based value measure

Location and descriptive data were grouped thematically within each value domain. These data informed the construction of hierarchical models (**Figure 5**). Primary level labels were taken directly from location identifications and descriptive text; secondary level labels were assigned during the *post-hoc* thematic grouping process. Thematic groupings begin to describe the interconnected relationship between community and landscape. Only four thematic groups are required, across the secondary level, to capture all primary data from locations and descriptions over the three value domains. Further examination of the map-based value data describes the level of connectedness

Rank	Value domain	Value preference statement	Sum of ranks
1	Ecological	A mixed landscape of meadow, mountain, woodland, river, and farmland	8211.41
2	Ecological	A landscape that protects and provides long-term stability of the environment	8081.54
3	Socio-cultural	A landscape that promotes vitality, physical and mental well-being	8020.86
4	Ecological	A landscape in which scarce and rare elements exist, now and in the future	7119.91
5	Socio-cultural	Fair and equal access to all aspects of the surrounding landscape	6828.35
6	Socio-cultural	A landscape that maintains local arts, customs, institutions, and characteristics	6669.62
7	Economic	A landscape that provides resources for consumption, now and in the future	5725.01
8	Economic	Landscape that provides resources that can be exchanged for monetary value	2543.38
9	Economic	A landscape in which resources are produced efficiently and in large quantity	2410.55

Table 3: Ranking preference-based value statements by strength of agreement; the sum of ranks is used for ranking purposes, N = 333.

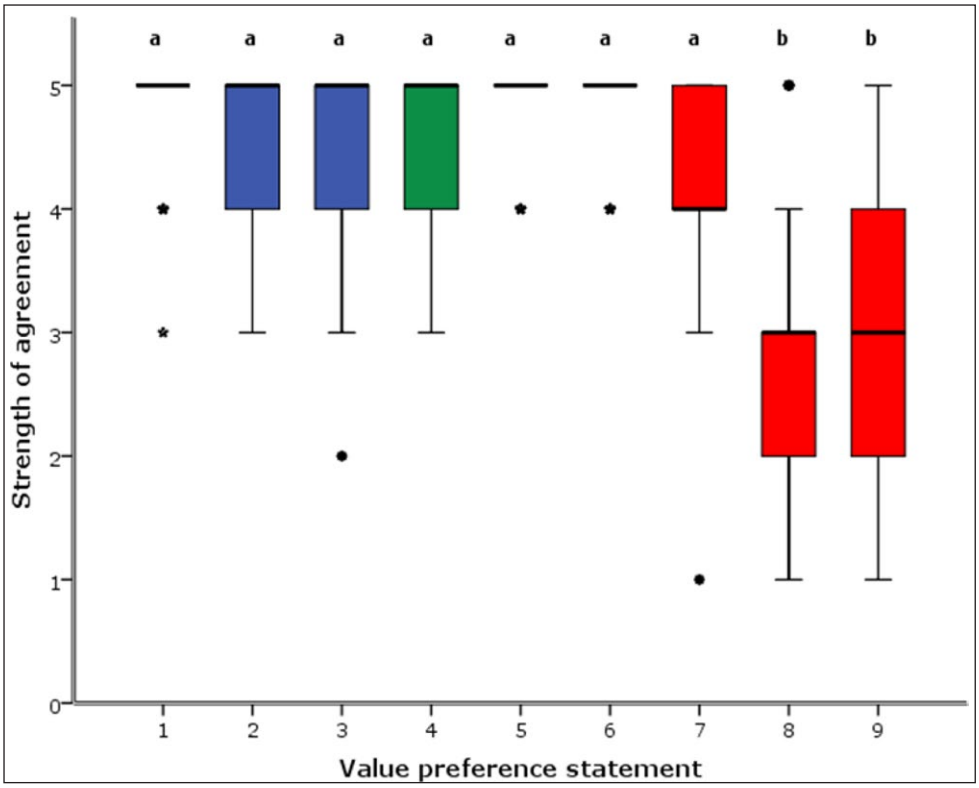

Figure 4: Difference between the strength of participant agreement for the nine preference-based value statements, χ^2 = 145.738, df = 8, $p < 0.0005$; N = 333. Black lines show medians, boxes show interquartile range, and whiskers show total range (excluding outliers shown as stars). Letters denote homogenous subsets by value statement.

Value domain	Underlying value basis	Agree (%)	Neutral/Disagree (%)
	Physical & mental well-being	97.3	2.7
Socio-cultural	Cultural diversity & identity	89.2	10.8
	Equity & equal allocation	91.2	8.8
	Scarcity & rarity	91.2	8.8
Ecological	Diversity & complexity	100.0	0.0
	Integrity & resilience	100.0	0.0
	Sustainable & utilitarian	83.8	16.2
Economic	Efficiency & maximisation	21.6	78.4
	Monetary valuation of goods, services & benefits received	27.0	73.0

Table 4: Proportional data for strength of agreement responses for individual preference-based value preference. Participant responses have been combined in to two groups, agree and neutral/disagree, for each value preference statement.

between value domains, value in the landscape is multi-faceted and interconnected (**Figure 6**).

Many of the selected landscape features, areas, buildings, and facilities that participants feel contribute most to a sense of value in their community landscape represent multiple value domains. This suggests that participant selections are thought to simultaneously hold multiple value qualities. Using proportional data from the map-based value exercise selections that express qualities of two or more value domains represent 86.5 per cent of all selections.

Discussion

This work examines value held in a landscape that surrounds a rural community through their strength of agreement for selected preference-based value statements and a map-based landscape value. The approach was designed to describe an underlying value basis which reflects difference in attitude towards natural resource and its use as described by three distinct value domains; socio-cultural, ecological, and economic. Ideas rooted in underlying values and attitudes are often seen to direct the concrete

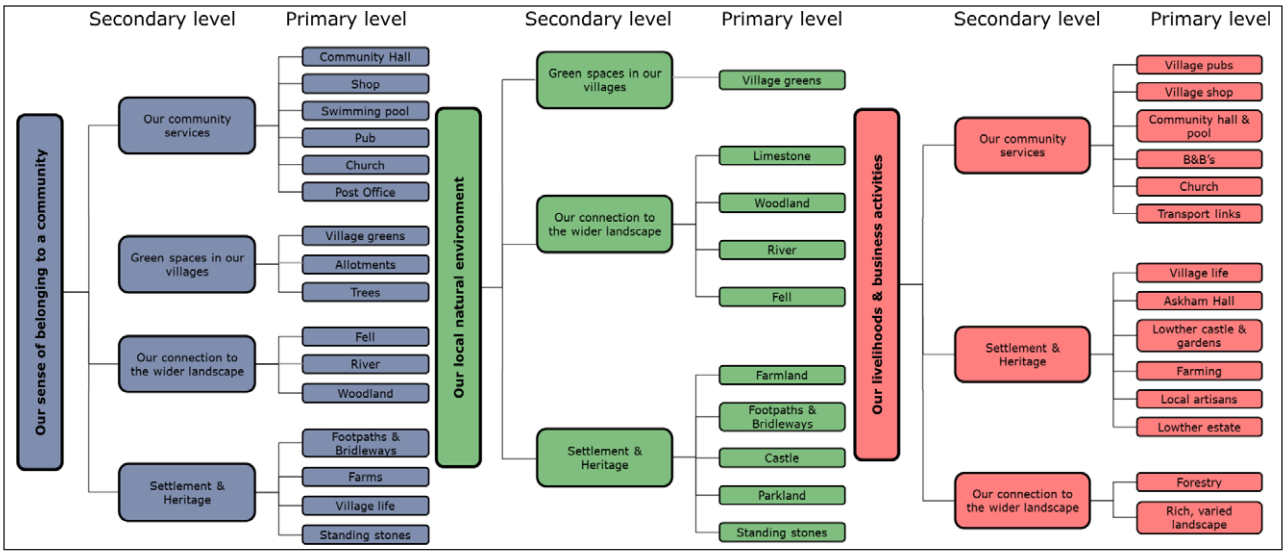

Figure 5: Results of map-based value exercise, participants identified areas of the surrounding landscape, specific areas within it, buildings, or facilities that contribute to a perceived sense of value within each of the three value domains. Within each value domain the identified elements have been grouped thematically, *post-hoc*.

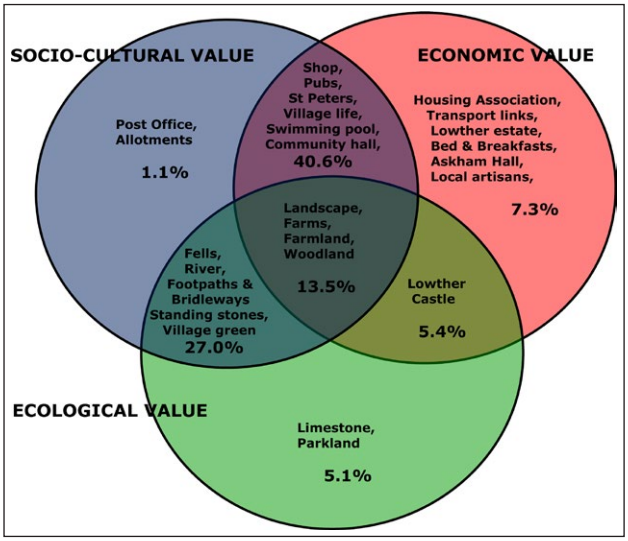

Figure 6: A Venn diagram displays location choices by value domain; intersections represent the connected nature of the community-landscape value relationship. Selections centred on landscape, farms, farmland, and woodland were thought to hold a sense of value within socio-cultural, ecological, and economic value domains. Numbers denote percentage of all selections; 86.5% of locations represent two or more value domains, 13.5% only one value domain.

decisions and actions taken by individuals and groups (Bardi et al. 2008). An important caveat, however, is that the sample size in this study was relatively small (37), and more work is required to substantiate these findings.

Through the expression of a community's attitude towards its relationship with natural resource the primacy for monetary value as the basis for a landscape evaluation exercise is considered. Participants expressed strong agreement with preference-based value statements that promote socio-cultural and ecological value considerations to their surrounding landscape, over those that operate from a specifically economic position. These value statements describe a physical and experiential sense of connection to the surrounding landscape which clearly illicit strong expressions of preference, for example 'mixed landscapes' where 'diversity and complexity' build environments with 'integrity and resilience' that 'protects and provides long term stability' in a manner 'that promotes vitality, physical and mental well-being'.

Consideration of the economic-based value statements further confirms this view. Participants express a preference for a utilitarian interaction with landscape when coupled with the idea of 'consumption now' by the current community but also continued 'consumption' for community 'in the future'. Whilst the utilitarian nature of use comes from a position of self interest in the current individual, here, the idea is tempered with thoughts of community and insurance of use for future generations. However, attitudes toward statements that describe a relationship based on overt economic principals with a focus primarily on the current individual do not demonstrate a similarly high level of agreement, where 'resources are produced efficiently and in large quantity' and 'can be exchanged for monetary value'.

Strength of agreement, with value statements, is further consolidated by consensus around the level of agreement. A high level of consensus for agreement with ecological and socio-cultural value-based statements demonstrates the importance of the physical nature of the underlying relationship society has with landscape and land-use. Levels of consensus around the three economic value statements further describe distinct difference between what maybe considered a physical and a transactional relationship with landscape. A high level of consensus around agreement for a sustainable utilitarian interaction with landscape is expressed, whereas value statements that directly imply transactional principals illicit a wider range of views. Consensus of opinion for value statements that reflect ideas of 'efficiency, maximisation' and 'exchange of

natural resource for monetary value' operate from a position of neutrality/disagreement.

Additionally, if one considers the map-based illustration of value held in the landscape, expressions of multiple value characteristics are observed. For example, landscape components thought to hold high value are considerably more likely to display qualities associated with more than one value domain. Whilst participants did recognise an economic-based value component in both value exercises, primacy for any one value domain or underlying value concept was not observed in either exercise. Moreover while responses to the map-based exercise describe an economic component to individual expressions of value, the underlying values and attitudes, as characterised by the preference-based exercise, illustrate that overtly monetised concepts are not at the forefront of individual value-based decisions. Inclusion of a place-based focus to characterise thoughts of value held by natural resources, supported by contingent preference-based expressions, fosters acceptance of a broader range of values.

Increasingly, to address the consequences of our utilitarian relationship with the natural world, the importance of natural resources and ecosystems to human welfare is expressed by transactional concepts that produce a monetary valuation (Spangenberg and Settele 2010). Conventional monetary analyses convert both ecological and socio-cultural values to a currency based unit derived from artificial market solutions (Turner et al. 1994). Daly (1980) and Grant (2012) are amongst many who have written of the dangers of abstraction with respect to our relationships with natural resources. The creation of abstract entities, described by artificial market scenarios rather than concrete aspects of the physical environment, can work to separate behaviour from its physical consequences on environment (Grant 2012). For Daly (1991), economics in a finite world employed without account for natural capital stocks is ill conceived and ignores outcomes of the community–landscape–natural resource relationship.

Natural capital stocks become substitutable with human capital (Daly 1991) and traditional community-based societies move to a modern society model that operates from a position of self-interest (Wackernagel and Rees 1997). The monetisation of natural resource feeds commercial interests and works to further the role of globalisation that introduces physical and emotional distance between production and consumption and extends the role of self-interested individualistic behaviour (Wackernagel and Rees 1997). This approach works to dis-embed cultural identity, belief systems, attitudes, and intentions of humankind from any relationship with the natural world (Borgstrom Hansson and Wackernagel 1999). Folke (2006) draws attention to the importance of considering human actions and their impacts upon ecosystem services, as part of a social–ecological system. Ecologists now recognise that most aspects of ecosystem components, structure, and processes cannot be understood without accounting for the strong, dominant influence of humanity (Ellis 2011).

Community, as a geographical context, describes an area in which social and economic structures interact with ecological systems to meet the daily needs of its inhabitants (Brown et al. 2002). According to Brown et al. (2002), community can be a relatively distinct spatial area that reflects local values, attitudes and lifestyles. 'Place is a powerful social influence in natural resource ... that can inform the study of natural resource politics' (Cheng et al. 2003). Community presents a way to integrate the biophysical and ecological attributes of place with social and political processes, and social and cultural meaning (Cheng et al. 2003). 'The concept of place embeds [natural] resource attributes back into the system of which they are a part...' (Williams and Patterson 1996).

Interaction with a local ecosystem provides a familiar institutional context, within which respondents can feel comfortable enough to express importance in a manner that reflects their preferred behaviour (Borgstrom Hansson and Wackernagel,1999; Meinard and Grill, 2011). This expression of value seeks to capture local distinctiveness and aims to incorporate the role of multiple stakeholder views (de Chazal et al. 2008). Society and the values it holds are an integral component of a wider social-ecological system; nature should not be viewed as external to the expression of socio-cultural values (Chiesura and de Groot 2003; Folke 2006). Utilisation of a socio-ecological centred approach, where the explicit focus is on relationship between humans and nature, seeks to place the influence of society on landscape as a determinative element in the interactions between the ecological, societal, and economic value domains. Here the aim is to describe the nature and fabric of ecosystems by plurality of concept, attribute, and dimension, where complexity results from the multifaceted nature of connections, relationships, and levels.

Conversion of ecological and socio-cultural values to a currency-based unit derived from artificial market scenarios (Turner et al., 1994) gives primacy to monetary based value solutions. The effects of non-monetisation for many components of the environment are ignored, with the focus shifting towards economic self-interest (Spangenberg and Settele 2010; Gómez-Baggethun et al. 2010). Using monetary value as a measure of natural capital is misleading, change in market price imparts no information about changes to physical stocks and processes (Spangenberg and Settele 2010; Gómez-Baggethun et al. 2010).

Expressions of socio-cultural value need to consider the relationships between community, landscape and natural resource; they should capture attitudes that influence this relationship and interactions with landscape and natural resource. The evaluation of natural resources, e.g. also when expressed through the concept of ecosystem services, needs to consider a broader set of goals that includes ecological sustainability and a societal perspective, alongside a monetary-based economic component (Costanza 2000; Straton 2006; Spangenberg and Settele 2010).

Acknowledgement of the interconnected nature of social and ecological systems (Folke 2006) and the development of a pluralistic approach to value (de Groot et al. 2002; Straton 2006; Kumar and Kumar 2008) encourages thoughts of variability and thus resilience. Here, the relationships between ecological dynamics, management

practices, and institutional arrangements express the inherent adaptive capacity of social-ecological systems (de Chazal et al. 2008). And what we know about nature becomes shaped by society's interaction with it (Meadows et al. 1972; Vitousek et al. 1997; Ellis 2011).

Conclusion

Value can give meaning to landscape; however, meaning is not an inherent component of the nature of things. Landscape value as meaning needs a physical space and experiential knowledge, gathered through the process of living in it, to be fully expressed. Human perception, choice, and action drive political, economic, and cultural decisions that lead to or respond to change in ecological systems. This relationship is reciprocal; the physical nature of the environment will influence the socio-cultural interactions with it, but the nature of this interaction will influence the physical characteristics of the environment.

By necessity, such complex systems cannot be evaluated, analysed and understood from a single value-based perspective. Expansion of evaluation techniques which explicitly acknowledge the relationship between humans and nature, accommodating different values and interests, can provide models for sustainable landscape management in real landscapes by applying economic, ecological and socio-cultural balance. Landscape evaluation must extend beyond the economic concerns of resource commodities to encompass the human relationship with the resource itself. Thus, a multi-faceted approach to attributing value to landscape set within an experiential framework will provide a concrete focal point where discussion can begin.

Competing Interests

The authors declare that they have no competing interests.

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