Geohealth Meets Geodesign: The Multidisciplinary Challenges of Informing the Regional Design Studio with Human Health Research

David L. Tulloch, Ph. D.

Rutgers University, New Brunswick NJ/USA · tulluch@crssa.rutgers.edu

Abstract: The increasingly facile tools of geodesign create new opportunities for integrating the sciences of human health into landscape interventions. This paper tests those opportunities using examples from a series of graduate design studios as an investigation of ways that these fields can advance together. The paper concludes with a discussion of outcomes as well as implications for future efforts integrating geohealth and geodesign.

Keywords: Geodesign, geohealth, human health, data-driven design, regional design

1 Introduction

While an appreciation of the linkages between landscape and human health may date back to Dr. John Snow (BRODY et al. 2000) and Frederick Law Olmsted (FISHER 2010), a rapidly expanding body of research now details many different ways that our environment shapes our health (e. g., THOMPSON 2011). Landscape architecture has often successfully used park design as its primary forum for shaping healthier environments, but the integration of sciences like health and epidemiology support expansion of the design arena while bringing new challenges for the designer.

One of the strengths often touted for geodesign is the ability to infuse the design process with increased quantities of science and data, with the outcome of more informed designs. A challenge for institutionalizing geodesign is teaching design students to meaningfully integrate science and data into the design process, while they are still learning to navigate the process. This approach has a long tradition, as evidenced by McHarg's use of the physical and social sciences as integral components in studio education and his department. Two of the most common procedural models for geodesign projects (STEINER 2008, STEINITZ 2012) both explicitly incorporate connections between foundational science and data and the resulting design work. They also both proscribe systematic approaches while conceding the need for flexibility in those approaches.

The emergence of geodesign and similar tools opens the quite daunting possibility (perhaps even expectation) of students accessing and building on sophisticated research from other fields (DANGERMOND 2009, GOODCHILD 2010, FLAXMAN 2010). This integration across disparate fields raises potential conflicts in methodology and outcomes. It also creates opportunities for imaginative solutions and open conversations about conditions and problems that are usually addressed in a more controlled and formulaic manner.

This paper reports on pedagogical experiences centred on bridging the gap between multidisciplinary research outcomes and landscape architectural design outcomes in a graduate design studio. Specifically, the paper identifies lessons that can be applied beyond the classroom to the growing realm of health applications in geodesign. While these examples are

Journal of Digital Landscape Architecture, 4-2019, pp. 300-307. © Wichmann Verlag, VDE VERLAG GMBH · Berlin · Offenbach. ISBN 978-3-87907-663-5, ISSN 2367-4253, e-ISSN 2511-624X, doi:10.14627/537663032

student explorations, they serve as a reminder of the aspirational goals of geodesign in changed landscapes for improving the overriding conditions for communities.

2 Studio Projects

The primary bases for this paper are the outcomes of a series of graduate regional design studios which repeatedly partnered with county planning departments for semester-long explorations of potential county-wide approaches to healthier landscapes. The completed projects were expected to generate a variety of designed landscape alternatives that demonstrated the potential for these counties to integrate research outcomes on human health into the process.

Human health encompasses vast fields of study, and the projects did not initially restrict the topical contents of the outcomes. Some of the health issues discussed are easily linked with spatial outcomes, like the tick-borne Lyme disease that is plaguing the Northeast US. Other health issues, such as influenza, did not seem as obviously linked with specific places in the counties that were being studied. As the studio progressed, however, patterns of treatment often emerged even if patterns of exposure or incidence were less explicit. Early in each semester students were introduced to a variety of human health literature that explicitly connects health outcomes to conditions of the built landscape (e. g., BURDETTE & WHITAKER 2004, THOMPSON 2011, COUTTS & HAHN 2015). They were also presented with research that explicitly used GIS as a foundation of inquiry or for communication (e. g., OHRI-VACHASPATI et al. 2013, TANG et al. 2014, CAVANAUGH, MIAL & TULLOCH 2016).

This paper is written with the intention of capturing larger experiences that might be generalized to other studios, but it is worth noting a particular background condition that supported the studios. At the time of the studios, the instructor had conducted several years of research in human health with specialists from several health fields (including epidemiology, public health, global surgery, psychology). However, the unique conditions of each county required the instructor and students to all learn new topics quickly, with both substantial breadth and depth. For example, one of the studios found an interview with County Chief Health Officer to be particularly challenging, as he and his staff were concerned about a series of health issues that were surprising to the group. Still, in each case the classes were able to follow a systematic approach, translate issues into spatial representations, and develop strategies to discuss further with the local authorities.

2.1 Informed Spatial Analysis

After an initial study of the study area, one of the early exercises for students is the incorporation of scientific research into spatial analysis. Set in a design studio, the results are often more creative analyses than what might be expected in a straight-forward GIS and health class. For example, mapping food outlets and buffering them becomes an illustration of "food deserts". The creation of simple buffered maps around health facilities often sparks new conversations, especially with health professionals from outside the studio. With this expanded understand of the urban landscape, the students began to see "exercise deserts" and "emergency care deserts" (Figure 1).

Recognizing the importance of the experience of the landscape, a second step is often the creation of walking distance buffers rather than geometric circles (Figure 2). Building on the traditions of Manning and McHarg, suitability analyses for multiple uses also emerge as tools for the project. Even though they lacked the necessary sophistication with the tools, discussions about how advanced technicians would map walkability across a large landscape enriched their critical thinking about the place. And student creativity often led to combinations and overlays that forced new perspectives on the landscape (Figure 3). Simpler versions of advanced analyses were still valuable as proxies for advanced research and stimulate class discussions.

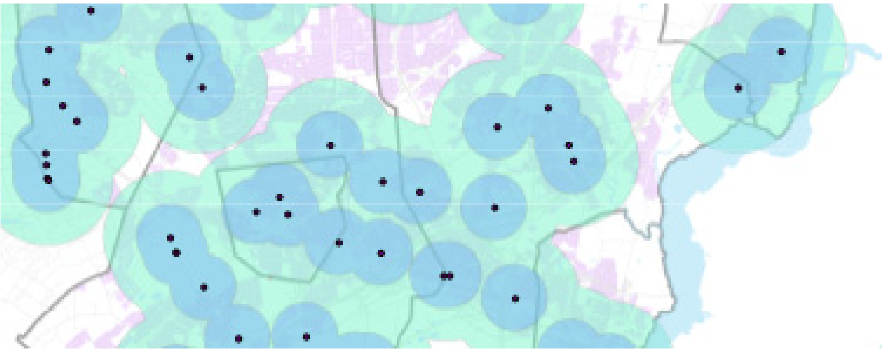

Fig. 1: Simple buffering of points (fitness centres and clubs) provides a powerful first look at the landscape, especially as students are in early stages of learning geospatial applications

2.2 Design Alternatives

After a considerable period of developing spatial analyses, the studio challenged the students asking them to derive alternative regional design solutions that are "proven" with site-specific design solutions (in the tradition of LEWIS 1996). The regional designs were expected to serve as revelatory designs, revealing the landscape as seen through the earlier analyses (Figure 4). While the nascent designers were not always able to fully realize that desired outcome, their work did often demonstrate ways that it could fit larger contexts and relationships landscape.

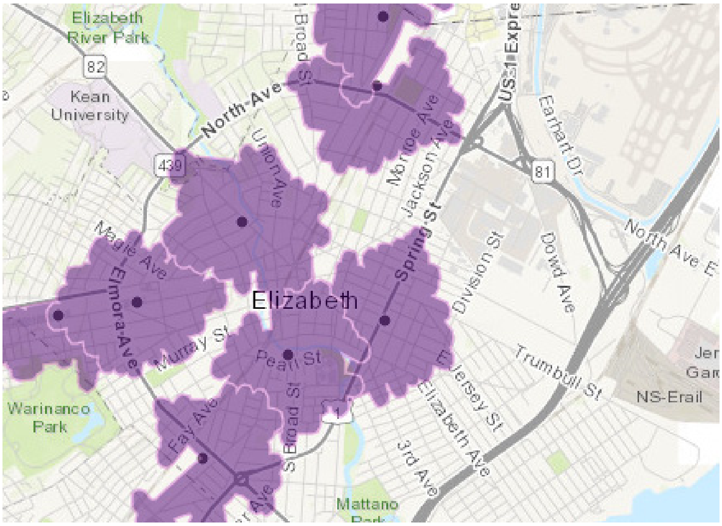

Fig. 2: Students created maps showing walking distance around supermarkets as a representation of the food environment

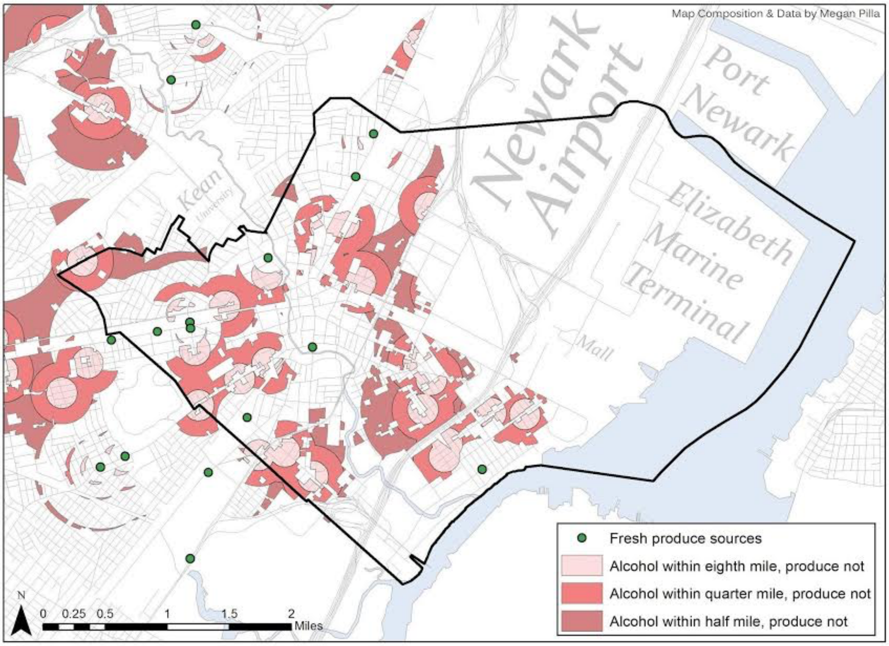

Fig. 3: Student spatial analysis of health conditions combined food desert mapping with questions about availability of alcohol

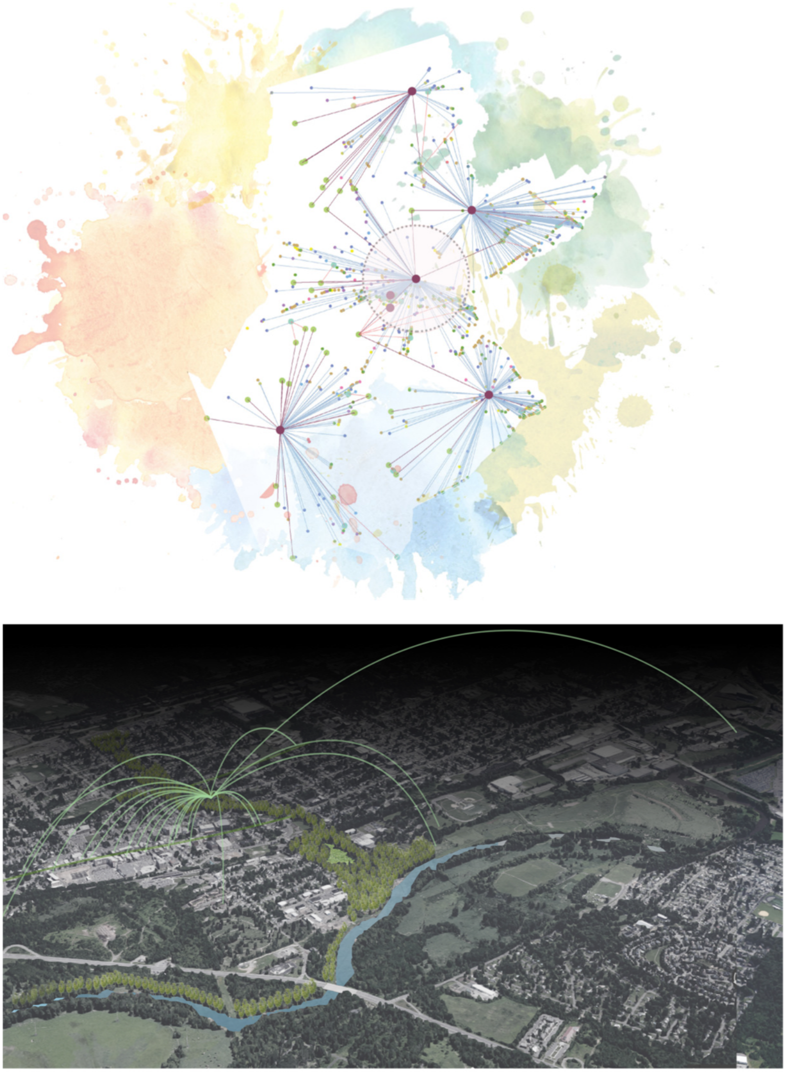

Fig. 4a & b: One student team endeavoured to improve access to healthier environments at a county-wide scale, but designed at a local scale, in the regional design tradition of Wisconsin Professor Phil Lewis (LEWIS 1996)

Fundamental to the exercise was a foundation in data-driven design and planning. When students found themselves stymied or unable to generate new ideas they were encouraged to return to the analyses and the data to ask what was needed. The repetition in outcomes suggests a form of concurrent validity that makes generalizations from these experiences more promising. The resulting designs showed some recurring themes that are worth mentioning:

- Student design solutions repeatedly built on the sites of hospitals as multi-activity hubs for access to multiple forms of health expertise, experience, and education.

- Reaching at-risk populations often featured guerrilla designs or pop-up solutions, which challenged some assumptions and expectations about locations (Figure 5).
- Strengthening the link between food and community, including filling in food access gaps to reduce food deserts.
- Designs were used to present other deserts – park, clinic, nature, physical activity.
- Wellness became recognized through disparate perspectives as benefitting from integrated approaches.

Fig. 5:
Students used design to explore adaptive approaches to the landscape

An important result is that the studio was not stymied by difficulties in accessing the enormous and difficult literature. While class conversations explored the way that science and creativity could potentially conflict, the resulting designs displayed an open creativity while confronting the limits of the science. This certainly suggests that the role for geodesign can expand more into health and science areas. Initial responses to the design outcomes also suggest that professionals in the fields found the creative work provocative in useful ways. Perhaps just as intriguing are the unique individual design solutions which generated unexpected discussions with the studio stakeholders.

3 Outcomes

Ultimately, there are several different obstacles to the integration of science and data into informed designs. The science can be complex and hard to understand, requiring substantial background knowledge. The results often don't lend themselves to immediate spatial interpretation. And the supporting documentation for scientific data can be poor, since it is often developed for a small circle of users.

Despite these barriers, the paper identifies key outcomes that suggest that the informed design project serves a substantive pedagogical purpose beyond the simple technical lessons and skill building. The data-driven approach demands students respond to the entirety of a vast landscape as it is described in the data, not simply as they imagine it after limited or constrained site visits. Turning to research papers and geospatial data forces the students to grapple with an exceptionally challenging problem of whether to address the large volume of information or to isolate a small portion and focus on a detailed response to that. Finally, using this approach reinforces Carl Steinitz's longstanding call for the profession to step up and deliver defensible designs (STEINITZ 1979).

Using design as a research tool in the studio is revelatory of the landscape, not just the process. While GIS is not as important for the students' creative programming of pop-up health clinics and roof-top healing gardens, it forces a contextual awareness and their suitability analyses for a variety of health uses create a information resource about the landscapes of these counties. Clusters of opportunities repeatedly appeared in some areas, while other areas varied dramatically. Additionally, the response from the county planning offices demonstrated a newly heightened awareness of both the spatial patterns of need as well as landscape patterns that could potentially aid or impede interventions.

Aside from the immediate pedagogical lessons, these projects point to larger concerns about geohealth and geodesign. One primary limitation of future work is the lack of a supporting health information infrastructure (RICHARDSON et al. 2013). In addition, scale remains an important dimension. Geohealth research has spanned a variety of scales, from neighbourhood-scale impacts and interventions (DUNCAN et al. 2011, DEWEESE et al. 2013) to nationwide analyses (KNOWLTON et al. 2017). For landscape architecture, balancing creativity and science remains a critical challenge. Simply following the science or mapping risks the creation of soulless solutions that lack appeal and will fail to engage the public and generate healthier results. Creative geodesign applications will be key to making healthier landscapes both compelling and places of measurably increased wellness.

Acknowledgments

The author wishes to express special thanks to all of the students of Rutgers University graduate program in landscape architecture whose work in the geodesign studio has not only informed the communities of Middlesex and Somerset Counties, but has also been instructive to me as an educator. And a special thanks to students whose work was most helpful in illustrating the projects for this paper: Thomas Young, Lungon Ju, Constatine Janulis, Andrew Schlesinger, and Megan Pilla. These studios also benefitted from critiques and comments of the county planning staffs, especially Nick Tufaro and Tara Kenyon.

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