The application of augmented reality as a landscape visualisation tool: a proposed research study

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Summary: The benefits that the landscape gives us (ecosystem services) are often taken for granted and inadequately considered in decision making. The recently published National Ecosystem Assessment has highlighted growing individual consumerism as one source of pressure on ecosystem services. It is therefore important to communicate to people the link between personal behaviour and pressures on the ecosystem services in the landscape, supporting the need for behavioural change. Visualisations have been successfully used in the past to engage people with the landscape around them. This research explores the use of augmented reality as a visualisation tool to communicate information about ecosystem services and encourage behaviour change.

KEYWORDS: Augmented Reality, Ecosystem Services, Public Participation

1. Introduction

Traditionally rural landscapes have had agriculture and forestry central to the strategies used to manage them. However the landscape provides a wealth of other functions (ecosystem services) to human kind, some obvious such as food and fresh water, and some so subtle they do not feature in the public consciousness (National Ecosystem Assessment, 2011). The rural landscape around us is changing rapidly due to a range of economic and climate driven factors, putting some ecosystem services at risk (Hawkins & Selman, 2002). With a shift towards bottom-up (as opposed to top-down) management approaches, stakeholders are playing an increasing role in decision making (Lange and Lange, 2010). Increased awareness is needed amongst the general public about ecosystem services, including why it is important to manage the rural landscape at a landscape scale, and the link between individual actions and local level issues (Nicholson-Cole, 2005).

Lange (2011) suggests that there is a great deal of potential in the use of mobile visualisations to increase public participation in the environment around us. Communicating information while in the field enables the non-visual senses to be engaged, and a sense of interaction impossible within a building to be stimulated.

This paper briefly outlines an engagement event to be held in the spring of 2012 in King's Lynn, Norfolk, UK, where augmented reality on mobile devices will be used to show the location of ecosystem services within the Gaywood catchment. The project will involve the Gaywood Valley Project, an INTERREG project aimed at engaging the community with their rural fringe.

2. Study Area

The Gaywood Valley is a small chalk valley of just 4,000 ha which is located to the east of King's Lynn in Norfolk, UK see Figure 1. The land use of the valley is predominantly agriculture and heathland and it contains a variety of different protected areas and a mosaic of habitats. The source of the Gaywood River is from a chalk fed aquifer; the river itself is just 10km long, and is not visible by the general public for most of its length leading to a sense of community disengagement with the river and its catchment.

The valley has in the past been intensively managed with flood management as the prime objective. There has been more recently been a drive to restore the meanders of the river channel which has led to increased populations of species such as the otter and water vole. In addition, the large coniferous

plantations have been logged by Norfolk Wildlife Trust, who bought the site intending to return the upper slopes of the valley back to heath which supports a diverse range of wildlife. The Norfolk Wildlife Trust hope that engaging with local communities and stakeholders will increase support for restoration of the valley along its entire length.

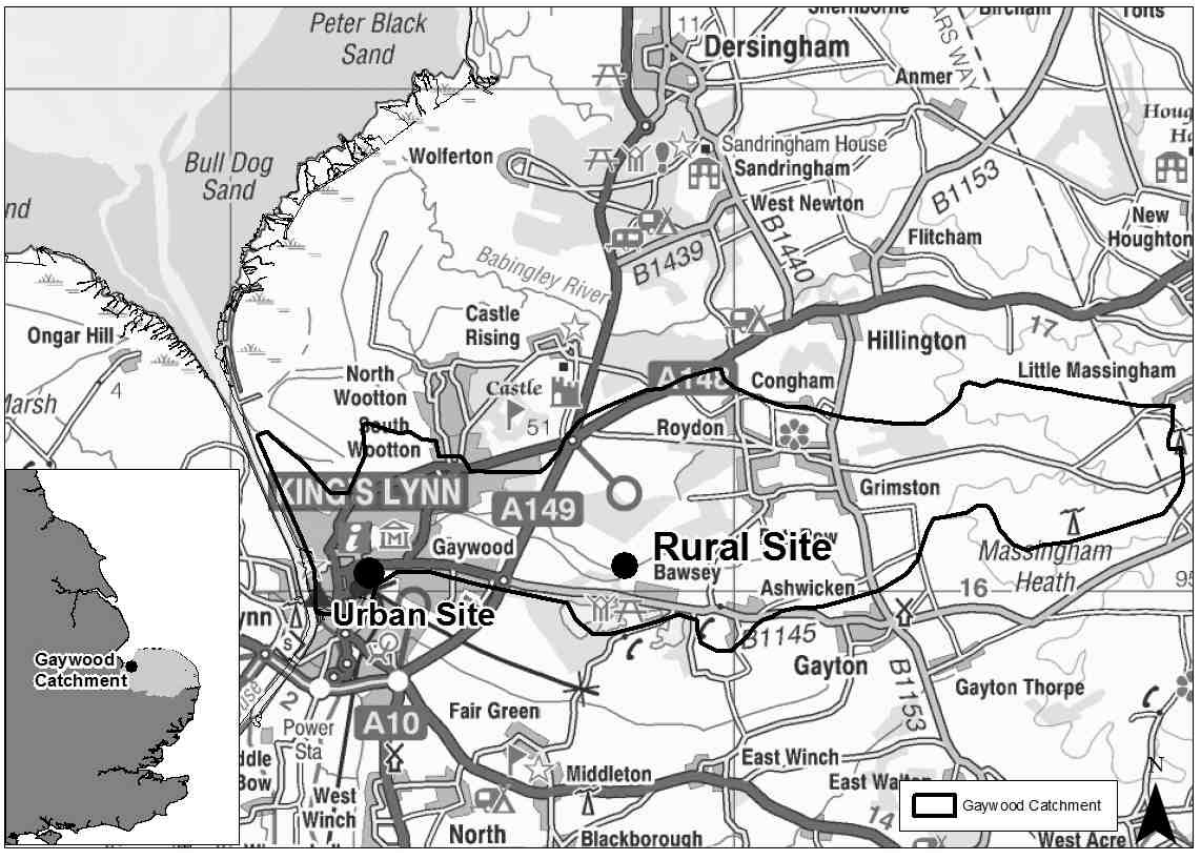

Figure 1 - The location of the Gaywood catchment and the two sites to be used in the evaluation, the rural site at Church Farm, Bawsey and the urban site in King's Lynn

3. Development of the augmented reality application

The augmented reality application VesAR (Visualising ecosystem services using Augmented Reality) has been developed using a suite of internet based applications including the Hoppala web service (Hoppala, 2011) and the LayAR augmented reality provider (LayAR, 2011a). The National Ecosystem Assessment (2011) and the Millennium Ecosystem Assessment (2006) have been used to describe the types of ecosystem services in the catchment which were identified during a field visit to the sites in September 2011.

VesAR utilises a combination of camera, GPS, compass, accelerometer and an Internet connection: GPS determines the exact location of the device (within a few meters) and the compass and accelerometer determine the field of view. The person using the device sees the world via the camera image which is displayed on the screen (Figure 2); additional digital information such as text, images and animations are augmented on top of the camera view via mobile Internet (LayAR, 2011b).

Figure 2 - VesAR on an HTC Android phone

To date the applications of augmented reality on smartphones (Android, iPhone) have been targeted at gaming, marketing and advertising, and as yet their application to landscape visualisation has been limited. Lange (2011) highlights the potential use of augmented reality for viewing planning proposals live on site or visualising 3D models of proposed building aligned to the existing viewpoints.

4. Survey Methodology

A series of engagement events, taking the form of a ramble, will take place in the spring of 2012 in conjunction with the Gaywood Valley project. A number of participants will be shown the ecosystem services within the Gaywood catchment on both a rural and an urban site (Figure 1), using two tools: a paper handout and an augmented reality phone/tablet application. The aim is to examine the potential of augmented reality for communicating information about features within the landscape and engaging people with the importance of ecosystem services which these features offer.

After the tours, participants will be surveyed to establish which tool was most effective and which was preferred, along with demographic information to examine any differences in responses due to age, technological familiarity, and other factors. Details of the engagement event are yet to be finalized but the data collection will most likely use face to face paper-based questionnaires.

5. Next Steps

VesAR has been developed as part of a PhD based at the UEA to develop tools to enable the visioning of future catchment landscapes. It is intended that by bringing together a group of interested stakeholders the future of Gaywood Valley landscape at the rural site can be explored in further workshops using 3D visualisation tools, the results being used by conservation and community groups. In turn the outcome from the visualisation strand of research will feed into an interactive What If? decision-based management tool.

6. Acknowledgements

Sarah Taigel's research is being conducted as part of ESRC PhD Studentship No. ES/I022139/1

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8. Biography

The author has a background in GIS in industry, an MSc with Distinction from the University of Southampton in 2008 and an RGS award for her Masters project on modelling tranquillity in EIA using GIS. She is currently funded by ESRC on a PhD researching innovative uses of visualisation and spatial technologies for visioning river catchment futures.