Landscape and Urban Planning xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research Paper

Location based information to support understanding of landscape futures

Ian D. Bishop*

Department of Infrastructure Engineering, University of Melbourne, 3010, Australia

HIGHLIGHTS

- Review of potential of mobile technology to inform people about the landscapes they travel through.
- Includes audio and visual augmentation.
- Describes a prototype iPhone App which provides data and augmented reality relating to climate and linked landscape changes.
- Considers data, technical and user issues.

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Landscape change
Location based information
Climate change
Smartphones
Augmented reality

ABSTRACT

We are entering a period of rapid change in such landscape shaping forces as climate, the demand for food and water, fire, the push toward renewable energy, and the transition to GM-based agriculture. As a result the landscape, which has traditionally been a point of stability for many people, is likely to change significantly. Can the technologies we have to hand, and their increasing ubiquity, assist people to better understand the forces leading to landscape change, comprehend the science of landscape, take a more informed view on proposals, and adapt to some inevitable outcomes? This paper considers the potential, in this context, of smartphones and other devices that are equipped with positioning and orientation devices, significant computational power and high-speed communications. We all travel through the landscape; sometimes we fly over. During these movements the possibility exists to entertain, and educate, people with information about the landscape through, or over, which they are traveling, to give them insights into the changes that have occurred historically and may occur in the future, the processes at work and the choices that exist. There are several ways to do this including audio commentary and augmented reality displays using the device camera coupled with visualized alternative conditions. A prototype iPhone, called 'What's Here?' that includes augmented audio and visual features for landscape interpretation is described, and is illustrated with data related to climate change, renewable energy infrastructure, land use change and sea level rise. Associated data, technology and user issues are discussed.

1. Introduction

People's landscape preferences, and willingness to accept landscape change, depend on many factors relating to their values and attitudes (Ford, Williams, Smith, & Bishop, 2012; Ribe, 2002), their own use of the land (Gomez-Limon & De Lucio Fernandez, 1999), their knowledge of its history (Hanley et al., 2009), and what they are told about its use and condition (Hodgson & Thayer, 1980). For many people, a key element of landscape enjoyment is stability. No matter what the historic conditions, the status quo can be a very popular option (Hanley et al., 2009). For example, Willis and Garrod (1993), in their research on Yorkshire Dales landscapes, found that around 50% of people preferred the "today" landscape more than a range of alternatives, with a further 30% preferring a "conserved" landscape. Rapid changes to the landscape driven by forces such as climate, the demand for food and water, fire, the push toward renewable energy, the transition to GM-based agriculture and power-shifts in the world economy, are likely. When people's preference is for landscape stability, many such changes are likely to be unpopular. Even if new land use patterns, new energy infrastructure or new fire control measures are well justified from a societal viewpoint, they can still meet with local opposition

* Tel.: +61 408009099.
E-mail address: i.bishop@unimelb.edu.au

http://dx.doi.org/10.1016/j.landurbplan.2014.06.001
0169-2046/

(Devine-Wright, 2013). There may be a range of reasons for negative attitudes to changes, but it is the anticipated visual changes that are often the focus of complaint (Jones & Eiser, 2010). Several studies have however identified that good information provision can engender public trust and this can reduce levels of local objection (Devine-Wright, 2013; Wolsink, 2000).

This suggests that public acceptance of landscape change is hard to achieve without a well-informed public discourse of the relative advantages and disadvantages of either a particular project, or, even more difficult, the accumulation of projects that will eventually make for profound differences. Researchers have begun to look at ways to provide people with the knowledge and awareness that can sustain sensible debate, particularly in the domain of climate change and associated changes in infrastructure (Aurambout, Seth, Bishop, & Pettit, 2013; Dockerty, Lovett, Sünnenberg, Appleton, & Parry, 2005; Dockerty, Lovett, Appleton, Bone, & Sünnenberg, 2006; Pettit, Raymond, Bryan, & Lewis, 2011; Salter, Campbell, Journeay, & Sheppard, 2009; Schroth, Pond, & Sheppard, 2014; Shaw et al., 2009; Sheppard, 2005; Wissen, Schroth, Lange, & Schmid, 2008). The relative effectiveness of the approaches used in these studies has only been lightly explored (Bishop, Pettit, Sheth, & Sharma, 2013; Schroth et al., 2014). While visualization techniques have been a popular part of the communication process for several years, more recently there has also emerged strong interest in making the information accessible on the web (Bishop, 2012; Marcy et al., 2011), using serious gaming to attract people's interest (Bishop, 2011; Pak & Brieva, 2010) and the potential of smartphones to support these directions (Chen & Bishop, 2013; Westhead, Smith, Shelley, Pedley, & Napier, 2012). These developments all make visual communication more familiar to people and hence improve the prospects of visually enhanced community dialog, with the opportunity also for public generation of imagery from the crowd and the cloud.

The long-standing argument for visualization, whether the abstract scientific approach or realistic landscape visualization, is that it gives better understanding of the available options for landscape futures (Bishop, 1994; Lange, 2001). Intuitively it seems that this should be even more the case if the view of the data is combined in some way with the view of the real world such that our innate sense of place is augmented by facts, explanations or expectations of the landscape that we are observing. This suggests that systems, such as augmented reality, which provide the user with supplementary information, while they are experiencing the landscape, will have benefits for understanding and appreciation. As Graber (1990, p. 154) concludes, "we cannot afford to ignore the major ways in which learning is shaped by the vistas gleaned by the human eye and the cognitions, emotions, and memories that these vistas produce." (quoted in Nicholson-Cole, 2005, p. 268).

The environment is a place of movement: both changes in the viewer (location, orientation and disposition) and changes in the environment itself. Changes in the environment are critical, but changes in the viewer can have a profound influence on attitudes to environmental change. These include short-term changes, most particularly movement through the landscape, and longer-term changes of values and beliefs that can affect responses (Ford et al., 2012). Short-term movements include travel by car (as an example, each vehicle in Victoria, Australia averaged over 14,500 km in the year 2010) often through the rural landscape. As they travel people observe the unfolding environment, sometimes they think about what they see. People with special expertise recognize particular features and are able to interpret the geomorphology or the vegetation and understand something about the past or the future. Most people do not have this ability and the experience is lessened as a consequence. We now have technologies that can significantly enhance the traveling experience by increasing awareness, of non-experts, of the places in which they work or recreate or through which they travel. In addition, and supported by this awareness, we can give them glimpses of plausible futures and allow them to develop an understanding of the strengths and weakness of arguments for changes in the landscape. Of course the potential exists to present biased or misleading information: the possible need for new guidelines is discussed in the conclusion of this paper. Even if this approach does not engender consensus, it may, by providing a common visually explicit idea of plausible futures, reduce the levels of fear that sometimes take over debate.

The objectives of this paper are therefore to explore the potential of new technologies to provide travelers with special insights into the environments through which they pass, this may include understanding of the local history, details of the present and awareness of possible futures. Section 2 reviews recent developments and applications of candidate technologies (essentially mobile computing devices such as smartphones). The specific features of a suitable system for mobile presentation of landscape information are discussed in Section 3 and a prototype iPhone App, with a case study application in Victoria, Australia, is introduced in Section 4. The conclusion reviews data, technical and user issues associated with production of such an App and offers some suggestions for the way forward.

2. Augmenting the landscape

2.1. Location-based landscape information

While interest in showing alternative futures goes back a long way, as discussed by Zube, Simcox, and Law (1987) and exemplified in early works such as Repton's Red Books (early 19th century), and while the new technologies have accelerated developments, the emphasis has been almost entirely on reproduction of landscape experiences for someone removed from the real landscape. This is typically done by presentation of representations of current and future landscapes. Before computers this was done primarily by painting, then photomontage but more recently as still images, animations or interactive virtual worlds (see Lovett, Appleton, Warren-Kretzschmar, & von Haaren, 2014). The emphasis in this paper is however on enhancement of landscape experiences for people actually moving about in the landscape in question. This has been done using specialist devices at urban tourism centers and in galleries, and would be reasonably easy to implement within, for example, a small park. My objective here however is to review the potential for information provision across wide areas of rural landscape.

There is already wide access, thanks to mobile computing devices, to a great deal of location-based information, but this is often focused on commercial and consumer opportunities (restaurants, government service, etc.). I argue that this exploitation of location can be directed just as readily toward awareness and understanding of the rural environment. When we consider augmenting the landscapes we travel in, a number of communication options are open: text, maps, sound and imagery all potentially have a part to play.

Michael Jones of Google Maps argues (http://www.theatlantic.com/magazine/archive/2013/01/the-places-youll-go/309191/) that through such technology: "It'll be like you're a local everywhere you go. You'll know your way through the back alleys and hutongs of Beijing, you'll know your way all around Paris even if you've never been before. Signs will seem to translate themselves for you". He then becomes hyperbolic: "Effectively, people are about 20 IQ points smarter now because of Google Search and Maps." One might argue that people are smarter if they are better at solving wicked problems, but not simply because they can find their way to a fast food outlet or even to the Louvre.

Please cite this article in press as: Bishop, I.D. Location based information to support understanding of landscape futures. *Landscape Urban Plan.* (2014), http://dx.doi.org/10.1016/j.landurbplan.2014.06.001