

Combining conventional and volunteered geographic information to identify and model forest recreational resources



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ABSTRACT

It is now common for researchers in natural resource management and economics to develop spatial models of recreation demand for the purposes of valuation and planning. Such an approach has significant advantages but requires access to relatively detailed spatial data. In the absence of official data concerning resources, researchers may benefit from employing increasingly available volunteered geographic information (VGI) as a central source of data or to complement more traditional data sources. This paper describes the development of a map of forest recreational resources in Ireland by combining conventional forest cover data and VGI of recreational trails. As an extension the new map is combined with household survey data to explore respondent's ability to identify local recreational forests and models the impact of the characteristics of the closest forest on their annual visitation. The results suggest that VGI can be a useful resource to researchers in both the identification and characterisation of recreational resources. In addition, this paper finds that the distance to and characteristics of the nearest recreational forest has a significant impact on total annual visitation by members of the public.

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Introduction

Recreation is recognised internationally as one of the most important cultural ecosystem services provided by forests (MEA, 2005). An essential tool in the planning and management of recreational resources is a reliable measure of the location, extent and characteristics of the resources themselves. The development of recreation models has, by definition, involved variables that are spatial, such as distance, but this has been extended to spatially explicit maps of visitation (Bateman, Day, Georgiou, & Lake, 2006; Brainard, Lovett, & Bateman, 1999). This move has facilitated more complex approaches to modelling and valuing recreational visits across different ecosystems (Sen et al., 2014). It has also created opportunities to incorporate substitute sites into models and to target land use change to maximise the value of associated services (Brainard et al., 1999; Gimona & van der Horst, 2007). More generally such resources can be employed in public participatory approaches to understanding the spatial distribution of ecosystem services (Nahuelhual, Carmona, Lozada, Jaramillo, & Aguayo, 2013). Such a spatial approach to understanding the use of ecosystems is

of unquestionable value. However, an essential requirement for this is the availability of data concerning the current extent and location of recreational resources. Data on the type and level of facilities contained in locations or their general characteristics can also be invaluable to researchers seeking to explain use patterns and the valuation of resources (Scarpa, Chilton, Hutchinson, & Buongiorno, 2000). Where an established ownership and management structure is in place such data may be readily available. However, where multiple agencies manage facilities or where recreational use is not a management priority such data may not exist or may not be compiled. Hill and Courtney (2006) highlight this challenge and that of the definitions that different agencies may employ in their study of the recreational value of forests in the UK. In addition, even where locations of resources may be known, measures of characteristics or quality may be lacking. A relatively new and potentially important source of such data is crowd-sourced or volunteered geographic information (VGI). Both VGI and participatory GIS are recognised as useful tools for exploring and mapping public preferences for natural resource management (Brown, 2013).

This study focuses on Ireland, a country with limited but expanding forest cover. Forest cover currently stands at 10.5%, with the vast majority having been established as plantations by both public bodies and private individuals since the early 20th century.

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This has resulted in a forest estate that is young, fragmented and dispersed (Fig. 1). Although relatively good spatial data are available for Irish forests, they lack detailed information concerning ownership and accessibility. Unlike some countries, privately owned forests in Ireland are not accessible to the public in general. Conversely all publicly owned forests, irrespective of management objectives, are open for informal recreational use, in theory, but may lack facilities or signage.

Forest recreation models

Forests are considered important sources of recreation in many countries and the quantification of their use and value has been a rich source of research for many decades (Zandersen & Tol, 2009). This research has primarily focused on approaches to capturing the value of a recreational trip using stated and revealed preference methods. It has become increasingly common for researchers to develop spatial models of recreation at both a local and national level (Brainard et al., 1999; Cullinan, 2011). Such an approach may

provide more accurate measures of visitation, in addition to accounting for existing and substitute resources, which is essential for the targeting of new resources to maximise their value (Brainard et al., 1999; Gimona & van der Horst, 2007). However, researchers may face a challenge in the development of such models if data on the current availability of resources are lacking or of limited detail. In the absence of such data, researchers may not be able to identify accurate travel distances or to measure the availability of substitute sites.

Recreation is a well recognised forest ecosystem service in Ireland and a limited number of studies have sought to examine the use of forests by the public and the values they place on visits and access (Cullinan, 2011; Scarpa et al., 2000; Upton, NíDhubháin, & Bullock, 2012). Irish forests are managed by a number of agencies. Coillte Teoranta (The Irish Forestry Board), a private limited company owned by the government, is by far the biggest forest owner in Ireland and it operates an open access policy. However, only specific forests are advertised as recreational areas. The National Parks and Wildlife Service also manage a number of forests, in

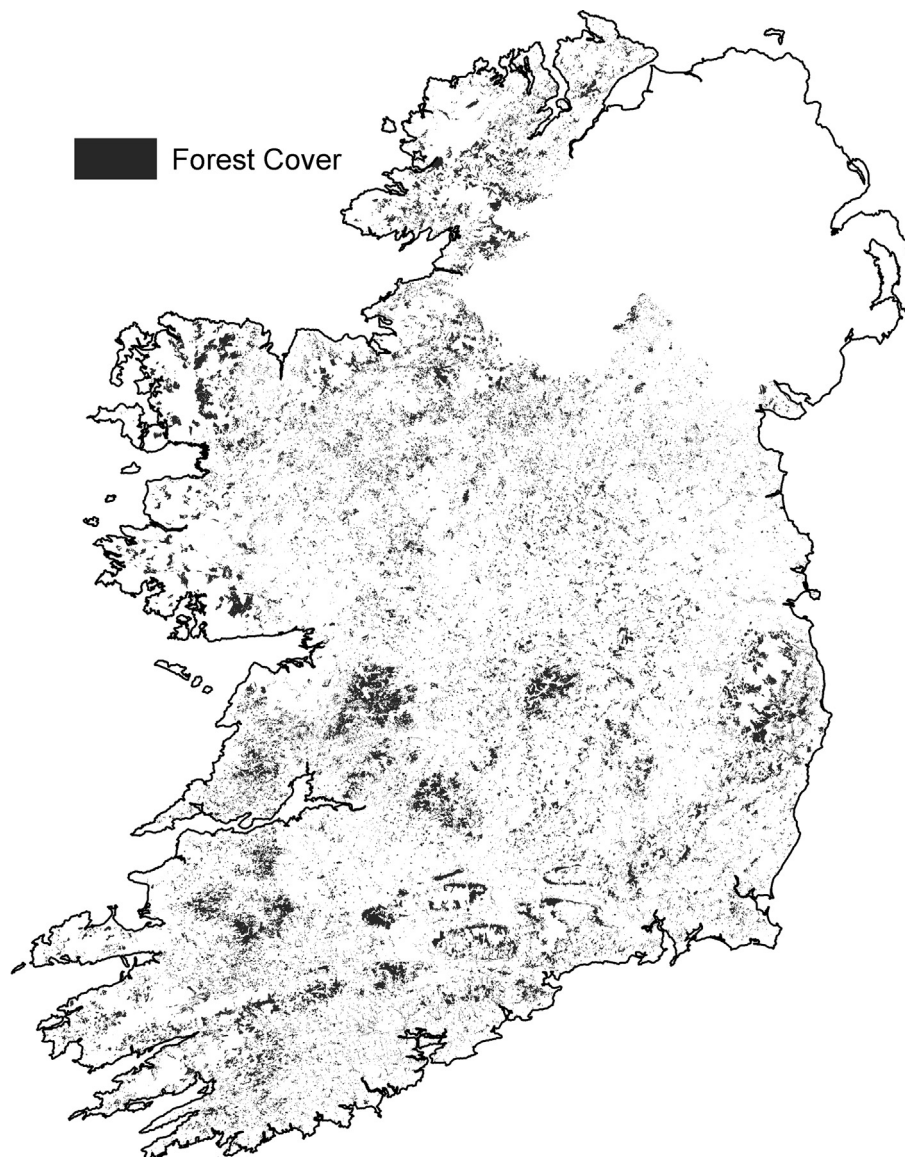


Fig. 1. Forest cover in Ireland.
Source: Irish Forest Service.

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