

Estimating the aggregate amenity value of woodland views using spatial analysis

Review and Application

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- What is visual amenity?
- What problems are addressed?
 - Estimation (physical, spatial)
 - Valuation (economic)
- Proposed solution
- Applications
 - England (north and northwest) and Wales



- Urban and peri-urban views
 - Directly visible from property
 - Woodlands
- Large-scale estimates to aid regional policy
 - Multiple objectives in forest management
 - Health benefits: physical and mental
 - Access to greenspace - exercise
 - Air pollution reduction
 - Stress reduction
- Background:
 - Valuing benefits of (Scottish) woodlands: Forestry For People
 - Housing market is the largest single component of national wealth (60% in 2006 market value)
 - Value of greenspace capitalised in the property prices, esp. input of woodlands into the process



- Garrod (2002) study
 - willingness to pay (WTP) for a woodland view for houses on the urban fringe
 - £269 per annum per household (2002 prices)
 - GB wide survey
 - only for urban fringe broadleaves
 - at a distance of about 300 meters (no decay)
 - no socio-economic characteristics (income, family)
- Naturally constrains estimation methodology
- Limitations of the 2002 study apply
- Van der Horst (2006)
 - new forest plantations yield the highest marginal visual amenity benefits at urban fringe





- Problem is essentially spatial
 - Urban fringe
 - Distance up to 300m
 - Unobstructed views
 - Broadleaves only
 - Need to deal with coniferous obstructions in addition to landscape profile (elevation)



- ArcGIS 9.1(2) ArcInfo developed by ESRI
- Digital elevation model (DEM)
 - 50m resolution
- Use 3D Analyst extension
 - Extrude non-broadleaved by 15m
- Amend original DEM with this extrusion data
- Viewshed analysis
 - Observer points in 50m inner urban buffer
- Population with a view
 - Proportional to area with a view
- Monetary valuation using Garrod's WTP





- Data
 - National Inventory for Woodland and Trees (NIWT1, 2002 update)
 - minimum size of 2 ha and greater than 50% cover by tree crowns
 - Urban settlements polygons
 - population of 1,000 and above (mid-2005 from ONS and Census)
 - area size of at least 20 hectares (ha)
- Test areas
 - Wales (Cardiff, Swansea and Newport – 30%)
 - The north of England
 - Kielder and the North West England FDs
 - Manchester, Tyneside and Liverpool – 47%



	Wales	Region in North England
Total area (ha)	2,122,476	2,190,825
Total woodland area (ha)	254,924	181,410
Woodland area inside urban and within 300m of urban (ha)	10,130	11,140
Total broadleaved area (ha)	79,132	51,488
Broadleaved area inside urban and within 300m of urban (ha)	6,657	7,670
Urban area (ha) and (number)	67,643 (224)	201,527 (300)
Urban population (millions)	2.49	8.52



	Wales	Region in North England
Visible broadleaved within 300m of urban, including all inner city broadleaved (ha)	4,715	4,287
Population with visibility (% of total)	251,072 (10%)	425,126 (5%)
Aggregate value (£, millions, annual)	33	56





- Two similar regions in terms of area and forest cover:
 - the one with the larger urban population and more urban areas yields a higher aggregate value for woodland views,
 - the estimated values illustrating the size of the difference in this case:
 - Wales – 54% more BL, but N.Eng. – 70% higher value
 - N.Eng. – 242% more pop., and 34% more urban areas
- Effective and flexible algorithm for the valuation of woodland views
 - Can be adapted to work with distance decay and socio-economic effects

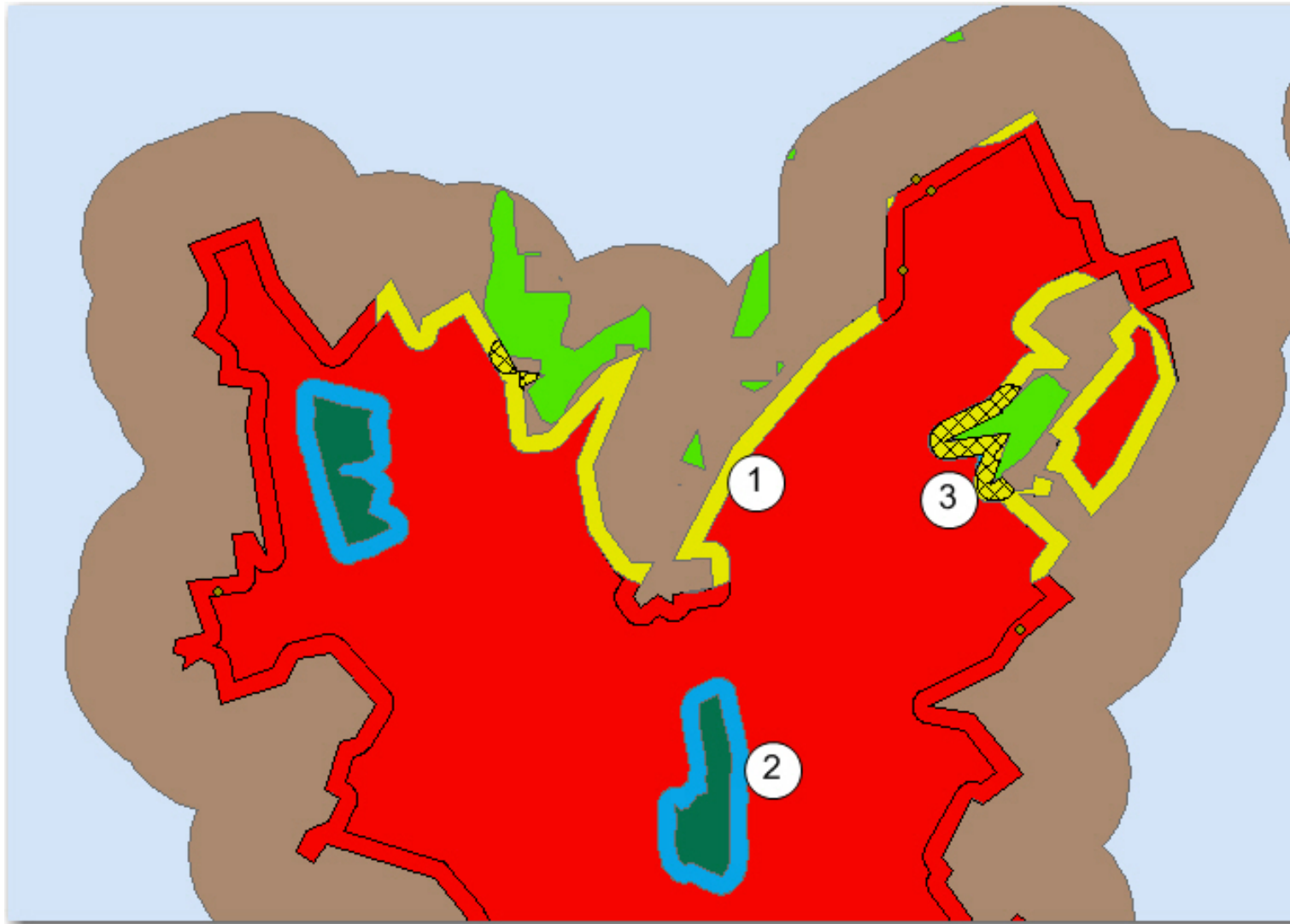


- Potential future research directions
 - Identify regions/localities with relative dearth of woodland views
 - Helping targeted policy interventions: woodland planting
- Lift some data limitations to fuller and more precise estimates
 - Economic
 - WTP to include non-broadleaves
 - WTP to control for income, ...
 - WTP to account for distance decay effect
 - WTP to include other than urban fringe woodlands
 - Spatial
 - Improvements to NIWT1 (2ha) → NFI (0.5ha)
 - Google maps has buildings





- Northern English region:
Knutsford (pop.: 12,513;
area: 407.2 ha)
- Buffers:
 1. urban 300m outer
(brown);
 2. urban 50m inner (thin,
light colour);
- broadleaved woodland
areas:
 3. inside urban (dark green)
 4. visible outside urban
(light green colour)





- Valuing non-market goods – visual amenity
 - revealed preference: travel costs and hedonic models
 - measure only use values
 - stated preference: contingent valuation and choice experiment
 - use surveys and direct work with people to elicit their preferences
 - measure use and non-use values
 - derives from the knowledge that environmental resources continue to exist (existence value), or are available for others to use now (altruistic value) or in the future (bequest value)





	Wales	Region in North England
Visible broadleaved within 300m of urban, including all inner city broadleaved (ha)	4,715	4,287
Area_300 (intersection between 300m woodland and 50m urban buffers) (ha)	6,193.6	6,819.7
Area_50dc (intersection between 50m woodland and 50m urban buffers) (ha)	939.4	1,082.2
Area_50 (intersection between 50m woodland buffer and urban areas) (ha)	1,690.3	3,077.8
Population with visibility (% of total)	251,072 (10%)	425,126 (5%)
Aggregate value (£, millions, annual)	33	56

