

## **The Value of Hertfordshire's Living Landscapes**

### **1. Executive Summary**

Natural ecosystems are important to the health of the environment and hence to human populations. Healthy ecosystems assist in maintaining the quality of air, water and soils. Access to natural ecosystems is also important for the physical and mental health of human populations, particularly by enabling quiet recreation. Such services possess an economic value, although estimating such values has been difficult in the past. There is now increasing interest in assigning values to the services that ecosystems provide to humanity, culminating in 2010 with the work performed by the EU sponsored TEEB (The Economics of Ecosystems and Biodiversity) study. This study is a major international initiative to draw attention to the global economic benefits of biodiversity, to highlight the growing costs of biodiversity loss and ecosystem degradation, and to draw together expertise from the fields of science, economics and policy to enable practical actions moving forward.

Using data from research undertaken by the University of Essex, estimates of the value of the ecosystem services provided by each of the Living Landscape (LL) in Hertfordshire have been calculated. This paper summarises the results of this valuation exercise and provides details of the methodology used.

In summary:

1. The total value of the ecosystem services that the 28 LL areas provide to the county is £684m per year.
2. The most valuable LL in terms of absolute value is South Herts Woods, £152m per year (representing 29% of the total value).
3. The most valuable in terms of value per ha is Tring Reservoirs at £120k per ha per year.
4. The most valuable habitat types are Ancient Woodland (£183m, 27% of total) and Wetlands: Open Water (£219m, 32%).

Such values can be used to raise the awareness of the value of Hertfordshire's countryside, help in the decision making process when considering land use conversion and help to prioritise conservation efforts.

### **2. Ecosystem Services**

The services provided by ecosystems are varied. For example, according to an economic study of global ecosystems, the most valued services of wetlands are

disturbance regulation, waste treatment, water supply, cultural, recreational, habitat, and food production (Costanza et al., 1997). The Millennium Ecosystem Assessment provided a comprehensive overview of the services provided by ecosystems, grouping them into the following four categories, with some examples provided below:

### 1. Provisioning services

1. Food
2. Fresh water – storage and retention of water; provision of water for irrigation and drinking. Important water storage site during wet periods and often provide reserve of water during dry periods

Resource managers now realize that preservation and restoration of wetlands and natural waterways may be a more cost effective means of maintaining drinking water quality than expensive water treatment technologies.

### 2. Regulating services (benefits obtained from the regulation of ecosystem processes):

1. Hydrological regimes – groundwater recharge and discharge; storage of water for agriculture or industry
2. Pollution control and detoxification – retention, recovery and removal of excess nutrients and pollutants. Valuable role played by wetland plants and substrates in trapping sediments, nutrients and pollutants is well established. Many shallow water bodies have trapped high levels of sediment that would otherwise be transported downstream and deposited in coastal areas. Estimated that wetlands intercept more than 80% of nitrogen flowing from terrestrial systems
3. Natural hazards – flood control, floodplain almost always reduce floods (and their peaks) or delay them

### 3. Cultural services (non-material benefits)

1. Spiritual and inspirational – personal feelings and well-being
2. Recreational – opportunities for tourism and recreational activities, including angling
3. Educational – opportunities for formal and informal education and training

### 4. Supporting services (those necessary for the production of all other services):

1. Biodiversity – habitats for resident or transient species
2. Soil formation – sediment retention and accumulation of organic matter
3. Nutrient cycling – storage, recycling, processing and acquisition of nutrients

A common held perception is that such services are effectively ‘free’. This stems from classical economic theory, which fails to account for natural capital. The fact that such values have been ignored in the past does not make them ‘free’. For example, well-managed watersheds provide valuable services to downstream residents, such as an adequate supply of good quality water. These services are in jeopardy if land, in upstream areas, is poorly managed. This can have serious impacts and cost for

downstream water users. Until recently, society has expected farmers to protect critical watersheds without any form of compensation for the services they provide and the costs they face. Payments for watershed services are mechanisms that aim to compensate land-users and owners for the services that they can provide. New York City is assisting farmers to change their land use. By doing so, it has avoided the cost of constructing a massive water purification plant.

### 3. Ecosystem Service Valuation

The valuation of ecosystem services is notoriously difficult, and is the subject of significant ongoing research. A number of studies have estimated the value of such services, for example:

- Wetlands trading programs allow property owners to capitalise on the demand for wetlands banks, with wetlands being sold in banks for \$74,100 to \$493,800 per hectare (Powicki 1998).
- A wetland valuation study for the Ramsar convention (de Groot, 2006) estimated the value of individual services, arriving at a total figure of approximately USD 62,000 per hectare per year.
- At a more granular level, a study was conducted for the East of England Regional Assembly which attempted to estimate the value from individual services (Glaves et al, 2009). For example, flood control was estimated to be worth GBP 1,100 per hectare of freshwater wetland per year.
- Studies have also been conducted by the University of Essex, which estimates the total value of services provided by wetlands to average GBP 396,000 per hectare per year, and GBP 14,400 per year for each hectare of rivers, streams and ponds.

For the purposes of this study, the methodology provided by the University of Essex has been adopted. This research has resulted in a range of values per hectare per habitat type, which is a summation of the value of all the services provided by that particular habitat type. The average values per hectare of habitat type are provided in Table 1 below.

Table 1 – Average Values of Ecosystem Services per Habitat Type

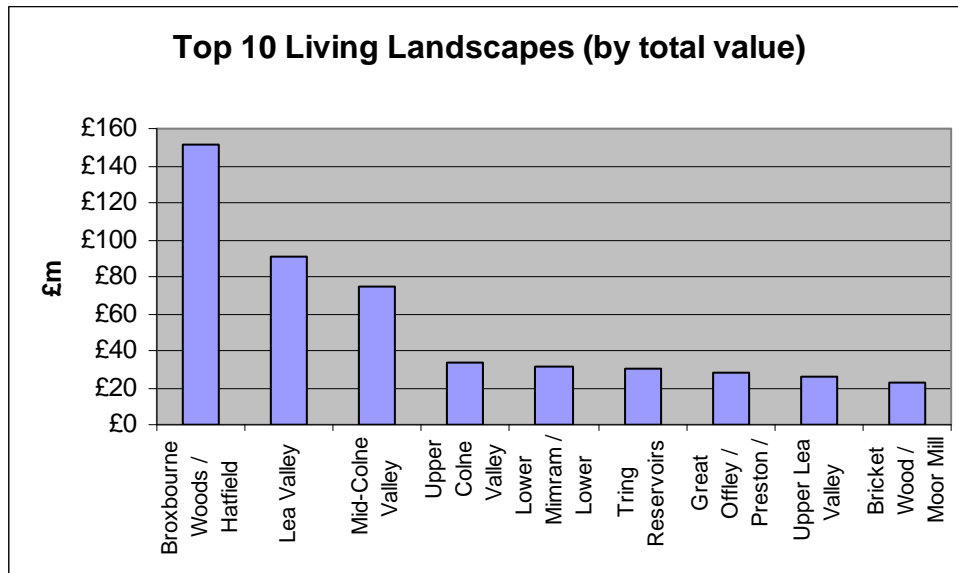
<b>Ecosystem Services</b>	<b>Average Estimates, £ per year per hectare</b>
Woodland	45,600
Grassland/shrub	36,000
Agriculture/pasture	16,800
Urban	4,800
River, streams, ponds	14,400
Wetland	396,000
Coastal	199,000

Source: University of Essex/Essex Wildlife Trust

The areas of habitat types per LL have been provided by the Herts Biological Records Office. However, these figures are probably conservative (e.g. they currently exclude value from agricultural and urban land use). A simple calculation of multiplying land

areas by average value results in a total value per LL per year. The values for each LL are provided in the Appendix. Figure 1 below displays the top 10 Living Landscapes in terms of absolute value per year, with South Herts Woods providing a total value of approximately £150m per year in terms of ecosystem services. Such services include, for example, air purification and carbon sequestration.

Figure 1 – Top 10 Living Landscapes by Total Annual Value



When viewed in terms of monetary value per hectare, Tring Reservoirs comes out as the most valuable LL in the county, as illustrated in Figure 2 below.

Figure 2 – Top 10 Living Landscapes by Annual Value per Hectare

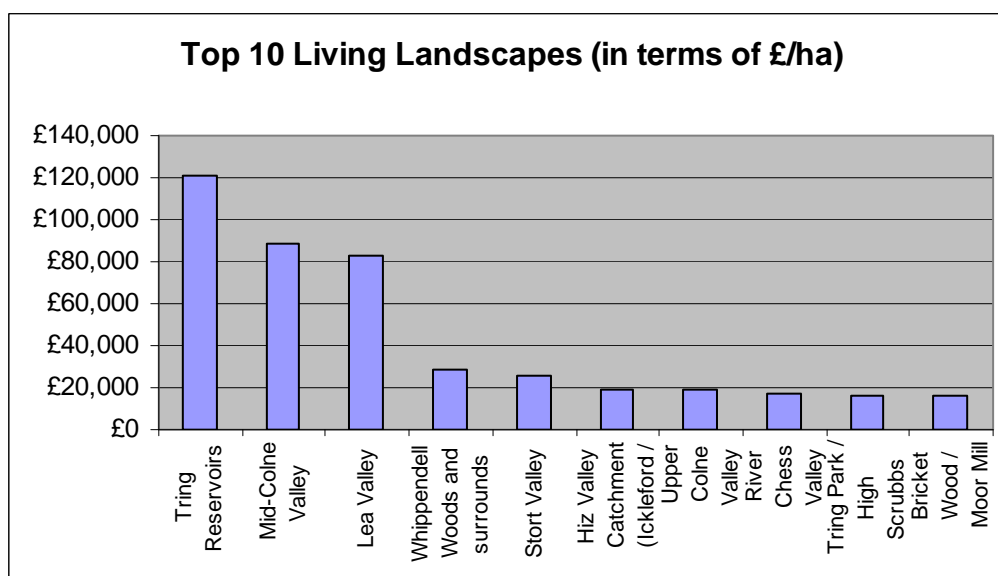


Table 2 below provides the values across the county per habitat type, and clearly illustrates the value that Hertfordshire’s Ancient Woodlands and Wetlands provide.

Table 2 – Total Values of Ecosystem Services per Habitat Type

<b>Value by Habitat Type</b>	<b>Value per year</b>
Ancient Woodland	£183,173,656
Wetlands (Open waters) > 0.3 ha	£198,144,540
Wetlands (Open waters) <= 0.3 ha	£21,220,848
Wetlands (Reedbed)	£10,593,000
Wet woodland	£28,515,718
Heathland and Acid Grassland (Heathland)	£970,560
Heathland and Acid Grassland (Acid grassland) (Unimproved)	£5,085,622
Heathland and Acid Grassland (Acid grassland) (Semi-improved)	£11,682,360
Neutral Grassland (Unimproved)	£14,248,372
Neutral Grassland (Semi-improved)	£201,461,220
Chalk Grassland (Unimproved)	£2,059,178
Chalk Grassland (Semi-improved)	£6,946,056

## Appendix

### Living Landscapes: Absolute Value per year

	<b>Living Landscape</b>	<b>Value p.a. (£m)</b>	
1	Broxbourne Woods / Hatfield Park	£152	22%
2	Lea Valley	£91	13%
3	Mid-Colne Valley	£75	11%
4	Upper Colne Valley	£33	5%
5	Lower Mimram / Lower Beane / Bramfield Plateau	£31	5%
6	Tring Reservoirs	£30	4%
7	Great Offley / Preston / Knebworth	£28	4%
8	Upper Lea Valley	£26	4%
9	Bricket Wood / Moor Mill	£23	3%
10	Tring Park / High Scrubbs	£20	3%
11	Ashridge / Berkhamsted Common / Aldbury	£20	3%
12	Mymmshall / Water End	£17	2%
13	Whippendell Woods and surrounds	£16	2%
14	Sandon / Green End Clothall / Wallington / Weston	£15	2%
15	Cottered / Ardeley / Benington	£14	2%
16	Upper Gade Valley	£14	2%
17	Stort Valley	£13	2%
18	Rib Valley	£13	2%
19	River Chess Valley	£10	1%
20	Cokenach Estate	£8	1%
21	Hiz Valley Catchment (Ickleford / Oughton Head / Purwell)	£7	1%
22	River Ash Valley	£6	1%
23	Therfield Heath / Coombe Bottom	£5	1%
24	Scales Park / Meesden / Beeches Wood	£4	1%
25	Wellpond Green / Westland Green	£4	1%
26	Patmore Heath / Upwick Green	£4	1%
27	River Ver / Gorehambury	£4	1%
28	Hexton / Pirton / Great Offley	£2	0%

### Living Landscapes: Value per hectare per year

	<b>Living Landscape</b>	<b>Value p.a. per ha</b>
1	Tring Reservoirs	£120,489
2	Mid-Colne Valley	£88,304
3	Lea Valley	£83,059
4	Whippendell Woods and surrounds	£28,809
5	Stort Valley	£25,589
6	Hiz Valley Catchment (Ickleford / Oughton Head / Purwell)	£18,999
7	Upper Colne Valley	£18,592
8	River Chess Valley	£17,533
9	Tring Park / High Scrubbs	£16,443
10	Bricket Wood / Moor Mill	£15,877
11	Broxbourne Woods / Hatfield Park	£15,699
12	Mymmshall / Water End	£15,378

	<b>Living Landscape</b>	<b>Value p.a. per ha</b>
13	Great Offley / Preston / Knebworth	£14,491
14	River Ash Valley	£13,468
15	Ashridge / Berkhamsted Common / Aldbury	£11,963
16	Upper Gade Valley	£11,842
17	Patmore Heath / Upwick Green	£11,783
18	Cokenach Estate	£9,317
19	Lower Mimram / Lower Beane / Bramfield Plateau	£8,345
20	Upper Lea Valley	£8,138
21	Rib Valley	£6,112
22	Cottered / Ardeley / Benington	£6,010
23	Sandon / Green End Clothall / Wallington / Weston	£5,059
24	Scales Park / Meesden / Beeches Wood	£4,072
25	Therfield Heath / Coombe Bottom	£4,048
26	Wellpond Green / Westland Green	£4,037
27	River Ver / Gorehambury	£3,996
28	Hexton / Pirton / Great Offley	£2,249

## References

<http://www.teebweb.org>

Costanza, R., R. d'Arge, R. deGroot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton, and M. v. d. Belt. 1997. The value of the world's ecosystem services and natural capital. *Nature* 387:253-260.

De Groot, R.S., Stuij, M.A.M., Finlayson, C.M. & Davidson, N. 2006. Valuing wetlands: guidance for valuing the benefits derived from wetland ecosystem services, Ramsar Technical Report No. 3/CBD Technical Series No. 27. Ramsar Convention Secretariat, Gland, Switzerland & Secretariat of the Convention on Biological Diversity, Montreal, Canada. ISBN 2-940073-31-7.

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-Being: Wetlands and Water Synthesis. World Resources Institute, Washington, D.C.

Powicki, C.R. 1998. The value of ecological resources. *EPRI Journal* 23, July-August. Palo Alto, California.

Glaves, P., Egan, D., Harrison, K. and Robinson, R. (2009) Valuing Ecosystem Services in the East of England, East of England Environment Forum, East of England Regional Assembly and Government Office East England