

Beyond the ecomap: GIS as a promising yet chronically under- utilized method in social work.

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Abstract: Social work has used the ecomap approach to situate individuals within their environments since the 1970's. While a useful tool, ecomaps have limitations, including their qualitative nature and pen-and-paper technology. GIS mapping, when conceptualized as an evolution of ecomaps, can situate individuals in their environment and quantify threats and resources. Social work literature mentions the usefulness of GIS as far back as the 1990's, however current application of mapping in the profession is still quite rare. The purpose of this brief review is to examine the current state of GIS in social work teaching and published research, explore reasons why social work has been slow to adopt this methodology, and invigorate social work's knowledge of and interest in mapping.

Keywords: GIS; mapping; ecomaps; social work technology; person-in-environment

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The person-in-environment (PIE) approach, used to define and differentiate social work practice, is a framework emphasizing the importance of community and environmental level factors on individual well-being. To apply the PIE framework with clients, social workers frequently develop ecomaps, visual representations of how an individual is reciprocally situated within familial, social, political, spiritual, economic, and physical environments. While ecomaps have been integral in client planning, assessment, and intervention since the 1970's, and may include rich and complex information, the tool is based largely on qualitative data, self-reports, and pen-and-paper technology (Hartman, 1995). For example, although ecomaps can diagram the flow or lack of resources from social or environmental systems to the client, ecomaps may not be able to quantify the strength or the magnitude of the resource flow, nor fully examine how the interaction between larger systems may help or hinder client progress.

Geographic Information Systems (GIS) is a field of technology using computer programs to capture, analyze, and present spatial and other types of geographic data (Environmental Protection Agency, 2015). Similar to ecomapping, GIS mapping is helpful in understanding relationships and patterns between individuals and their environments. However, GIS employs cutting edge technology utilizing techniques to capture and analyze large amounts of data, enabling users to examine and quantify characteristics of individuals and their environments. GIS technology creates visual maps that are easy to interpret and understand across most audiences.

Literature mentioning GIS as an innovative technology for social work practice dates as far back as 1998 (Tompkins & Southward, 1998). More recently, Hillier (2007) published comprehensive work lauding the application of and benefits of GIS in social work practice and research, calling for social work to embrace GIS (Hillier, 2007). However, nearly a decade later, the applications of GIS in social work appear rare. The purpose of this paper is to apply Hillier's (2007) framework to examine the current state of mapping in the published social work literature, explore reasons why social work has been slow to adopt this methodology, and invigorate social work's knowledge of and interest in mapping by conceptualizing GIS as an expansion of ecomaps.

Hillier's Framework and the current state of GIS in social work

Hillier (2007) published in the social work literature describing, conceptualizing, and illustrating how GIS can benefit social work practice and research. The work included a comprehensive literature review of GIS applications in social work contemporary to that time, and suggestions and recommendations for the expansion of mapping in social work. Hillier organized the benefits of GIS in social work around five primary ideas:

First, better integrating GIS into social work education, research, and practice will allow social work professionals to continue and strengthen the social survey tradition. Second, GIS provides a theoretical framework for understanding human behavior that moves beyond an individual deficit model. Third, when used to assess needs and assets, mapping reveals patterns in disparity across race, income, and geography that are critical for promoting social justice and addressing needs of at-risk populations. Fourth, mapping can improve the delivery of social services when used to evaluate programs, locate new facilities, and organize work assignments. Finally, GIS can empower communities and traditionally disenfranchised groups when used to share information and facilitate public planning (Hillier, 2007, p. 206).

The following section briefly summarizes each of Hillier's five primary ideas and provides an example from the current social work literature on the uses of GIS mapping.

Strengthening the social survey tradition

Social Work has a long tradition of creating and disseminating social surveys to document and explore the living conditions of the poor and underserved, and to better understand people in their environments (Hillier, 2007). GIS mapping techniques continue to provide invaluable information to researchers and practitioners regarding how place influences the life of marginalized, excluded, and highly stigmatized populations. For example, one study used GIS to explore factors related to health services barriers among a group of substance-abusing women working in the sex industry. The study found that heavy policing and high rates of violence against these women encouraged the avoidance of physical settings where health services, such as HIV services and needle-exchange services were located (Shannon, Rusch, Shoveller, Alexson, Gibson, & Tyndall, 2008). The study used mapping to illustrate how environmental interventions were necessary in addition to individual behavior change with this highly stigmatized and marginalized population.

Moving beyond an individual deficit mode

Hillier (2007) explains that because mapping allows us to actually see representations of people in their environments, GIS is an invaluable tool for moving past individual deficit models of explaining human behavior. For example, a large body of evidence has documented that poor nutrition leads to higher risk for chronic disease and shorter lifespans (Mokdad et al, 2004; Thacker, Stroup, Carande-Kulis,

Marks, Roy, & Gerberding, 2006). While reasons for poor nutritional choices vary, a growing body of evidence suggests environmental factors outside of personal volitional control as strong predictors (Caspi, Sorensen, Subramanian, & Kawachi, 2012; O'Dare, 2011). Individuals cannot choose healthy foods if they do not have access to them. A plethora of recent studies have demonstrated that residing in a food desert, or area with severely limited proximal access to affordable, healthy food items increases risk for morbidity and mortality (Caspi, Sorensen, Subramanian, & Kawachi, 2012; O'Dare Wilson, in press). Researchers and policy makers are increasingly calling on GIS to examine the conditions of the 23.5 million Americans residing in these food deserts. For example, the Florida Department of Agriculture recently commissioned a comprehensive GIS analysis of food deserts in the state. The study identified 200 census tracts in Florida where improving healthy food access could measurably improve diet-related health outcomes. Reducing insufficient food access in the identified areas by just one percentage point would prevent 650 premature deaths over seven years (Florida Department of Agriculture, 2013). Figure 1 below demonstrates how Florida is using GIS software to illustrate where improving access to healthy foods could significantly improve diet related deaths. The cross hatch shaded areas are considered USDA food deserts, and the rural and urban tract areas are the high-impact areas where improving food access could result in positive outcomes.

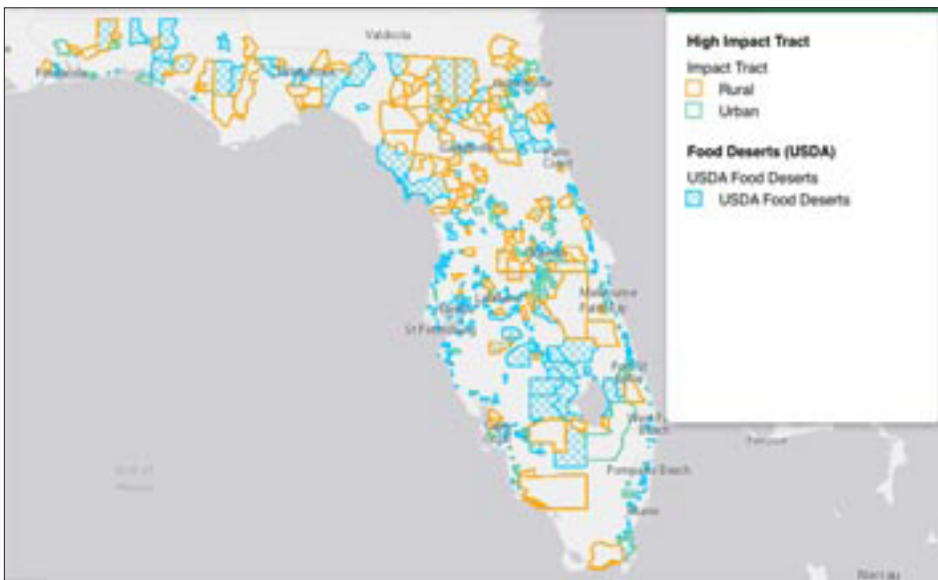


Figure source: Created with the Florida Department of Agriculture's Roadmap to Healthy Living <http://app2.freshfromflorida.com/gis/roadmaptohealth/>. A larger scale version of the map may be found at that URL.

Examining patterns, promoting social justice, and addressing needs

Mapping has become an invaluable tool in advancing our understanding of the interactions of race, ethnicity, and place in our society (Environmental Systems Research Institute [ESRI], 2014). Mapping can provide a clear and compelling visual representation of inequalities that tables or text may fail to convey (Hillier, 2007). For example, a recent study found GIS as an effective means to teach the concept of poverty to social work students (Gjesfjeld & Jung, 2014). Through mapping, the authors demonstrated unequal access to grocery stores in predominately Black neighborhoods compared to predominately white neighborhoods. Students found GIS methods accessible and easy to understand, and the instructors reported that mapping engaged students in ecological and systems thinking (Gjesfjeld & Jung, 2014).

Improve the delivery and evaluation of social services

In addition to highlighting disparities, GIS can be used to plan and locate services by a social work professional on behalf of clients, who themselves may also learn to use mapping to find services independently (Hillier, 2007). GIS can also be used for program evaluation to evaluate the usefulness of existing services (Hillier, 2007). One recent study used GIS to examine the geographic distance between a pregnant woman's county of residence and the county she gave birth in (Gjesfjeld & Jung, 2011). The study found almost 18% of women in the sample lived over 40 miles from the birth hospital. Distance from the hospital was associated with less frequent prenatal appointments, stress related to traveling to find care, and fewer social supports, resulting in higher risks for pre-term birth, lower birth weights and lower Apgar scores for rural women (Gjesfjeld & Jung, 2011). The authors suggest GIS mapping could be used to plan and implement public health social work based home visitation programs during critical pre- and postnatal periods to improve outcomes.

Empowering disenfranchised communities

Social workers promote the right to “socially responsible self-determination and seek to enhance clients’ capacity to change and to address their own needs” (NASW, 2008, Ethical Principles). GIS is a powerful tool when used to include disenfranchised individuals, historically left out of the choices impacting their lives, in important decisions regarding themselves and their communities. Neighborhood is often defined and measured by artificial boundaries, such as zip code, census tract, or other type of spatial demarcation. These measures do not consider the social,

collective, and other informal networks that often cross the arbitrary lines drawn on a map, nor do they consider that poverty may reduce neighborhood connectivity and engagement (Coulton, Jennings, & Chan, 2013). Oftentimes, residents (especially those in smaller communities or resource-poor areas) engage in resource sharing across formal borders (Ewing, 2003). GIS mapping allows for the creation and use of resident-informed boundaries, thereby including individuals in important planning decisions regarding the allocation of scarce resources in their neighborhoods. For example, a recent study found significant differences between resident's perceived size of their neighborhood when compared to formal census tract, and concluded that artificially drawn neighborhood boundaries may misrepresent the experiences of residents (Coulton, Jennings, & Chan, 2013). GIS can be used to include residents in the development of "more authentic neighborhood definitions for research and practice" (Coulton, Jennings, & Chan, 2013, p. 140).

Why has social work been slow to adopt GIS?

The usefulness of GIS for examining social issues is well documented in other academic disciplines, yet social work has been slow to adopt and apply GIS in practice, teaching, and research (Hillier, 2007). While the literature regarding the use of GIS specifically for social work emerged in the late 1990's, nearly 20 years later instances of GIS-based research in the social work literature is still quite rare. So why has the field of social work been so slow to embrace GIS? Many of the barriers discussed by Hillier (2007) persist. GIS applications may be perceived as elitist and overly complex, requiring social workers with strong foundations in research methods, measurement, and statistics (Hillier, 2007). Learning GIS may involve new training along with the potential expense of updating computer hardware and software programs. Incorporating GIS into teaching at schools of social work requires a level of motivation on the part of instructors to learn and adopt new pedagogical methods. GIS requires access to and comfort with large, quantitative data sets, frequently unpopular with clinically oriented social work students and practitioners. The demand for GIS coursework may be low, as students (and practitioners alike) may be unaware or not interested in the benefits of mapping for social work. Community agencies and researchers alike may be intimidated by the complexity (both real and perceived) of GIS programs.

Strategies to increase GIS in social work

Similar to the traditional ecomap, GIS mapping enables social workers to view, understand, interpret, and organize client systems in ways that reveal important relationships, patterns, and trends. By conceptualizing GIS as an extension of the ecomap and demystifying the technical complexities of the methods, this paper hopes to stimulate interest in the usefulness of GIS in social work teaching, practice, and research. While perceived as highly technical and overly-complex, GIS developers have made tremendous strides to increase the user-friendliness of mapping techniques and reduce the costs associated with learning and implementing the methods. Social workers with a desire to learn this new skillset have options. For example, the Environmental Systems Research Institute (ESRI), the manufacturer of popular GIS software ArcGIS, offers free web-based applications and free web-based training for beginners on how to use the programs (ESRI, 2015). In addition, the internet offers other free, open source, self-supported GIS programs such as Quantum Geographic Information Systems (QGIS) for social workers to use at no cost (Quantum Geographic Information Systems, 2015).

Several schools of social work have begun offering GIS courses in their curriculums (Felke, 2014, pp. 81-92). Offerings range from single seminars/workshops to semester long coursework. For example, Boston College offers student workshops once per semester called “Geographic Information Systems (GIS) as a Social Work Tool”, and the University of Michigan School of Social Work offers a semester long course titled “Advanced Topics in Macro Social Work” that focuses solely on the use of GIS for social work (Boston College, 2015; University of Michigan, 2013). Given that the Council on Social Work Education’s (CSWE) Educational Policy and Accreditation Standards (EPAS) statement encourages social work programs to continually discover, appraise, and implement scientific and technological developments, these courses may be useful to consider as models for the development and implementation of additional social work specific GIS curricula in the future (Council on Social Work Education [CSWE], 2012). In addition, by collaborating on projects identified as having value and meaning in local communities, GIS also has the potential to strengthen connections between academia and community-based research (Kirwan Institute, 2009).

Given that GIS relies on scientific principles, includes practitioner experience and ethics, and client preferences and culture, the method should be considered as a strong application of evidence-based social work practice and research. Schools of social work should continue to develop and explore courses in GIS for social work students. Instructors can use GIS examples from relevant interdisciplinary work to add richness and context in teaching human behavior and social justice. Social Work researchers can pursue community-based research partnerships to incorporate the benefits of GIS into social service agencies. By conceptualizing GIS as an extension of ecomaps, social workers can continue to demystify mapping and expand the benefits of this persistently underutilized resource in the profession.

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