

## Estimating the aggregate amenity value of woodland views using spatial analysis

A recent literature review of studies on amenity values of woodland views and greenspace valuation methods revealed a paucity of nationwide or large-scale valuations of the visual amenity of woodlands in the UK based upon GIS analysis. Viewshed analysis ascertains the locations visible to an observer. Informed by this review, an improved viewshed analysis methodology was developed and successfully applied to identify urban areas with woodland views, allowing large-scale valuation of amenity woodland views in Wales and the north of England.



### Background

This project builds upon analysis undertaken for the Forestry for People project in Scotland by further developing GIS viewshed methods used in estimating amenity values of woodland views, and facilitating their application to datasets for other parts of Britain.

The amenity value of woodland views capitalised in property prices could be very significant. (The net value of UK housing of £3915 billion in 2006 represented 60% of the value of the nation's total assets in that year.) Recent conservative estimates for woodland views imply capitalised value of up to £300 million for Scotland. An earlier study yielded capitalised values of about £540 million for Scotland and over £4 billion for Great Britain.

### Objectives

This research aimed to improve GIS-based viewshed methodology for estimating numbers of households with woodland views and apply the method to data for other parts of Britain (Wales and the north of England) to estimate the aggregate value of associated visual amenity benefits.

### Methods

Viewshed methods are used to analyse whether a specific location or area is visible from other locations. The project included:

- development of improved GIS viewshed analysis methodology;
- application of the improved methodology to identify numbers of households with particular types of woodland views in two different regions of Britain;
- benefit transfer, based upon existing estimates for household values willingness-to-pay (WTP), to estimate the associated aggregate value of visual amenity benefits of woodlands. A value of £316 per household reflat from the original Garrod (2002) estimate was used to value views of broadleaved woodland, with an average of 2.4 people per household assumed<sup>1</sup>.

### Findings

The improved viewshed analysis methodology developed was applied to allow valuation of woodland views in Wales and northern England (defined as comprising Kielder and North West England Forest Districts), as shown in the table overleaf.

<sup>1</sup> Office for National Statistics: [www.statistics.gov.uk/cci/nscl.asp?id=7749](http://www.statistics.gov.uk/cci/nscl.asp?id=7749), Table 15 (Appendix 1): Household characteristics of decile groups of all households, 2003-04. Accessed: 7 August 2009.

## Data and results

	Wales	Northern England
Total area (ha)	2,122,476	2,190,825
Total woodland area (ha)	254,924	181,410
Woodland area within urban areas or within 300 m of urban boundaries (ha)	10,130	11,140
Total broadleaved area (ha)	79,132	51,488
Broadleaved area within urban areas or within 300 m of urban boundaries (ha)	6,657	7,670
Urban area (ha)	67,643	201,527
Urban population (millions)	2.49	8.52
Urban population with views of broadleaved woodland (% of total)	251,072 (10 %)	425,126 (5 %)
Aggregate value (£ millions) <sup>2</sup>	33	56

Wales has nearly 54 % more broadleaved woodland than the northern region of England. Nevertheless, the final aggregate value of the amenity broadleaved woodland views is nearly 70 % higher in northern England. This is due to northern England having more than three times the population and 34 % more urban areas (300 versus 224) than Wales, with Wales being relatively sparsely

populated. For two similar regions in terms of area and forest cover, the conclusion that the one with the larger urban population and more urban areas will be associated with a higher aggregate value for woodland views is to be expected. The estimated values illustrate the size of the difference in aggregate amenity valuations between the two regions.

## Recommendations

1. The methodology developed yields consistent estimates of the aggregate value of households' woodland views, and provides a tool which could aid the assessment of multiple objectives in forest management.
2. The elevation aspect of data at the forest stand level should not be ignored in viewshed analysis to avoid the problem of overestimated visual amenity valuations that can arise due to neglect of potential obstacles present in the line-of-sight, e.g. coniferous stands in front of broadleaf woodland.
3. Sampling points that follow the topography of urban boundaries rather than uniform sampling is preferable and improves precision of viewshed analysis. It avoids placing observer points deep inside urban areas from where woodland views near the urban fringe are likely to be precluded by obstructions from the built environment.
4. Given the paucity of existing WTP estimates, further research to overcome shortcomings of previous studies would be useful to increase the precision of large-scale woodland valuations in Britain and facilitate further methodological improvements. WTP estimates along the lines of Garrod (2002) but based upon a larger survey sample, with controls for distance decay, woodland type and respondents' socio-economic characteristics, could be very useful.

<sup>2</sup> The WTP figure of £268.79 per household from the Garrod (2002) study value is reflated to 2007/08 prices to yield £315.88.

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### Reports and publications

Edwards, D., Elliott, A., Hislop, M., Martin, S., Morris, J., O'Brien, L., Peace, A., Sarajevs, V., Serrand, M. and Valatin, G. (2009). *A valuation of the economic and social contribution of Forestry for People in Scotland*. Research Report for Forestry Commission Scotland by Forest Research, Edinburgh.

Garrod, Guy D. (2002). *Social & environmental benefits of forestry phase 2: Landscape benefits*. Report to Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.

Willis, K.G., Garrod, G., Scarpa, R., Powe, N., Lovett, A., Bateman, I.J., Hanley, N. and Macmillan, D.C. (2003). *The social and environmental benefits of forests in Great Britain*. Report to Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.