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Visualization of place attachment

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ABSTRACT

The concept of place attachment is amorphous and difficult to study. To address this, we set out to map and analyze place attachment for a city park in Nanaimo, British Columbia, Canada. We developed a GIS application called the Place Analysis System (PAS) to allow place attachment data to be collected, georegistered, stored and processed into map form. Upon analysis, we found notable differences in the spatial distribution of place attachment between groups and under different weather conditions. The ability to visualize and analyze place attachment can assist with both academic and applied studies in fields such as planning.

1. Introduction

Recent research into place attachment has revealed the major components of this concept. Nevertheless, place attachment remains ethereal, lacking in form and context. Despite extensive study in the geographic literature, little attention has been given to the spatial distribution of place attachment.

We addressed this problem by connecting place attachment to real-world places. Using a geographic information system (GIS), we mapped the strength and spatial distribution of place attachment around the features that make up places. This makes place attachment easier to visualize and measure, making it more amenable to empirical analysis and applied research.

1.1. Understanding place

Place studies can be complicated because there are many concepts of place from different fields of study and intellectual traditions. Williams (2014) defines three views of place: *demos*, which views place as being dynamic, cosmopolitan, and spatiotemporal, *ethnos*, in which place is defined by group identities and parochial attachments to place, and *bios*, in which place is defined by bioregionalism and a "back to the land" ethic.

Our research examines place primarily from the *demos* perspective. Many of the concepts used to study place benefit from the work of Massey (1997), Pred (1984) and Thrift (1994). This perspective recognizes the cosmopolitan nature of place and leads us to model place as unbounded and connected to other places. The dynamic nature of place can be analyzed by studying where people travel at different times and under different weather conditions.

1.2. Modeling place using GIS

In this paper, we introduce and demonstrate the use of the Place Analysis System (PAS), a GIS application that facilitates improved data collection and analysis of place based on place attachment theory (Stedman, 2002; Williams & Vaske, 2003). The PAS enables researchers to create fuzzy models of place attachment, which facilitate the understanding, analysis and communication of this concept. We will demonstrate how the system can help visualize place attachment, taking study participants' vague notions of place attachment and making them concrete.

1.3. Study area

We chose Colliery Dam Park, a 27.2 ha (67.2 ac.) semi-wilderness park in Nanaimo, Canada for our study area (Fig. 1).

The centerpieces of the park are two artificial lakes formed by the Colliery Dams (Fig. 2). These lakes formerly supplied water for coal mining, but now serve recreational purposes (Fig. 3). The park has much in common with larger parks such as Central Park in New York, Rock Creek Park in Washington, D.C. or Stanley Park in Vancouver.

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Abbreviations

PAS Place Attachment System, the GIS application used to collect and organize data for this study

2. Literature review

2.1. Working with fuzzy surfaces

Individuals view places differently from one another (Williams, 2014) and have different features and levels of interest. We can represent these as fuzzy surfaces (Burrough, 1996; Fonte & Lodwick, 2005; Fonte, 2008; Zadeh, 1965), in which place attachment decays as distance increases. This decay represents the decrease in awareness as features fade from short-term memory. The awareness never reaches zero because long-term memories of a feature may be recalled at any time with the right stimuli.

2.2. Modeling emotion

We employed Plutchik's (1962, 1980) psychoevolutionary model of the emotions as the dictionary of emotions used in this study. A numerical intensity value is associated with each emotion in Plutchik's model. This value is used in the PAS; the emotion name simply provides a convenient reference for the participants to use.

2.3. Efforts to map place

Geographers and psychologists have been refining the concept of place over the past six decades. Work on "mental maps" has revealed the distortions present in how people model their surroundings (Gould & White, 1992). These distortions make it difficult to operationalize findings, because it is difficult to identify exactly where features are located (Golledge, 1978, p. 41).

The work of Lynch (1960) has been built upon and expanded by modern researchers using GIS. There has been a gradual shift from paper-based to computer-based methods of recording spatial data. Early work, such as Brown (2005) made use of paper-based methods for data collection, whereas later work (Brown & Raymond, 2007; Brown, Raymond, & Corcoran, 2014) made use of computer data entry. We are now moving towards decentralized or mobile computer data entry through web pages (Carver et al., 2009), and smartphone applications.

In these GIS studies, places have been conceptualized in different ways. They have been represented as points (Brown & Raymond, 2007; Brown, 2005; Brown et al., 2014), polygons (Lowery & Morse, 2013), or rasters. Carver et al. (2009) developed a method that uses a "spray paint" metaphor, in which a participant can "paint" place importance onto a raster map. This technique allows for the direct recording of a fuzzy surface.

2.4. Research advances

The method proposed in this paper offers a general solution for the modeling of place attachment based on the *demos* concept of place. Collecting the data soon after participants have visited the features allows us to work with participants while impressions of new features are fresh. In addition, the sights, sounds, and smells of the park assist in the recollection of past memories of park features. As well, participants can use body language to indicate the distance, direction, size and configuration of the features that they are describing.

Brown (2005) mentioned that "… in the Chugach National Forest study, many of the intrinsic value dots were placed on empty spaces …" (p. 33). Although Brown attributes this to people recognizing the intrinsic value of wild places, another possibility is that a lack of familiarity with certain places or a lack of map literacy caused people to place the dots inaccurately. Brown also relates that the points were used to infer polygon boundaries based on the density of their placement, which is a subjective process.

Written and verbal communications were used when interacting with the participants to avoid issues related to computer literacy. Because we mapped the features in advance, we were able to use ***place-based nomenclature*** (Evans & Waters, 2007; cited in Carver et al., 2009) to match the names of features with their mapped counterparts. This allowed features to be identified without having to rely on the cartographic or map reading skills of the participants.

Once identified, the features were automatically copied for analysis so that the original data remained intact. The decay in place attachment was calculated for each feature, and this was used to create ***feature surfaces*** that describe how memories of features decrease as distance increases. Rather than using a pre-defined interpolation method (e.g. spline, inverse distance weighting), the shape of each feature surface was based on the decay rate of place memories, as described by Dornič

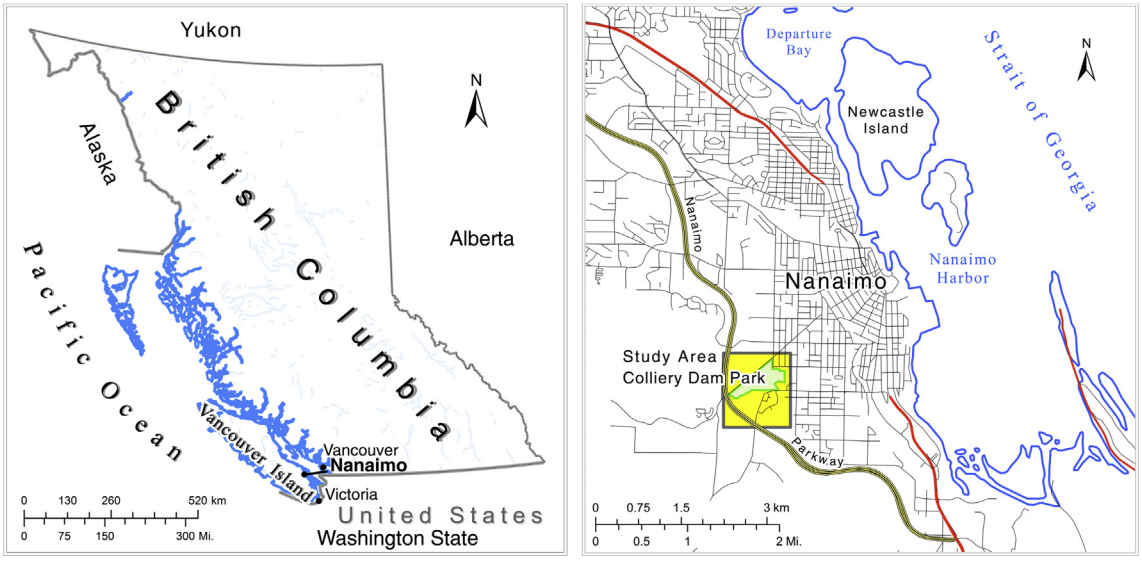

Fig. 1. The study area around Colliery Dam Park.