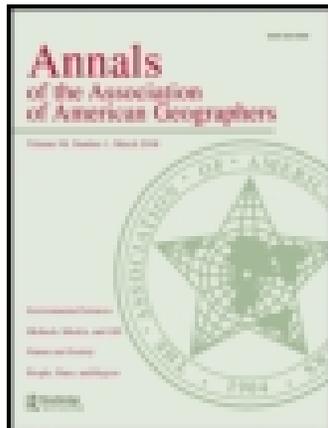


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Critical Reflection Mapping as a Hybrid Methodology for Examining Sociospatial Perceptions of New Research Sites

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We introduce *critical reflection mapping* as a novel and hybrid research methodology for examining the sociospatial perceptions of researchers in new research settings, particularly international ones. The methodology, theoretically situated within the critical geographic information systems literature, combines two existing research methods (qualitative sketch mapping and critical reflection) to elicit original ways in which researchers can critically reflect on an area new to them while spatially linking these qualitative place-based reflections to sketch maps. The methodology allows for synergistic data sets to inform each other and to be analyzed together rather than separately. Through critical reflection mapping, we demonstrate how multiple data sets and methods are combined so that critical reflection and word clouds add significant intellectual value by making another layer of textual information immediately accessible to qualitative sketch mapping data analysis. We present two case studies in Belize and Panama from our current community geography research agendas to demonstrate the viability as well as the caveats of this novel methodology for understanding and representing the immediate sociospatial perceptions of researchers. In the context of international research experiences discussed in this article, the methodology captures individual responses to features of the built environment including walkability and sustainability; documents the changing emotions a newly immersed researcher has in a largely unfamiliar geographic setting; and connects new experiences in a foreign research setting to an individual's everyday lived experiences, positionality, and multiple identities. It also makes these experiences more visible to fellow researchers in a large research team and thus lends itself as a potential forum for shared reflection. **Key Words:** *Belize, community geography, critical GIS, critical reflection mapping, Panama.*

我们引介批判性反思製图，作为检视研究者在崭新研究环境中、特别是在国际研究环境中的社会空间感知的一种新颖且混合的研究方法论。该方法论，在理论上座落于批判地理信息系统的学术文献中，并结合了两种既有的研究方法（质性示意製图和批判性反思），以引出研究者能够批判性地反思新领域的原初方法，并将这些根据地方的质性反思方法连结至示意地图。此般方法，得以让协同数据集相互告知并共同进行分析，而非各自分析之。我们透过批判性反思製图，证实多重数据集与方法如何相互结合，批判性反思和文字云因而得以透过让质性示意製图数据分析可立即取得另一层的文本信息，以此增加显著的知识含量。我们从目前自身的社群地理研究议程中，呈现伯利兹和巴拿马的两个案例研究，以证明此一理解和再现研究者立即性的社会空间感知之崭新方法学的可行性与提醒。在本文所探讨的国际研究经验脉络中，该方法论捕捉了个人对于包含适于步行性、可持续性 etc 建成环境特徵的回应；纪录了投入工作的新研究者在大量不熟悉的地理环境中所产生的情绪变化；并将陌生研究环境中的崭新经验，与个人的日常生活经验、位置性和多重身份认同相互连结。本方法同时使这些经验更能被大型研究团队中的研究同侪所看见，因而使其本身成为分享反思的潜在场域。 **关键词：** 伯利兹，社群地理，批判地理信息系统，批判性反思製图，巴拿马。

En este artículo, presentamos el mapeo de la reflexión crítica como una metodología de investigación novedosa e híbrida destinada a examinar las percepciones socio-espaciales de los investigadores, y nuevos escenarios de investigación, en particular los de carácter internacional. La metodología, ubicada teóricamente en el ámbito de la literatura de los sistemas de información geográfica críticos, combina dos de los métodos de investigación existentes (mapeo de bocetos cualitativos y reflexión crítica) para derivar enfoques originales mediante los cuales los investigadores puedan reflexionar críticamente sobre un área para ellos nueva, al tiempo que ligan espacialmente reflexiones cualitativas de base lugareña para bosquejar mapas. La metodología permite utilizar conjuntos de datos sinérgicos que se informen entre sí, para ser analizados conjuntamente en vez de individualizados. A través del mapeo de reflexión crítica demostramos cómo conjuntos de datos y métodos múltiples se

combinan de modo que la reflexión crítica y nubes de palabras agregan valor intelectual significativo al construir otra capa de información textual de acceso inmediato para el análisis de datos del mapeo de bosquejo cualitativo. Presentamos dos estudios de caso de Belice y Panamá de nuestras actuales agendas de investigación en geografía comunitaria para demostrar tanto la viabilidad como las prevenciones de esta novedosa metodología para entender y representar las percepciones socio-espaciales inmediatas de los investigadores. En el contexto de las experiencias investigativas internacionales que se discuten en el artículo, la metodología capta las respuestas individuales a rasgos del entorno construido, inclusive la transitabilidad y la sustentabilidad; documenta las emociones cambiantes que tiene un investigador recientemente inmerso en un ambiente geográfico en gran medida desconocido; y conecta nuevas experiencias adquiridas en un escenario de investigación extranjero con las experiencias cotidianas vividas de un individuo, la posicionalidad y las identidades múltiples. También, hace estas experiencias mucho más visibles a los colegas investigadores en un equipo investigativo grande, convirtiéndose así en un foro potencial de reflexión compartida. *Palabras clave: Belice, geografía comunitaria, SIG crítico, mapeo de reflexión crítica, Panamá.*

Many researchers in geography and related fields engage in international research experiences. Such experiences often rely heavily on fieldwork in unfamiliar, foreign locations where researchers are expected to immerse themselves in a new environment while interacting with people from different cultures. In international fieldwork situations, researchers are often confronted with numerous issues. First, a researcher often questions her or his positionality and multiple identities as a visitor and researcher in a new geographic context. Second, a researcher's preconceived notions of the foreign research location are often immediately challenged, contradicted, or confirmed by initial experiences with the on-site realities of the new geographic space. Third, researchers involved in short-term study periods often work in groups, with international collaborators, or both, where the need arises for sharing information and ideas in ways that yield results that are transparent yet insightful. Maintaining the reflexivity that qualitative research in particular calls for under such conditions (i.e., studying a new site in collaboration with others) can be difficult if not impossible without a thoughtful process put in place beforehand. These represent the core challenges that compelled us to develop the hybrid research methodology that we introduce in this article.

In this methodological article, we introduce the research method of *critical reflection mapping*. The method combines qualitative sketch mapping and critical reflection to represent the sociospatial perceptions of teams of researchers working in foreign settings that are new to them. Our focus on method acknowledges that research is a *process*, not just a product (England 1994), so that finding ways to enable reflexivity of individual researchers within a group setting also informs the negotiations of actual outcomes of the intended

research project. Although this kind of reflexivity “may not result in destabilizing existing power relations,” particularly for collaborative fieldwork, “the alternative of not heeding such issues is even more problematic” (Sultana 2007, 383). Numerous methodological studies in geography and related fields consider the role of critical reflection and journaling in research (Cook 2000; Arreola 2001; Nietschmann 2001). Additional studies, especially more recent studies in critical geographic information systems (GIS), utilize qualitative sketch mapping (Curtis 2012; Boschmann and Cubbon 2014; Curtis et al. 2014) as a research method to explore “the unique and varied lived experiences of social groups, households, or individuals” (Boschmann and Cubbon 2014, 238). Such studies, however, often focus on maps completed by individuals or groups with more experience in an area, rather than maps from the perspective of a newly immersed researcher or research team. We recognize that the knowledge of researchers new to a study site is deeply connected to one's own identity and positionality, socially constructed, and sometimes based on misperceptions and stereotypes. For us, these are precisely the reasons why critical reflection mapping as a methodology holds practical promise to connect broader theoretical debates about the social construction of knowledge to applied discussions in the field about research sites and researchers' sociospatial perceptions of these locations. The hybrid methodology can foster spatially infused conversations among researchers in a study site (including those new to the site and those who live in or know the site very well) in a manner that exposes issues that might lead to opportunities and challenges in new collaborative research settings. In other words, it opens a space for reflexive conversation.

In this method, we use qualitative tagging along points and transects, field journals, critical reflection,

and word clouds to document observations and data collected by teams of undergraduate and graduate researchers in two separate, short-term international research experiences in the developing nations of Belize and Panama in Central America. Both study abroad programs included community-engaged research focused on sustainability, uneven development, tourism practices, and social and environmental disparities. The community geography framework used in the two study sites, much like other public participation GIS (PPGIS) frameworks (see Sieber's [2006] review of PPGIS), places explicit emphasis on identifying and enhancing spatial thinking and seeks to "affect positive community change, in a variety of ways, whether it is to visualize challenges and assets, improve service delivery, or more accurately identify geographic disparities" (Robinson 2010, 6). For our international research agendas discussed in this article, we define community geography as a process, set of methods, and collaborative framework that uses spatial thinking and geographic approaches that enable academics and communities to engage in inclusive, mutually beneficial, shared research experiences. These experiences are designed to understand and visualize the wants, needs, and future visions of willing communities. Such experiences can be facilitated through and strengthened by critical reflection.

The critical reflection mapping exercises presented in this article led the two groups of researchers in Belize and Panama to walk around their respective town centers while reflecting on and mapping their immediate impressions and observations of the built environment, people, and landscapes while keying in on issues of sustainability, walkability, comfort level, and development. The exercise was designed to serve simultaneously as an introductory tour of the research site, an opportunity for the researchers to examine their individual and collective assumptions in consideration of the possible impact on the ensuing study, and a means to further familiarize the team members with each other as collaborators. The methodological work presented here from our two case studies addresses three related questions about the methodology developed for the purpose of their research:

1. How do researchers who are unfamiliar with an area experience and reflect spatially on a new location for the first time?
2. What opportunities for generating and sharing new insights might this methodology have for collaboratively working with residents who live in the foreign research location?

3. How does this hybrid methodology inform the ways in which it is possible to analyze different sources of qualitative and even quantitative data together?

The contributions of this work are threefold. First, the hybrid methodology elicits a way in which researchers can critically reflect on an area new to them (typically done through journaling and field notes) while thinking spatially by linking place-based reflections to qualitative sketch maps. Second, the methodology provides a way for community-engaged researchers to share and compare their perceptions with foreign collaborators and local communities. For example, the maps resulting from the methodology can be shared with residents, government officials, and organizations to understand how foreign visitors view places. This is particularly important for destinations like Belize and Panama that rely increasingly on tourism for significant portions of their overall economies and desire to attract more visitors. Third, the methodology allows for synergistic data sets to inform each other and to be analyzed together rather than separately. The types of data we use in this study are most often analyzed separately in sketch maps and in written field journals, if they are ever collected and analyzed from multiple respondents, let alone researchers themselves. Our critical reflection mapping method is innovative in how multiple data sets and methods are combined so that critical reflection and word clouds add significant intellectual value by making another layer of textual information immediately accessible to qualitative sketch mapping data analysis. In these ways, we contribute an integrated methodology for examining the sociospatial perceptions of researchers immersed in new settings. Although our focus in this article is on international team research settings, the work can be expanded or replicated in any research field setting.

To conceptually position this new hybrid methodology as a novel option for researchers embarking on group study efforts in new places, we first review the critical GIS, qualitative sketch mapping, and critical reflection literatures. After identifying gaps in the literature and opportunities for methodological improvement, we describe how critical reflection mapping improves on conventional methods. We then document the design process for developing the methodology, itself a multiresearcher collaboration process. We then discuss results from our two respective case studies, remarking on the contributions to

both reflexivity of our research teams and to the directions of the research projects themselves. We end with concluding remarks about the caveats, benefits of, and future directions for critical reflection mapping methodology.

Literature Review and Theoretical Framework

Critical GIS

In developing the critical reflection mapping methodology for researchers and research teams in the field, we theoretically situate our work within the critical GIS literature (Schuurman 1999). In noting the need for a critical (re)turn in geography and quantitative geography in particular, Kwan and Schwanen (2009) suggested that more critical perspectives are needed in geographic scholarship. As they wrote:

It is now important to reinvigorate quantitative geography's critical sensibility and to recognize that it was originally meant for a critical politics that seeks to challenge and transform "prevalent relations, systems, and structures of capitalist exploitation, oppression, imperialism, neo-liberalism, national aggression, and environmental destruction." (Kwan and Schwanen [2009] citing Moss, Berg, and Desbiens [2002, 3])

Critical GIS researchers, along with feminist GIS scholars, actively challenge the limitations of GIS technology and its multiple uses; acknowledge the value-laden nature of and power relations embedded within in all geographic research; recognize the positionality of researchers as they engage with and promote the technology; and seek to eliminate the disconnect between qualitative and quantitative methods and data in GIS (Schuurman 1999, 2006; Kwan 2002b, 2004, 2007; Weiner and Harris 2003; Sheppard 2005; Wilson 2005; Elwood 2006, 2008, 2010, 2011; Gahegan 2006; Harvey, Kwan, and Pavlovskaya 2006; O'Sullivan 2006; Pavlovskaya 2006; Leszczynski and Wilson 2013).

Although recognizing the situatedness of all knowledge, critical GIS researchers often suggest hybrid, mixed-method approaches to challenge dominant, hegemonic uses of GIS technology (Pavlovskaya 2002; Cieri 2003; Heasley 2003; Jiang 2003; Bell and Reed 2004; Kwaku-Kyem 2004; Matthews, Detwiler, and Burton 2005; Dennis 2006; Knigge and Cope 2006; Pain, MacFarlane, and Turner 2006; Pavlovskaya 2006;

Brown and Knopp 2008; Hawthorne, Krygier, and Kwan 2008; Hawthorne and Kwan 2012; Case and Hawthorne 2013). Furthermore, critical GIS scholars often seek to uncover silences in methods and data that marginalize particular groups such as women, minorities, and lower income populations (McLafferty 2002). In exposing these silences, researchers seek to empower these populations in new and creative ways (Kwan 2002a, 2007; McLafferty 2002), although such empowerment is often recognized as contested, shifting, and context dependent (Kwaku-Kyem 2004).

Critical GIS researchers acknowledge the situatedness of all knowledge and challenge "objective truths" (McLafferty 2002; Pavlovskaya 2002; Schuurman and Pratt 2002; Knigge and Cope 2006). By assuming that all knowledge is situated, critical GIS scholars move toward more context-specific analyses of people, places, and spatial processes. For example, Knigge and Cope's (2006) study of urban food and neighborhood change in Buffalo, New York, introduces "grounded visualization" to create "contextualized cartographic narratives in geographic discourse" (Knigge and Cope 2006, 2023).

Critical GIS researchers also call for the elimination of binary thinking (Kwan 2002a, 2004, 2007). Critical GIS and feminist geographers attempt to merge their methods of analysis to uncover the partiality of all knowledge. Kwan (2002b) argued:

The representational possibilities of GIS can be used for enacting creative discursive tactics that disrupt the dualist understanding of geographical methods—where visual images (albeit generated and composed with digital technology), words and numbers are used together to compose contextualized cartographic narratives in geographical discourse. (273)

Recognizing the necessity for hybrid ways of knowing to reveal the situatedness of knowledge production in the field research setting, we briefly highlight additional critical GIS and feminist GIS studies focused on mapping and representing perceptions and emotions of individuals or groups that helped us to conceptualize our critical reflection mapping methodology.

The work of Kwan (2007), for example, uses GIS to create three-dimensional visualizations of emotions and feelings for a Muslim woman as she travels around Columbus, Ohio, after 11 September 2001 (9/11). In these 3-D visualizations, the woman's feelings and perceptions of safe and unsafe spaces in the city are revealed in a way that has not been done in

conventional GIS research. Kwan and Ding (2008) extended this work to create “geonarratives” where 3-D geovisualizations of Global Positioning System (GPS) travel diaries are analyzed in GIS along with computer-aided qualitative data analysis of oral histories collected shortly after the travel diaries to show the spatial and temporal changes in women’s activities after 9/11.

Matthews and colleagues (2005) developed “geo-ethnography” linking ethnography and GIS mapping in a study of Boston, Chicago, and San Antonio families. They suggested that field notes and GIS must be combined given that “the GIS database evolves in parallel with the ethnography . . . without reference to accompanying ethnographic field notes, the maps need not and probably do not convey the whole story, and certainly they cannot describe the dynamics of the individual or family story” (87).

Parks (2001) used GPS for “plotting the personal” to map what she calls trajectory data: the data falling between the objective and subjective. In using GPS as a “technology of the self,” Parks made the critical point that “GPS maps are so abstract, they must be contextualized—or perhaps more appropriately, grounded—in order to signify anything other than their distant and strategic vantage point” (214). To accomplish such a task, she documented her personal journeys as a researcher using GPS. Her theoretical work posits that the personal plots created from GPS can reveal locations visited and provide additional context to the research agenda exposing identity and difference such as

who one is and/or what one does. For instance, the movement signature of a bicycle courier in New York City might look quite different from that of an assembly line worker in Detroit, or a working mother running errands in a suburban strip mall. . . . We might consider, then, how social positions might be coded or “signed” in the GPS image. For while these images can be used to reconstruct personal narratives and memories of travel, like the earliest motion pictures they can be used to profile and classify bodies as well—to reinforce both pre-existing and new categories of difference. (218)

A biomapping project by Nold (2009) combines GPS mapping technologies with galvanic skin response measurements to consider individual reactions to locations with a focus on arousal and stress levels of individuals. Nold combined quotes from participant interviews to explain what happened at a location to warrant a response from an individual. Jones and Evans

(2012) developed the “spatial transcript” with research participants to document how space shapes data both from walking participants and commuter cyclists in a UK study matching GPS locations to the words participants speak at each location.

As the preceding studies demonstrate, critical GIS researchers are actively seeking to change the way GIS conceptualizations and methods represent people, places, and processes. Such scholarship provides opportunities to challenge objective truths, consider issues of empowerment, expose the partiality of all situated knowledges, and combine multiple methods and data sources. Each of these themes makes critical GIS important to our hybrid research methodology, which seeks to combine the strengths of qualitative sketch mapping represented in GIS with the reflections of field researchers from critical reflection journaling exercises. Such a combination of methods and data sources offers the opportunity to create a spatially infused view of researcher perceptions, identities, and positionalities in a way that helps us work through the challenges and opportunities present in new research sites for collaborative research teams.

Qualitative Sketch Mapping of Geographic Space

The preceding work in critical GIS demonstrates a clear connection between mapping and understanding the connections of individuals to their everyday lived experiences in place. Qualitative sketch mapping offers one such method for moving forward the tenets of critical GIS. There is a long research history examining individual and group sociospatial perceptions of geographic spaces through paper, digital, and less conventional forms of mapping. Ideas surrounding internal compasses and cognitive geographic understanding date to the beginning of the twentieth century (Gulliver 1908; Trowbridge 1913). Mental maps were originally intended to capture the personal blueprints people conceptualize in their minds based on experience to navigate and make sense of the world (Lynch 1960; Ladd 1970; Niem Tu and Doherty 2007). The groundbreaking mental mapping research in Lynch’s (1960) *Image of the City* and subsequent works by Downs and Stea (1973, 1977), Orleans (1973), and Gould and White (1974) came at a time when the subfield of behavioral geography was developing as a critical response to the spatial quantitative revolution. During this time period, behavioral geography studies were focused on analyzing spatial perceptions to

understand environments and individual behaviors within such environments (Appleyard 1970; Acredolo, Pick, and Olsen 1975; Pocock 1976, 1979; Siegel and Schadler 1977; Haney and Knowles 1978; Evans 1980; Evans, Marrero, and Butler 1981; Matthews 1987).

More recently, the use of sketch maps (a form of mental mapping) to represent people's understanding of the environment around them has become a multidisciplinary effort with many different approaches and focuses (Kitchin 1994). Qualitative sketch mapping research methods range from pencil-and-paper sketches (Lynch 1960; Lee 1968; Ladd 1970; Maurer and Baxter 1972; Haney and Knowles 1978; Karan, Bladen, and Singh 1980; Aberley 1993; Al-Kodmany 2002; Cieri 2003; Dennis 2006) to digital sketch map drawings or digital representations of hand-drawn maps in GIS (Harris and Weiner 1998; Ceccato and Snickars 2000; Matei, Ball-Rokeach, and Qiu 2001; Pavlovskaya 2002; Cieri 2003; Comenetz 2005; Doran and Lees 2005; Hawthorne et al. 2006; Knigge and Cope 2006; Niem Tu and Doherty 2007; Kwan 2008; Kohm 2009; Lopez and Lukinbeal 2010; Niem Tu, Doherty, and Sharpe 2010; Wridt 2010; Coulton, Tsui, and Mikelbank 2011). Variations of sketch mapping methods also include using blocks and cardboard due to criticisms about the difference in participant artistic ability (Sherman, Croxton, and Giovanatto 1979; Hirtle and Jonides 1985). Other methods include surveys (Gould 1966) or oral recordings (Appleyard 1970; Chase 1983).

The terms *mental mapping*, *cognitive mapping*, and *sketch mapping* are sometimes used interchangeably, as the three terms all refer to the ways in which people see and conceptualize their environment (Lynch 1960; Downs and Stea 1973, 1977; Rovine and Weisman 1989; Kitchin 1994; Niem Tu and Doherty 2007; Boschmann and Cubbon 2014). Boschmann and Cubbon (2014) made the important distinction between mental maps (maps drawn from memory with less cartographic accuracy) and sketch maps (spatially referenced maps of individual or group experiences). They noted that "more recently sketch maps have been used in participatory and qualitative GIS (QGIS) to develop cartographies of group and individual spatial narratives" and to collect "unique spatial data of individual experiences, visualizing socio-spatial processes, breaking down particular barriers of positionality in research, and developing new uses of GIS" (Boschmann and Cubbon 2014, 237).

Sketch mapping has become an effective method for documenting the affect, emotions, and feelings of research participants particularly in relation to levels of fear and comfort (see Curtis [2012] for a substantive review of fear and emotional sketch mapping). Affect and emotion are important to consider when examining how people move through and interpret geographic spaces (Appleyard 1970; Tuan 1975; Buttimer 1976; Pocock and Hudson 1978; Widdowfield 2000; Coulton et al. 2001; Anderson and Smith 2002; Davidson and Milligan 2004; Bondi, Davidson, and Smith 2005; Thien 2005; Davidson, Smith, and Bondi 2007; Kwan 2007; Kwan and Ding 2008; Curti et al. 2011; Lees and Baxter 2011; Stanton Fraser et al. 2013). Yet qualitative GIS researchers suggest that such data are often absent from GIS and mapping analysis (Kwan 2002, 2007, 2008; Pavlovskaya 2006; Cope and Elwood 2009; Jung and Elwood 2010). There are, however, some recent studies that utilize sketch maps to document emotion and affect, especially as these traits relate to people's perceptions of safe and unsafe spaces (Ceccato and Snickars 2000; Matei, Ball-Rokeach, and Qiu 2001; Ratcliffe and McCullagh 2001; Cieri 2003; Doran and Lees 2005; Dennis 2006; Mans 2006; Pain, MacFarlane, and Turner 2006; Campbell et al. 2009; Veitch, Salmon, and Ball 2008; Kohm 2009; Wridt 2010).

Cieri (2003) used sketch mapping and interviews to identify perceptions of safe and unsafe social spaces from individuals in the lesbian community in Philadelphia, Pennsylvania. Research by Mans (2006) in Cape Town, South Africa, neighborhoods identifies perceived crime hotspots, including theft, drug trafficking, and assaults. Mans used an index and sketch maps with participants to identify prioritized areas for crime prevention services based on individual perceptions. A study in England used sketch mapping to capture the qualitative perceptions of residents connecting crime, victimization, and street lighting to views of urban space (Pain, MacFarlane, and Turner 2006). Wridt (2010) used qualitative GIS and sketch mapping to capture children's perceptions of safety and crime in Denver, Colorado, to understand children's levels of physical activity and recreation.

Although qualitative sketch mapping offers many unique contributions to critical GIS research agendas, there are several challenges to consider in implementing the method, including questions of participant identities, subjectivities, and positionalities; questions of data representation and aggregation in GIS; problems related to instructional prompts for participants

in data collection and representation; conflicts related to the temporal dynamic of memories, emotions, and feelings and the most recent experiences with a location being tagged to a sketch mapping exercise; issues of representation that reproduce inequalities, perpetuate stereotypes, and create privileged ways of knowing; and limitations related to who is participating in the mapping process (Blades 1990; Kitchin 1994; Curtis 2012).

Critical Reflection in Geographic Space

The preceding studies point to qualitative sketch mapping as a valuable method for representing experiential knowledge and sociospatial perceptions of space from both individuals and groups. We contend that much of the data represented in qualitative sketch maps are not only tied to individual experiences but are also tied to an individual's critical reflection of her or his everyday lived experiences in these spaces. Critical reflection is a method of systemic inquiry that calls assumptions and epistemologies into question (Mezirow 1990; Eyster and Giles 1999; Zlotkowski and Clayton 2005; Husu, Toom, and Patrikainen 2008). According to Ash and Clayton (2009), reflection becomes critical reflection when "it *generates* learning (articulating questions, confronting bias, examining causality, contrasting theory with practice, pointing to systemic issues), *deepens* learning (challenging simplistic conclusions, inviting alternative perspectives, asking 'why' iteratively), and *documents* learning (producing tangible expressions of new understandings for evaluation)" (27). Critical reflection is essential in community-based projects such as ours as it can "develop democratic partnerships with community groups and facilitate emancipatory forms of knowledge production" (Sletto 2010). Sletto (2010) further argued that reflection provides an opportunity for members of a research team to show how all knowledge is coproduced and socially constructed:

We hold that such co-production of knowledge is typical of PGIS projects in marginalized communities, in part because knowledge is not simply local or scientific, but socially contextual and informed by powerful assumptions about "better" and more accurate ways of knowing. This is why PGIS, especially when conducted in highly marginalized, impoverished communities, must be accompanied by critical reflection among practitioners and their commitment to open, ongoing, and reflexive dialogue with community members. (127)

Critical reflection comes with some challenges, especially for new student researchers in field-based and experiential learning. Clayton and Ash (2004), in particular, noted the difficulties of reflection for students. They suggested that opportunities to reflect must be structured and welcomed as part of experiential learning activities. King (2004) and others warn that critical reflection in experiential learning can often reproduce knowledge of the dominant organization or partner working with students, further develop stereotypes, and reinforce the privileged feeling that sometimes accompanies fieldwork where students see their service as necessary to a community partner.

Critical reflection is an especially important component for participants in international research experiences such as study abroad programs. Critical reflections are effective tools to engage students with critical theory and to question their role in the field work experience (Cook 2000; McGuinness and Simm 2005; Dummer et al. 2008; Sharma, Phillion, and Malewski 2011; Menard-Warwick and Palmer 2012). Talburt and Stewart (1999) noted that students should be provided opportunities to reflect on the sociocultural connections and differences while researching and learning in the host country. Dolby (2007) suggested that emphasizing critical reflection on students' understanding of their own national identity in relation to their host study sites can be an important step toward the objective of developing global awareness and global citizenship. Wynveen, Kyle, and Tarrant (2012) suggested that global citizenship can be fostered in study abroad from an environmental lens as students challenge and discuss their environmental values, beliefs, and norms.

As students actively reflect on their experiences in study abroad locations, they often write and reflect on geographic space but do not necessarily connect these reflections to a map. Only requiring students to journal in general during their time abroad neglects spatial variation within the areas they visit and risks producing erroneously homogenous perceptions. Although much has been written about critical reflection in geography and related fields, less has been written about the ways in which spatial narratives or spatial stories influence such critical reflections. Elwood (2004) stressed that spatial narratives (De Certeau 1984) help students attach meaning to particular places in field experiences and connect their experiences with multiple axes of difference, including race, class, gender, ethnicity, sexuality, and other socially constructed identities (McDowell 1997; DeLyster 2001;

Hyndman 2001). Elwood (2004) argued that students must reflect while in the field and while participating in experiential learning to recognize the active ways in which they (re)produce knowledge:

What is particularly useful to the process of experiential learning is the extent to which students are able, when prompted, to articulate the sources of their existing spatial narratives. This articulation of spatial stories is, I would argue, an essential first step in fostering critical thinking through experiential learning. Eliciting such narratives and collectively discussing their similarities and differences moves students toward a stronger understanding of place as socially constructed, an understanding that they must have in order to be able to revise and add to their spatial knowledge through experiential learning. (60)

Although our study focuses on student researchers, we recognize the potential of our hybrid methodology for researchers in all new study sites. Critical reflection allows a researcher to question her or his positionality as an active knowledge producer, contributor, and participant in examinations of real-world issues. In exploring one's positionality, one also considers ethics among the researcher, research participants, and the geographic context in which the research is being conducted (England 1994; Nast 1994; Rose 1995, 1997; Katz 1996; Herod 1999; Maxey 1999; Barker and Smith 2001; Morrow and Torres 2002; Chacko 2004; Sultana 2007; Moser 2008). Such honest, critical, and exposing accounts by the researcher and research team (especially when discussed with research partners in host study sites as we note in the Panama study) offer transformative potential for new research collaborations by recognizing the social construction and (re) production of knowledge prevalent in these new collaborative spaces. Thus, in our mind, there is great opportunity to better connect critical reflection to qualitative sketch mapping practices.

Toward Critical Reflection Mapping as a Hybrid Research Method

As evident in the preceding discussion, both qualitative sketch mapping and critical reflection play important roles in documenting the sociospatial perceptions of individuals as they interact with the environment. Written critical reflection and journaling allows an individual to examine and question multiple issues as he or she interacts with new people and

spaces. At the same time, qualitative sketch mapping can visually display an individual's perceptions of the environment and landscape as well as material observations. In our review of the two literatures, a significant opportunity lies in combining qualitative sketch mapping and critical reflection. Having individuals engage in additional spatial critical reflection might persuade them to question their own spatial knowledge, examine their role in the environment, and connect that reflective knowledge to a map that they are in effect in the process of creating at the same time they are exploring a new location. Combining qualitative sketch mapping with critical reflection can thus provide additional insights into how people experience and understand geographic space. Furthermore, using the aggregated reflections of a group in an anonymous, spatially referenced way allows contradictions and common perceptions alike to become salient points of an open group discussion about particular places without putting a particular individual on the spot. Aggregated text that simply summarizes a majority viewpoint will not suffice, however; the visualization of many different words permitted by word clouds makes visible this multitude of different perspectives. When employed by the researchers themselves, the method can become a tool for improving collaboration and bringing a spirit of collective reflexivity to the research site.

With this in mind, in the sections that follow, we present two case studies that combine critical reflection with qualitative sketch mapping. Although both cases tested the methodology in nearly identical ways, the first description (Belize) elaborates results from the reflections and walkability themes, featuring data from the journals, sketch maps, and aggregated word clouds. The second description (Panama) elaborates results from the reflections and sustainability themes, featuring data from the aggregated word clouds and sketch maps. Together, they demonstrate the novel contributions possible from this hybrid method. Much of the previously referenced literature focuses on individual perceptions from people with a wealth of experience in a location. In this article, we target a particular group of people who inspired the development of the methodology: researcher teams with no previous experience in the foreign location. In so doing, we introduce critical reflection mapping to represent the immediate sociospatial perceptions of individuals working together in a new and unfamiliar geographic space. This extends the current literature by (1) combining two research methods to examine individual

sociospatial perceptions; (2) turning the critical lens on those doing the research rather than those being researched; and (3) offering a framework for practice to extend the ability of research teams working in new locations to systematically enable reflexivity as a group, rather than only as individuals. In our view, it is especially important to examine the perceptions of researchers who have little experience in a location, yet are expected to function in a new space, interact with new people and cultures, and contribute to geographic research in largely unfamiliar settings. It should be noted that our method is principally designed to elicit visiting researcher perceptions, and not the perceptions of those who live in Belize and Panama, although the latter case study considers some additional data collected with collaborating Panamanian researchers. Still, we adopt the idea common across the previously referenced literature that one person's cognitive perceptions of an area offer one perspective or "reality." As our methodological study and other critical GIS and sketch mapping research suggest, a multitude of cognitive sociospatial perceptions across individuals tend to have trends emerge among them from among the contradictions, divergences, and convergences in discourses, which, taken together into the research process as the beginning of a conversation on reflexivity, contribute to an understanding of a group's perception of geographic space and of their relationships to each other. Making the ways in which these perceptions are shared or differ across individuals in a group transparent, particularly when done as a research activity, holds important implications for researcher team reflexivity, for group dynamics during the collaboration, and for directions of the research itself.

Study Areas and Methods

Study Areas

Our first case study of critical reflection mapping was completed in San Ignacio, Belize. Belize is a small Central American nation with a population of over 350,000. In May 2012, twenty-two undergraduate and graduate students from various disciplines at Georgia State University participated in a ten-day community geography and GIS study abroad program in Belize led by one community geography professor and one geoscience education professor. We model the Belize study abroad field course as a critical study abroad

experience (Reilly and Senders 2009) and seek to incorporate a flexible model of community geography and public participation (Hawthorne, Atchison, and LangBruttig 2014) that is responsive to the needs and constraints of our diverse Belizean collaborators in a fashion similar to other PPGIS and community geography projects around the globe (Elwood and Ghose 2001; Seiber 2006; Elwood 2009; Allahwala et al. 2013).

Prior to the Belize trip, the students meet several times on our home campus to learn basic GIS and fieldwork skills to be used in the field. The class then meets in Belize for ten days where students work with GIS software to learn how GIS and mapping can be used to support the needs of local residents, organizations, and Belize government offices. Themes explored in the class include social and environmental disparities, uneven community development, social service distribution, agriculture production and management, and ecotourism practices. Additionally, the students are provided with daily prompts to write about their experiences in the field. Discussions often include comments about research ethics, field data collection concerns, critical reflections of the sites, and challenges of GIS fieldwork. After the time in Belize, students return to four days of data analysis in our campus GIS lab. On the final day of the course, students hold open presentations of their work publicly at the university. In many cases projects are revised after the completion of the course by students in response to feedback from the instructors and Belizean partners. Maps, geospatial databases, and reports that are products of the students' work are then shared with our Belizean collaborators to be used in continued research or public service. Student researchers spent four of the trip's ten days in and around San Ignacio, a town of about 17,000 residents on the western border of Belize situated near multiple Maya ruin sites, jungles, ecolodges, and other tourist destinations. While in San Ignacio, students were asked to document their perceptions of sustainability, walkability, and comfort as these themes related to their research projects and their experiences as researchers and visitors in the area.

Understanding a foreign visitor's perspectives on these issues is important in Belize. The local and national tourism boards and the Belizean government have a vision to improve the tourist experience in the area because tourism is the leading economic activity in Belize. One example of this vision includes the recent construction of a new tourism zone and visitor

center in the heart of downtown San Ignacio, which students visited as it was being built. In initial research conversations in early 2011 between one of the authors and local tourism board members, it was suggested by a board member that data from foreign visitors and their experiences in the area would be useful to analyze. Recognizing our commitments to community-engaged scholarship in Belize, our study abroad group agreed to provide such data and maps documenting our initial impressions of San Ignacio.

Our second case study of critical reflection mapping was completed in the historical quarter known as Casco Viejo in Panama City, Panama. Panama is well known for its canal and its site as a center of early trade in the New World. Today, the metropolis is characterized by skyscrapers and traffic, as any modern metro area of nearly 1.3 million in a country of only 3.6 million people. The study site for our research is located in the old Spanish center, the second one established for the nation after the original center was sacked by pirates. An area known to tourists as Casco Viejo is congruent with, but not synonymous with, the residential area of San Felipe. Particularly since its designation as a UNESCO World Heritage site in 1997, tourism has become a significant economic activity for what seems to be a town within the city. Meanwhile, profound gentrification has set in, a process that has seen the population of San Felipe shrink from more than 10,000 in the late 1990s to less than 4,000 in the most recent census (Suman 2008; Adames 2009). Resident organizations, government agencies, realties, and other businesses diverge in their visions for the area, but unify to promote an image as an important international tourist destination, trying to exemplify certain sustainable development principles.

The field site and research approach itself was chosen as the theme of focus for this group's work in large measure due to long-term collaboration and friendship among the three female researchers convening the activity: a U.S.-born tenured professor in a U.S. institution of higher education, a U.S.-born geographer and longtime resident in Panama married to a Panamanian, and a Panamanian-born geographer and professor at the largest public university in Panama. The combination of positionalities among this core group of researchers, as well as their long-term relationship, helped to generate a pathway for the research team to engage a larger group of both U.S. and Panamanian researchers together (Solís, Price, and Adames forthcoming). The questions raised with the fieldwork drew from and built on the research on neighborhood

revitalization and gentrification that this third researcher had been undertaking in San Felipe for many years (Adames 2009). Her work centered on how power structures and contested spaces are increasingly becoming a challenge for many residents in developing regions, particularly taking place in historic districts, as in-depth studies about this issue in such locations are quite rare. Her thesis examined the dynamics of San Felipe with respect to the intersection of revitalization (after Scarpaci [2000], referring to the general physical and socioeconomic enhancement of a designated built environment) and gentrification (after Smith [1998], indicating how central urban neighborhoods that have undergone disinvestment and economic decline experience a reversal, reinvestment, and the in-migration of a relatively well-off, middle- and upper-middle-class population). The novelty of her studies has been to discover more about particular effects of gentrification in developing countries, especially in historic districts, "where this revitalization promotes gentrification of the local middle and upper groups and entrepreneurs, as well as from foreigners who believe they are part of a global village and are always looking for new and exotic areas to live" (Adames 2009, 3). Her work began to develop an understanding of how San Felipe residents perceive and react to these processes, whether they are participating in decision making, and how these processes are transforming their lives. Not surprisingly, historical tourism plays a central role in the ongoing development of this area and its examination together with foreign collaborators presented a productive point of departure for advancing this line of research.

In June 2012, nine undergraduate and graduate students from various disciplines from George Washington University participated in a two-week urban sustainability and development, community geography, and GIS study abroad program in Panama led by these three geography professors. Student researchers spent most of the trip's two-week agenda in Casco Viejo, with a weekend visiting an indigenous community, which served as a reflection retreat. The group worked closely with a counterpart group of sixteen undergraduate seniors from the Department of Geography at the University of Panama, finishing studies with either GIS or ecotourism emphases, under the guidance of the collaborating professor of geography there.

Given the profound and rapid change in the local community due to extreme gentrification, the group encountered a great deal of interest in their research

agenda, which focused on the prospect and reality of urban sustainability relative to a heritage tourism development trajectory. Both U.S. and Panamanian researchers participated in the critical reflection mapping exercise, albeit on a more limited basis for the local-based group, which gave this case study a basis for comparing the newcomer perspective with those of other researchers who had more intimate knowledge of the area, in addition to it being an exercise in group reflection. Other data were collaboratively collected by the research teams, including close to 200 interviews, focus groups, participant observation, archival research, and repeat photography. The researchers then divided into multinational teams to focus on analyzing the data collected by the group as a whole and to address particular subthemes chosen according to their particular interests and skills. Their preliminary research was presented at the end of the study tour in the Casco Viejo office, attended by local residents, representatives of business associations, neighborhood associations, government officials, university faculty, and other parties. The critical reflection maps completed by both groups of student researchers in this case study formed an important visual part of these presentations and were also used by the teams themselves to refine their research directions during the collaborative research process in ways that took into account the multiple perspectives on the geographic spaces of Casco Viejo, San Felipe, Panama City, Panama.

Development of a Hybrid Research Methodology

The creation of the critical reflection mapping method ensued in an iterative way, arising initially from the accidental discovery of two of the authors' shared interest for community geography when discussing a different project and the serendipity of simultaneous plans for similar study abroad research experiences in the two sites in Central America. Prior to the finalization of the respective research itineraries of each group, the authors first identified the common challenges noted earlier, namely, how to ensure reflexive research practices for a quality study conducted by teams of individuals new to the study site. The idea of combining critical reflection with sketch mapping emerged from noting the potential for visualizing qualitative data from multiple sources. Operationalization of the specific steps, questions, and themes in a framework that could be conducted in a single day by researchers of different abilities and from different

disciplines took several revisions among all of the authors and lead researchers. There was a commitment to balance the specific needs of the respective research projects with their ability to create a methodology that could be tested by both case studies and later proposed as a methodology that could be replicated by other research groups in other settings. A few of the details, such as which base map, which word cloud tool, and so on, are left as choices tailored to the particular application of the method, but the general framework was successfully conducted in both sites, as reported later. The method as employed in the test cases relies on key features that can be replicated by other research groups. We summarize these features in Table 1 with the hope that such information can be useful for researchers in other settings.

Table 1. Summary of Critical Reflection Mapping Methodology

Participants	<ul style="list-style-type: none"> • Minimum of 8, maximum of 22 researchers allows enough participation for sufficient text to be generated for qualitative cloud images across the spaces of interest but not too big for effective group discussion reflections.
Pre-fieldwork journaling and reflection	<ul style="list-style-type: none"> • A pretrip journal entry about expectations permits researchers a critical baseline for self-reflection on site.
Logistics of critical reflection mapping	<ul style="list-style-type: none"> • Maps identify both routes and locations to permit traveling reflection along a transect and stopping for deeper reflection at particular points of interest. • Routes and locations or options on the maps are assigned in advance to permit researchers to focus on the reflection process, not too much on navigation. • Researchers conduct the exercise as individuals; however, they should walk in pairs or trios for safety and ease of finding the way in a location new to them. • Reflection questions use Likert-scale type of choices for aggregation across the group, paired with open-ended commenting or journaling. • Other specific key themes of interest to the research study (e.g., sustainability and walkability) use simple two- to three-option closed responses for ease of aggregation. • Research-identified map points (i.e., "where I felt out of place") provide additional spatial information to counterpoint predetermined routes and locations.
Analysis and dissemination of results	<ul style="list-style-type: none"> • Analysis in a group-based online Web mapping application permits visibility and shared data access to support group communication. See our Belize case study (http://bit.ly/XbDG1B and http://bit.ly/XbDWxr) and our Panama case study (http://bit.ly/X6kFhp). • Results shared with collaborating researchers during the study process shape the direction of question refinement and future research directions.

Data collection. In both case studies, student researchers were asked to write a pretrip commentary about their expectations of the research experience as well as of the research location. This pretrip commentary included several questions, including questions designed to understand what students expected to see, learn, and encounter at the study site; how the study site might compare or contrast to the student's home location; and what their emotions and expectations were for the field experience. On site, students were divided on the first day into walking pairs. The students were instructed to (1) follow predetermined routes (two in Belize, three in Panama common to all pairs, and three unique to each pair); (2) visit required locations common across each pair (two in Belize, three in Panama); and (3) visit additional unique locations (Belize pairs or trios chose four of their own, Panama pairs or trios were assigned three). Students were provided 8 × 11 in. maps with highlighted routes and locations to visit and a two-page instruction sheet with specific questions they were asked to reflect on while in the field. In Belize, researchers used printouts of aerial photos from Open Street Map; in Panama, they used printouts from Google Maps' Street View. At each point along the walking routes, students were asked to describe the land use, rate the state of facilities and sustainability, assess walkability, document their primary emotions, record their level of comfort, and discuss any interactions with local residents. Walkability was chosen as a key theme to explore given (1) the necessity of walking in fieldwork in developing countries like Belize and Panama and (2) tourism (being encouraged in both research sites) is largely dependent on walking and the walker's comfort level plays a large role in which areas will be visited or avoided. Sustainability was chosen as a key theme for students to focus on in their field experience given the collaborative discussion among the faculty research teams in both sites and their respective partners in the local study areas. For example, many Belizean cities, towns, and villages take pride in offering eco-friendly and sustainable tourism practices as part of the nation's tourism marketing campaign. Journaling was encouraged during the field data collection to capture students' immediate perceptions of the research sites and the initial experience. Participants were also asked to write in their journals and reflect on their assessments after the initial exercise.

The scope of the field data collection was multifaceted. In this article, we present results from the walkability and sustainability assessments, comfort and

expectations recordings, information written on maps, and journal entries. None of the terms, such as walkability, sustainability, and comfort, was defined ahead of time. We encouraged the researchers to identify and verbalize what these terms meant to them as they reflected on the new geographic space. The ratings for walkability were poor, average, and good. The ratings for comfort were very uncomfortable, moderately uncomfortable, neither comfortable nor uncomfortable, moderately comfortable, and very comfortable. The choices for sustainability were sustainable and unsustainable. Participants were also asked to mark spots on the map where their pretrip expectations were met, where their expectations were challenged, and where they felt out of place. The researchers were encouraged to elaborate or explain their choices in their notes, including explanations that related to their expectations of the site relative to the research themes. Journal entries and information written on the maps were later analyzed using word clouds and integrated into GIS along with the categorized ratings. We recognize the open-ended nature of these terms and rankings, and also understand that their meanings are socially constructed by each individual based on a variety of factors. This was done on purpose to allow students to actively reflect on their experiences in the new research sites.

The team transferred all researcher-identified points and routes from the qualitative sketch maps into ArcGIS Online, using Open Street Map basemap, which allows for group access to the data. It is important to point out that when comparing these points with the written reflections, our local knowledge of the study site, and viewing where the points should actually be placed on aerial photography of the area, it is clear that some researcher-identified points appear to be approximate and in some cases inaccurate. For example, points from those in the same group did not match up or they wrote about something that was in another location. We agreed to leave these points on the map because to us approximate spatial representation on the map is more important than the actual spatial position (e.g., through the use of more accurate GPS locations). This is consistent with other qualitative sketch mapping studies that recognize sketch maps as approximate representations of an individual's cognitive mental map.

Analysis. The ratings were mapped in one of two ways. First, data that included more than two options were coded for aggregation. For each such point, we coded answers on a scale of 0 to 2. Zero indicated a

minimal level of agreement for a particular feeling or perception (i.e., this place was not very walkable). A coding of 1 was applied for students in the middle. A coding of 2 indicated the highest level of agreement for a particular feeling or perception. Visually, this could be represented cartographically by strength of color, thickness of route line, largeness of radius, and so on, corresponding to the mathematical aggregation of the group's responses. Second, data that permitted one of only two answers (e.g., "met my expectations" vs. "challenged my expectations") were aggregated separately and visualized as two different opposing colors to show the data in tandem.

We used open-source word cloud software (i.e., wordle.net) to aggregate what students wrote about routes and locations in their journal and on the map itself. Several parameters and preprocessing steps must be identified prior to completing analysis in word cloud software. For example, in this study we used a stop list, a list of words such as *it*, *the*, and *an*, to give more weight to words with more meaning. These methods are consistent with other word cloud studies (Cidell 2010; Gill and Griffin 2010).

We added to the cloud what people wrote in response to the instructional prompts (i.e., comfort levels, walkability ratings, and sustainability ratings). If a student wrote a statement such as, "Walkability is average, and is mostly comprised of gravel," however, we chose to eliminate "walkability is average" and retain "mostly comprised of gravel." We eliminated such phrasing from the word cloud analysis because our walkability layer on the GIS map represents student ratings of walkability as poor, average, or good. The word clouds are used primarily to complement these ratings on the maps, so our focus with the word cloud method was to capture what students said about their perceptions, assessments of the terms, and any other experiences while walking the paths and visiting locations. If we had not eliminated these required terms (given in the instructional sheet provided to students), then words such as *walkability* and *average* would be artificially ranked as some of the most used words in the analysis.

Once these preprocessing parameters were completed, the word clouds were created from aggregated data of reflections from student journals and from the short phrases students included on their maps tagged to the respective routes or locations from which they derived. This method allows the word clouds to capture the organic flow of researchers' thoughts as they navigated the study site for the first time. The size of the words indicate how common the verbalization of a

particular discourse is; smaller, perhaps even conflicting, references are not left out, but appear in proportion to their expression among the narratives of the researcher reflections. Combining written critical reflection from journal writing with spatial locations on a map, we are able to represent the responses, emotions, and perceptions experienced by the research team as they engage with the environment in the earliest stages of the research experience. This is an important point because most critical reflections are tied in some way to geographic space, yet few studies actually map critical reflections. This method also allows visual access to all of the different sources of qualitative data in the same place. The fact that the software for creating these visualizations works very quickly and easily also meant that these tools could be used essentially in real time, to guide group reflection and research direction discussions as the activity was taking place.

Results and Discussion

The critical reflection maps created from observed researcher data in both case studies provide striking results that demonstrate the power of this hybrid research method. Most important, the method is quickly able to visually display the content, qualitative themes, and spatial variation of responses aggregated together for the group. We first discuss the results of the Belize case study, focusing on how the different reflections on locations and transects relate to those spaces where expectations were met or challenged, researchers felt out of place, and observations were noted on walkability. We then turn to a discussion of the Panama results, focusing on how the different reflections on locations and transects relate to those spaces where expectations were met or challenged, researchers felt out of place, and observations were noted on sustainability. For the Panama case, comparisons are also made to the results of the same exercise at select locations where the method was conducted with collaborating student researchers from Panama.

San Ignacio, Belize

Interactive map #1 (<http://bit.ly/XbDG1B>) presents an aggregate view of walkability as defined by all of the student participants in Belize. Interactive map #2 (<http://bit.ly/XbDWxr>) presents an aggregate view of where students felt their expectations about the research location were met (blue circles) or challenged

(red circles); it also shows where students felt “out of place” denoted by circled x symbols.

Clear spatial patterns and variations for walkability and comfort in San Ignacio are revealed when examining the combination of student written reflections represented in the word clouds and the spatial component represented visually in the sketch maps. Along the western walking route, there is general consensus from the student researchers that the northern portion of the route was more walkable than the southern portion. Whereas the map itself provides visual evidence to support the notion of spatial variation in the reflections of walkability, the word clouds and journal writing provide additional data to support the reasons behind these walkability rankings. In the critical reflection journals, students most often reference traffic, pedestrian spaces, people, and activities. This is obvious in the word cloud for the western side of the walking route, as some of the highest frequency words include *gravel*, *street*, *roads*, and *pedestrian*.

In reflecting on walkability, the majority commented on the quality of sidewalks and roads along the route. In their reflections, they often referenced whether a road was paved or gravel. For example, at a location on the western route, one said, “We ranked the walkability as average because of a lack of sidewalks and the transition from pavement to gravel.” Many also referenced the open drainage ditches in their walkability reflections, as in some cases crossing the street involved jumping over these ditches.

In examining reflection journals, it becomes clear that students generally identified as being comfortable on both the north and south portions of the western walking route. Often they referenced being in a residential space as one reason why they were comfortable. One wrote that “most houses were well kept; a few were run down.” Another student who felt comfortable while referencing a portion of the western route wrote, “This was the most residential segment of the entire route.” Only one individual reported a high level of discomfort along the western route at one particular location. She wrote, “I began to notice more merchants, my first homeless person, and street peddlers. I know that type of activity is common, but as a young woman I always tend to feel less safe.”

The eastern walking route contains a more complex spatial variation of critical reflections related to walkability and comfort than the western walking route. The word cloud for the eastern route provides a variety of commonly cited words such as *market*, *area*, *traffic*, *guard*, and *soccer*. When delving deeper into the analysis

of the written reflection data, the reasons behind this high variability and lack of consensus become clear. The critical reflection journal responses indicate that the eastern walking route includes a much more diverse mix of activities and features (e.g., shops, restaurants, roadside stands, government offices, petroleum stations, parks, soccer fields, residential housing, and primary schools) than the western walking route.

For example, a large portion of the eastern route was more crowded with street vendors, residents, and tourists because of the town market. Some students felt comfortable in this lively setting. One wrote, “The area [near the market] is much more alive and active. There are shops, vendors, and lots of people. It feels like the main section that has life in the city.” Others also connected their level of comfort and ranking of walkability to the types of people in the locations visited. One student wrote about feeling comfortable in a portion of the main tourism zone by saying that “this segment had sidewalks next to dense mixed-use building, and had a touristy feel with many more Caucasians visible than the other corridors we passed.”

In examining additional reasons for the walkability and comfort rankings near the market area, it became clear that both vehicular and pedestrian traffic were important to the rankings. Many commented on a pedestrian’s ability to safely coexist with automobiles, especially as pedestrians were often in very close proximity to fast-moving vehicles. One expressed concern over motorists’ driving habits in this portion of the walking route: “The area is very busy with a lot of traffic. I feel safe from crime, but not from vehicles. I’m starting to feel vulnerable because of the crazy drivers who do not watch for or yield to pedestrians.” This result is particularly striking in the context of study abroad and the confrontations of identity that often accompany such international experiences. Many of the students on the Belize research trip live in Atlanta, Georgia, near the university where they drive their own cars in a city that is notorious for its poor planning, automobile dependence, and heavy traffic. In San Ignacio, these same students were required to use walking as their primary mode of transportation. This was a challenge for many of them. One reflection on the difference between walking and driving one’s own car in such a new setting revealed that “my initial emotion was anxiety, having to avoid cars and the ditches was unfamiliar.”

For some students there was also a temporal component to their reflections, especially along the eastern walking route. Most visited the market on the eastern

walking route a few minutes before sunset. Impending darkness led some to feel less comfortable in the space near the market: "It was getting dark now and the combination of the traffic and the construction site here made it difficult to navigate this corridor." Another offers a similar sentiment in the reflection journals: "I feel unsettled because I'm not really sure where to go or what is around me because it's getting dark and there are so many people and cars around, but there's a dog."

The results from the Belize case study offer a useful first attempt at critical reflection mapping. In combining written reflections, word clouds, and qualitative sketch maps, we are able to understand and represent the areas of consensus and variation documented by students as they rank walkability and comfort in San Ignacio. Importantly, we learn that these reflections are very much tied to specific geographic spaces and that the built environment and interactions with people of different backgrounds play important roles in how students reflect on and interact with geographic space as newly immersed researchers in a foreign location.

Pedestrian and vehicular traffic, along with the quality of sidewalks and roads, were important factors in student rankings of the study area. By examining the written reflection data more closely, we also learn that experiences in this particular geographic space intersect with the multiple identities of the student researchers. For example, many students compared their experiences in San Ignacio and their rankings of these geographic spaces to their daily activities in their home city. In particular, some reflected on their national identity as an American, gender, or age as they ranked their level of comfort in a particular location.

Panama

Like the case study in Belize, the research team in Panama conducted the critical reflection mapping exercise on the first day of arrival to the research site, broken into pairs as indicated in the assignment map in Figure 1. The interactive version of this map is

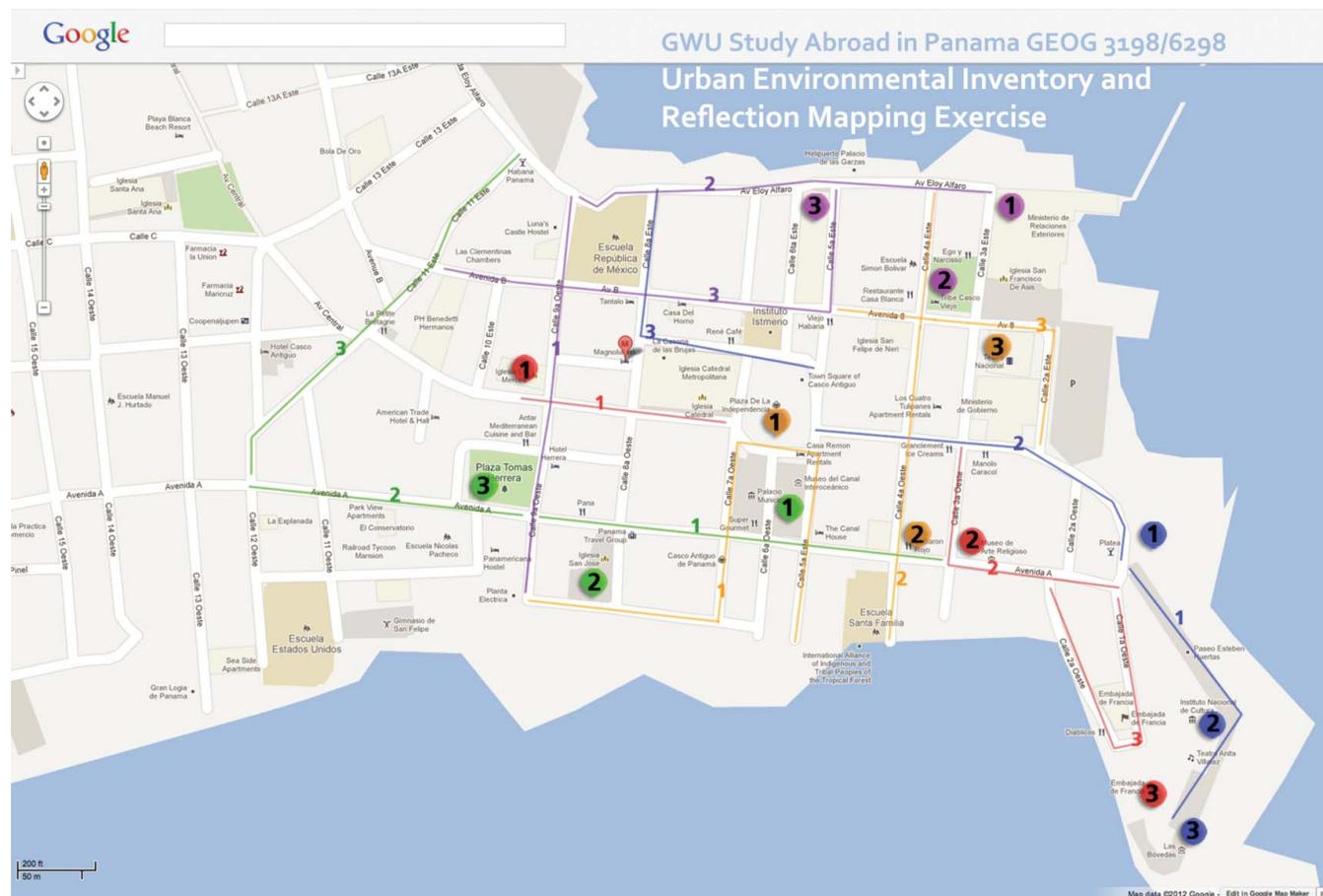


Figure 1. Assignment of routes and locations for researcher teams in Panama to conduct critical reflection mapping methodology. An interactive map of aggregated group qualitative data is available at <http://bit.ly/X6kFhp>. (Color figure available online.)

Material observations made during the exercise provided another source of information to reflect on, as the group had to negotiate meanings of various categories related to how they interpreted the state of the built environment. The uneven process of gentrification was reflected in their audit of properties across the Casco Viejo (Figure 4). The variations and complexity of qualitative information throughout the exercise allowed the researchers as a group to reflect on their perceptions of whether particular activities were sustainable or not (Figure 5). Taken together, the reflection demonstrated a strong tendency across the entire study area, where researchers perceived the older, earlier gentrified spaces along the peninsula as sustainable (green) as opposed to the active gentrification areas that are currently under construction (orange). During group discussions of these results, questions were inspired about the strong relationship of feeling out of place with unsustainable areas and whether urban sustainability is ever to be considered achievable in a gentrified tourist area, regardless of when that process has taken effect. The results immediately engendered a critical reflection on meanings of sustainability that were uniquely tied to the study site and highly relevant to this particular place, even though the researchers were only becoming familiar with this location.

But where the researchers noted feeling “out of place” did not correspond spatially as neatly with the map showing where expectations were met (blue) versus challenged (red; Figure 6). Notably, two clusters of “out of place” sites fell on or near two very different plazas in the Casco. One set of locations marked by the researchers as a place where they felt out of place but that their expectations were met was in the very center of the historic town, Plaza Independencia. This location typifies a Spanish town center plaza, with the cathedral and expected architecture characteristic of such a place in Central America. One finds tourist-oriented businesses and, of course, much construction at present due to renovations, which seemed to be the source of discomfort with the plaza for researchers. The other cluster of locations marked as a place where they felt out of place and that their expectations were challenged is located at Plaza Herrera, at the very western edge of what is considered the historic area, and what one would call San Felipe, rather than Casco Viejo, due to its characteristic of being a plaza very much in use by local Panamanian residents, complete with different kinds of vendors of cheaper food catering to national tastes, children hanging out in school uniforms, and other signs of daily life uncommon in tourist areas. A third site, Plaza Bolivar, was markedly missing from anyone’s reflection as being out of place,

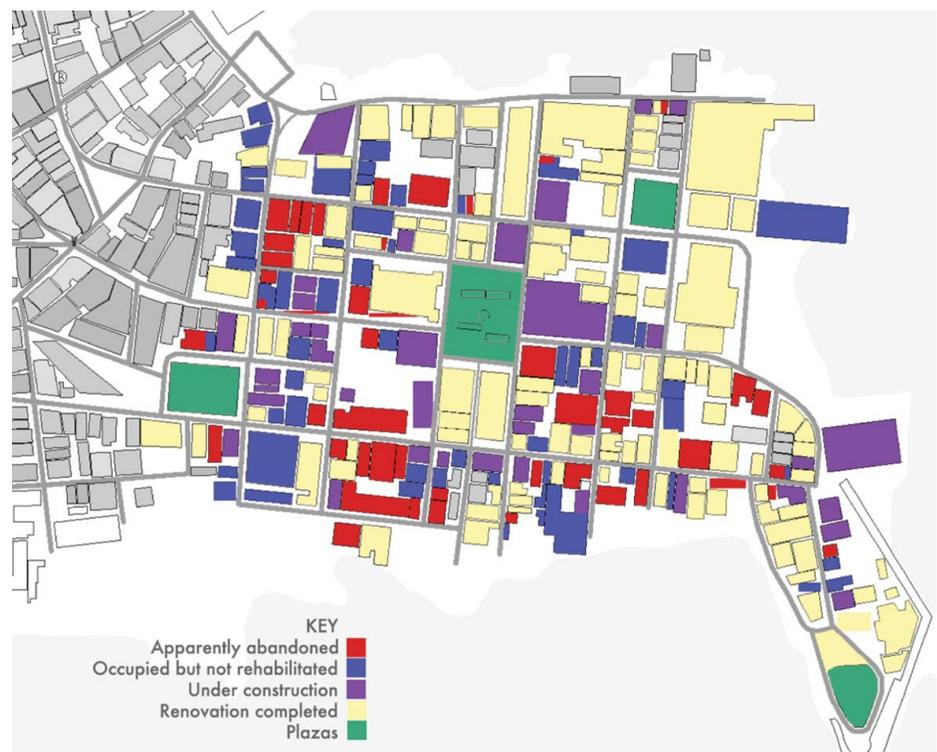


Figure 4. Results of built environment audit. (Color figure available online.)



Figure 5. Results of sustainability observations with designated sites where researchers marked “feeling out of place” (white circles with X); green denotes locations perceived as sustainable and orange denotes locations perceived as not sustainable, where the size of the circle indicates quantity of responses. (Color figure available online.)

because of or despite its role in the area serving nearby government office buildings as well as tourists.

From discussions that ensued after viewing the different word clouds, the researchers were able to share a critical reflection about their initial reaction in this

new place and moderate their positionality to achieve greater awareness of the different spaces in their study site and the multitude of layers of meaning these spaces might contain. Although construction seemed to figure about the same in each plaza where “out of

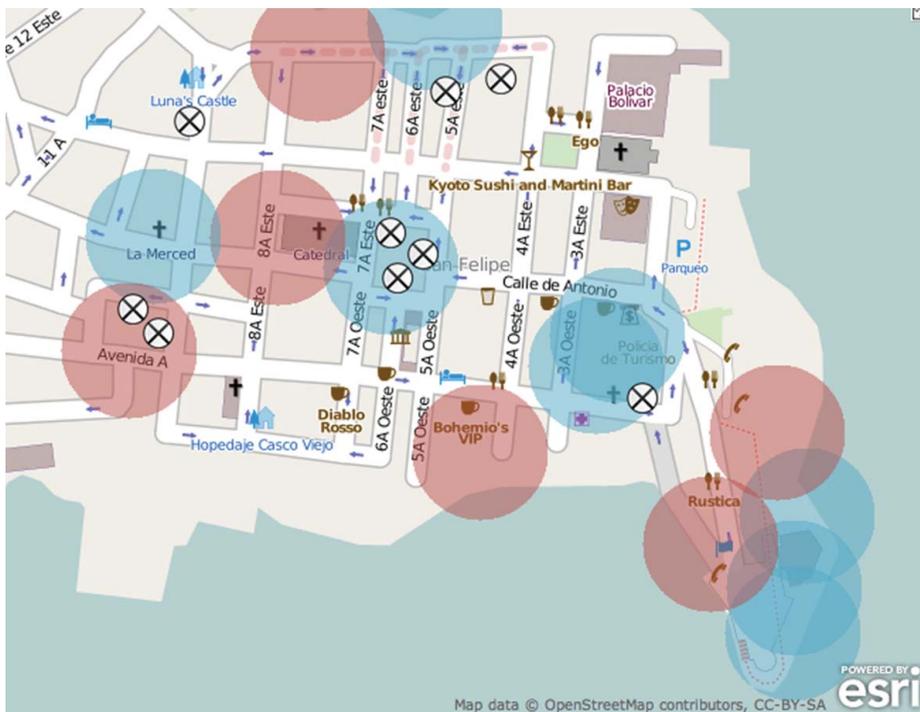


Figure 6. Results of expectations observations with designated sites where researchers marked “feeling out of place” (white circles with X); blue denotes locations that met the expectations of researchers and red indicates that research expectations were challenged, where the size of the circle indicates quantity of responses. (Color figure available online.)

on the process of research reflection. They suffice to demonstrate how the process we developed can be used in practice and tailored to the specific research theme and study site, while offering a way to compare qualitative data from multiple sources in situ.

Power Relations in the Production of Knowledge and Limitations of This Methodology

The methodology we propose as a novel one in this article seeks to provide a usable design for how to operationalize an important component of research: critical reflection. The reasons critical reflection is so important for research have long been well argued throughout the literature and center on an explicit acknowledgment of power relations throughout the research process or field experience. It is also well recognized that critical reflection is an important component of the learning process, and thus for pedagogy. The potential limitations of this method relate very clearly to how the participants understand, reflect on, and navigate uneven power relations, not only with respect to the subjects of the study but also across the team, particularly when the team includes members from the local site, such as with the Panamanian case. Thus, the method in itself does not automatically ensure critical reflection, but the way in which it is applied must not overlook such issues as the role and significance of “observation,” or of the problematic of the “field,” but doing so in ways that contextualize the particular configuration of the setting, participants, and study topic. Typical dichotomies that would normally characterize the “encounter” along lines of north and south (or us and them per Cook 2000) should be blurred and questioned as opportunities are presented to do so. Also, one of the research organizers in Panama was born in the United States and a resident of Panama, offering an insider–outsider perspective that defies characterization by the typical north–south divide. From a practical point of view, the inclusion of Panamanian students complicated misconceptions of north = powerful and south = disempowered, when the team members from the United States were able to navigate the streets of San Felipe in different ways when accompanied by their local counterparts, including being received very differently by interviewees. These reflections were noted in their journals and such positionality shifts were discussed in group reflection settings while going over the mapping results. Nevertheless, on the whole, the risk of reproducing unequal

power relations remains, which we believe cannot be fully overcome by this or any other field methodology; it can only be recognized, situated, and mitigated.

Conclusions

In this article, we combine critical reflection with qualitative sketch mapping to represent the sociospatial perceptions of geographic space from the perspectives of newly immersed researchers in Belize and Panama. As a new hybrid research method, critical reflection mapping provides a way for participants to critically reflect on an area while thinking spatially and collectively visualizing their reflections. In the context of international research experiences discussed in this article, the method captures individual responses to features of the built environment, spatially locates the changing emotions a newly immersed researcher has in a largely unfamiliar geographic setting, and connects new experiences in the foreign research setting to an individual’s everyday lived experiences, positionality, and multiple identities. It also makes these visible experiences more visible to fellow researchers in the group and thus lends itself as a potential forum for shared reflection, which can strengthen collaborative research teams.

The work also has important benefits to those living in a foreign research setting, particularly those settings that rely heavily on tourism as a major revenue source. Critical reflection mapping offers a quick and relatively inexpensive approach to rapidly assess the perspectives of multiple participants in a geographic space, making it a useful method for research in developing countries. For example, in the case of San Ignacio, Belize, reflections were shared directly with local tourism boards to demonstrate multiple viewpoints of areas in and around the tourism zone. In Casco Viejo, Panama, groups presented their work and maps together with local collaborators to various stakeholders and residents in the historical tourism community.

This new research method of critical reflection mapping also offers benefits to the discipline of geography and related fields as researchers attempt to analyze, visualize, and understand the sociospatial perceptions of geographic space. The combined method changes data and the way we are able to interpret data. Data can be analyzed in a conventional sense separately through qualitative sketch mapping or critical reflection journals but, as we argue here, critical reflection mapping is innovative in permitting immediate access

to different qualitative sources of information, including lengthy textual reflections, as well as quantitative descriptors. The work also fills an important gap in the research literature allowing us to use qualitative sketch mapping to visually represent the spatial components of critical reflection. It is through this hybrid method that we are able to visually represent the combined sociospatial perceptions of researchers as they interact with and are shaped by geographic space.

We offer the first two case studies of critical reflection mapping as a research method, cognizant of the caveats for its broader adoption. First, the focus of this article is on aggregating participant responses to discover commonalities and variations of multiple individuals across geographic space. In our view, it is equally important to consider individual critical reflection maps to document the lived experiences of an individual in a new geographic space. Second, the method does not portend to address critical reflection mapping across time. We learned that the temporal component is an important factor to represent in critical reflection maps of groups, as well as individuals. For example, areas where researchers initially felt “out of place” later became familiar and less threatening. Our future work will examine extended uses of the methodology for visually representing the temporal changes of participant critical reflections across geographic space. For instance, this could be done by repeating some or all of the exercises after different periods of exposure by the researcher to the new location and comparing results across different lengths of time. Third, given our focus on examining the sociospatial perceptions of newly immersed foreign researchers, our initial use of critical reflection mapping purposely focuses on the experiences of individuals largely unfamiliar with a particular location. The partial results from Panamanian student collaborating researchers hint at the potential insights to be gained through critical reflection mapping with longtime residents. It would be particularly useful to better examine convergences, divergences, and tensions within critical reflection maps based on length of time in a particular place and additional dimensions of difference and positionalities across the groups of participating researchers.

Finally, we recognize that we also need to be critically reflective about our search to understand researcher reflexivity, in the sense that we and the groups conducting the research might also be considered to be participating in research tourism (Noveli 2005, 137). We realize that methodological

innovations can often incite theoretical advances, and vice versa: Additional theoretical work might improve the methodology. We aim to further explore such possibilities with the interrogation of additional case studies. For instance, we see potential in expanding the conceptual framework on geographic perception by engaging literature on international development, urban geography, the production of space (i.e., Lefebvre 1991), or other works that permit the intellectual reckoning of the “cognitive maps” with the actual real physical spaces and all of the historical and cultural characteristics present in the built environment where the research unfolds. Despite these caveats, our two case studies provide useful examples of how to apply this novel methodology that can be used in other cases, with other subjects, and in other settings. By combining critical reflection and qualitative sketch mapping into a critical reflection mapping methodology, we are able to better understand and represent the commonalities and variations in how individuals and groups interact with, are shaped by, and perceive geographic space.

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