

Amsden, J., & VanWynsberghe, R. (2005). Community mapping as a research tool with youth. *Action Research*, 3(4), 357–381. <https://doi.org/10.1177/1476750305058487>

- a. Participation and collaboration with local communities is essential to garnering a picture of a locale in community mapping research. This paper outlines the methods used by one group of researchers in Vancouver in their attempt to discover the spatial relationships between community and public health. Importantly, youth are often excluded from decision-making processes, and the methods employed here attempt to generate further engagement. Amsden et al conclude that their research has helped to shape the community, but special care must be taken to foster a feeling of collaboration, support and understanding with subjects, lest research may be adversely impacted. This study also involved a sizeable survey portion.
- b. It is important to note that the environment in which the test subjects were given their carte-blanche maps to draw was required to be comfortable both physically and mentally for the youth engaged in this program. To effectively engage with local youth in our capstone research, it is imperative that the same safe space of collaboration be developed and nurtured with test subjects. Amsden et al note that the collective voices of the individual and the collective must always be made to feel ‘respected and valued’.

Brown, G., & Kytä, M. (2014). Key issues and research priorities for public participation GIS (PPGIS): A synthesis based on empirical research. *Applied Geography*, 46, 126–136. <https://doi.org/10.1016/j.apgeog.2013.11.004>

- a. In a more recent article, Brown & Kytä discuss some developments, evolutions and relationships between participatory GIS practices. They aim to point out that PGIS, PPGIS, and VIG are three distinctly different concepts, and must be utilized appropriately according to the research at hand. Moreover, the differences in spatial data gathered from each of these methods is described at length, with respect to the type of data you are collecting, and the intended end results. Finland has developed a PPGIS portal that is aiming to standardize participatory government data collection. Finally, they offer potential solutions to the ‘threats’ to spatial data quality. Like other articles in this list, there is concern over potential data custodianship, inherent bias from multiple subjects, and the like.
- b. This article points out some barriers that governments are facing while they adopt PPGIS standards and techniques to engage with their constituency. However, that perceived democratization is fraught with ambiguity with a field that is still developing. It is important to develop a set of standards by which research is carried out to satisfy the government need to engage with the population in *effective* ways. With regards to this project the methodologies should generally adhere to some of the standards described here (as obvious as some of them are), and should aim to be as standardized as possible as the research progresses.

Curits, J. W., Shiao, E., Lowery, B., Sloane, D., Hennigan, K., & Curtis, A. (n.d.). The Prospects and Problems of Integrating Sketch Maps with Geographic Information Systems (GIS) to Understand

Environmental Perception: A Case Study of Mapping Youth Fear in Los Angeles Gang Neighborhoods
Jacqueline.

- a. This research pulls on existing sketch mapping research to validate the integration of sketch mapping with GIS. In particular, they aim to answer the question of how to properly represent emotion in maps, and if there is a spatial analysis technique that is most appropriate to utilize. Curtis et al identified two common uses for sketch mapping, fear mapping and boundary identification. Fear mapping being the most common sketch mapping application. They describe the methods they use to generate points and polygons from those maps, and then how they analyzed the data.
- b. **This research will be fundamental to this capstone project** as the analysis methods they used are described thoroughly in this paper. These techniques are logical comparison points for the existing initiative Dr. Kelley is using. The article discusses some common points for discussion among their peers, including some ways their research has been challenged, it will be important to insulate this capstone against those challenges as much as possible.

Dennis, S. F. (2006). Prospects for qualitative GIS at the intersection of youth development and participatory urban planning. *Environment and Planning A*, 38(11), 2039–2054.

<https://doi.org/10.1068/a3861>

- a. Youth have been ‘involved’ in decision-making for neighborhoods for some decades, however, their involvement has generally been a symbolic measure rather than effectively soliciting their advice. Moreover, youth have been marginalized as ‘part of the problem’ with neighborhoods. To empower youth in the decision-making process, Dennis describes different methods of incorporating their qualitative local-knowledge into the power of GIS for decision-making. Dennis describes multiple methods for acquiring this data and ascribing it value in GIS.
- b. **This is a core article for the Tacoma Streets initiative**, as it describes many of the practices put in place here. In order to empower youth to be engaged in the civic process, these methods are exceptional starting points, and have been proven effective by Dr. Kelley’s existing prototypes. Extrapolating these methods into a scalable product would ideally help to reach and empower more youth civic participation.

Dunn, C. E. (2007). Participatory GIS — a people’s GIS? *Progress in Human Geography*, 31(5), 616–637.

<https://doi.org/10.1177/0309132507081493>

- a. Dunn evaluates the growing trend (at the time) of web based GIS, and the concepts that PGIS augmented with distributed web technologies might represent the holy grail in democratization of GIS data. However, there are notable points that are missing. First and foremost is the lack of accommodation for those who are not able to access the participation end points. The democratization of data immediately falls apart in these cases. Dunn notes that to ignore the political nature of PGIS data is to ignore the results that you are trying to achieve. To ‘do GIS’ in a political vacuum is akin to doing nothing at all. Dunn proposes some solutions that may guide the growth of web GIS including some feminist perspectives that are discussed in other articles in this list.

- b. For the purposes of this capstone, it is important to note that we are specifically trying to target those communities and demographics that are often marginalized (youth). Moreover, in some instances these youths may lack the access to participate in the democratic process. While we aim to build a web GIS portal to achieve this democratization, note that, according to Dunn, you do not achieve democracy simply by having a web portal. Dunn also points out that participation alone does not grant one the ability to take part in the decision-making process. With regards to this capstone we must remember that to collect this data and then not push forth an agenda would be missing the point of the research. We should use this data to enforce change where possible.

Elwood, S. (2008). Volunteered geographic information: Future research directions motivated by critical, participatory, and feminist GIS. *GeoJournal*, 72(3–4), 173–183. <https://doi.org/10.1007/s10708-008-9186-0>

- a. This article evaluates the new (at the time) considerations being thrust upon VGI. It draws upon earlier academic debates of 'GIS and Society' in which GIS was argued to be both an empowerment tool for marginalized groups, or a mechanism for exclusion for those same groups. Elwood points out the contrast between using VGI to augment existing datasets versus creating entirely new data. Exploring feminist ideologies, she points out the potential for increasing marginalization of some demographics based on the hardware components of VGI (internet, computer access). VGI offers the ability to expand diversity and heterogeneity of data, but also introduces uncertainty and concern. She argues that the democratic practice of VGI collection must be upheld to allay these concerns.
- b. It is imperative that any research focus on empowering underrepresented youth rather than extending their marginalization through VGI collection. We must ensure that we are as inclusive as possible with regards to subjects. Elwood goes on to note that there is an intrinsic link between identity, power and spatial knowledge (p179). This is the core of the problem we are addressing. We are attempting to flush out the specific spatial knowledge of unique individuals in their own setting. In doing so we hope to empower those individuals and communities.

Flanagin, A. J., & Metzger, M. J. (2008). The credibility of volunteered geographic information. *GeoJournal*, 72(3–4), 137–148. <https://doi.org/10.1007/s10708-008-9188-y>

- a. Flanagin and Metzger evaluate the advent of VGI (at the time of writing). A microcosm of the internet as a whole, there exists enormous knowledge in collections/groups that was untapped until the advent of the internet. Access to new data is exceptionally easy, but questions are raised about its veracity. Previously, higher powers were granted privilege of being data gatekeepers to ensure credibility, but volume of new data impairs their ability to vet new data. Rather, there is a shift towards appealing to the masses. Data with numerous supporters or agreeing members is seen as more credible than data with few in agreement. Such is the value of the *perceived* trustworthiness and expertise of the masses. Flanagin and Metzger caution that VGI may empower increased spatial knowledge, but may simultaneously hinder the development of social capital or community.

- b. With regards to this capstone, it is imperative to achieve an acceptable level of credibility with VGI. Using Flanagan and Metzger as guides, this means eliminating outliers in data as much as possible to find cohesive datasets that are generally in agreement. In doing so, perceived accuracy of the safezones will increase. Moreover, and more importantly, they note that credibility is generally considered more applicable when used for social, communal or political use, such as in this project. In short, Flanagan and Metzger suggest VGI is a suitable datasource for such a capstone.

Goodchild, M. F., & Li, L. (2012). Assuring the quality of volunteered geographic information. *Spatial Statistics*, 1, 110–120. <https://doi.org/10.1016/j.spasta.2012.03.002>

- a. Goodchild and Li propose several methods for attempting to validate VGI data, though some are more effective than others. Conventional ideas that the wisdom of the crowd will rectify errors proves that it may not actually be the case, as in one study, errors did not decline after the addition of 14 or more contributors. Google employs a strategy of having some gatekeepers to rectify errors and mediate disputes. Finally, Goodchild and Li propose geographic mediation, where rules are set that determine relationships between phenomena proximal to one another. If the VGI violates a rule, it is marked for verification.
- b. This is integral to collecting VGI, as outliers in data can skew entire results sets. With regards to this project, it is again imperative that outliers be managed in a way that does not *wrongfully* impact the data set. It is not as simple as simply removing outliers, but a rules-based approach should be taken to mitigate their potential deceitful impact. Importantly, there is note that the Flanagan/Metzger approach of driving up participation is still regarded as effective, meaning more study subjects is often viewed to produce more reliable results.

Kitchin, R. M. (1994). Cognitive Maps: What are they and why study them? *Journal of Environmental Psychology*, 1–19.

- a. Kitchin lays out the groundwork for describing cognitive maps, and their practical uses in furthering science. There are many theories about cognitive maps, reflected by the many applications that Kitchin concludes with. Moreover, given the multi-disciplinary nature of GI Science, cognitive maps have taken on many forms. Most accounts describe them as dynamic ‘maps’ that are continually reshaped by new memories, utilized primarily for decision-making. In this way, cognitive maps have the power to shape our behavior. Kitchin explores the concept that cognitive maps take many forms, from explicit maps, analogous maps, metaphorical maps, or not-even maps at all. Again, multidisciplinary science dictates how cognitive maps are perceived.
- b. This capstone aims to produce explicit maps of communities. In this regard we must acknowledge cognitive maps as a tool for helping individuals within a community to make spatial decisions against the backdrop of real space. Previous works in this list have dictated that fear-mapping is conventional for sketch mapping, and that trend continues in this case. Identifying the collective cognitive map of a community or neighborhood will help inform hypotheses about what makes an area safe.

Kolgani, N., Ramu, P., & Varghese, K. (2012). Participatory GIS in Empowering Rural Communities: A Framework for Iterative Development and Evaluation Nagesh Kolagani, Dr. Palaniappan Ramu and Dr. Koshy Varghese Indian Institute of Technology Madras, Chennai 600036 INDIA. In 6th International Congress on Environmental Modelling and Software, Leipzig, Germany, July 1-5.

- a. In order to actively engage GIS technology to underserved localities, Kolgani et al recommend addressing the core concerns with participatory GIS, map production and map utilization. Similar to Wood's research (2005, later in this document), engaging the community to employ GIS/PGIS tools and techniques will radically change how their political agendas are received. They propose a series of suggestions around common problems such as illiteracy and inaccuracy. In this case, participation is the key attribute of rural PGIS, with time the skillsets will be polished for more legal matters.
- b. It is *imperative* that the tools created in this capstone not exclude participants because of usability issues. In the case of access to technology, there is often little a researcher can do to achieve full participation, however, usability is well within the realm of variables that are controllable. Kolgani et al argue for simplified tools, simplistic visualizations so that even illiterate members of a community are able to spatially engage with the product and participate in the democratic process.

Ordoñez-Jasis, R., & Myck-Wayne, J. (2012). Community Mapping in Action. *Young Exceptional Children*, 15(3), 31–45. <https://doi.org/10.1177/1096250612451756>

- a. This article postulates that community mapping is a valuable resource for educators and support staff with regards to supporting at-risk youth. This study took 6 educators, and taught them community mapping skills to identify those spatial areas around schools that can be used for their students. The goal was to identify existing resources within the community rather than to affect change within it. Most importantly, this process required mappers to question their findings, to ask 'why' some trends emerged. In doing so they were able to identify some simple, yet effective measures to increase consumption of community resources for their at-risk students.
- b. An important takeaway with this research is that the mappers were required to question their results rather than blindly follow where they were led. With regards to this capstone it will be equally as important to question 'why' some areas are deemed less safe than others. Not only to affect community change in those areas, but also to verify the validity of results. There are some cases where a common-sense double check is a requirement.

Perkins, C. (2007). Community Mapping. *The Cartographic Journal*, 44(2), 127–137. <https://doi.org/10.1179/000870407X213440>

- a. Perkins makes note of the different aesthetics of community mapping projects, and that there are innate political statements found within those maps. While he acknowledges that PGIS has aimed to democratize the map to grant access to everyone, he specifically notes that in practice, PGIS often serves the map specialists to serve their own agendas. A somewhat cynical view. Perkins points out some community mapping projects such as the Parish Map project (described by Wood in another article of this list), OpenStreetMap, the Green Maps Project, and others. In each there is underlying power struggle that has been seen with maps since their colonial beginnings, however on a more distributed, community scale.
- b. This capstone aims to serve the community to empower itself through a new web tool. However, it is important to avoid the fallacy that Perkins points out where my own agenda may be pushed through the exploitation of PGIS and its data. While I don't entirely agree with his sentiments, the appearance of impropriety may undermine the capstone as a whole.

Poplin, A., Shenk, L., Krejci, C., & Passe, U. (2017). Engaging Youth Through Spatial Socio-Technical Storytelling, Participatory GIS, Agent-Based Modeling, Online Geogames and Action Projects. In ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences (Vol. 4, pp. 55–62). <https://doi.org/10.5194/isprs-annals-IV-4-W3-55-2017>

- a. Poplin et al describe the framework for their future research targeted at engaging with local youth in the community. There are multiple avenues for engagement described, however the fundamental question they are looking to address is 'will youth in the neighborhood feel engaged with the community through these techniques?' Poplin et al note that targeting marginalized, underrepresented groups of citizens is integral to serving those communities, but notes that conventional avenues to approach them (through organizations, landlords or policymakers) only serves to affirm the power broker relationship between these groups. New media must be found to engage with these groups to ensure a more adequate sense of engagement.
- b. Giving participants in a study the feeling of engagement is critical to the success of that study. This concept follows for this capstone as well. While Poplin et al describe methods that are not directly related to our research, the general consensus around PGIS, engagement and serving underrepresented groups remains paramount to the success of any research and subsequent decision-making processes that arise from the results.

Thompson, M. M. (2016). Upside-Down GIS: The Future of Citizen Science and Community Participation. *Cartographic Journal*, 53(4), 326–334. <https://doi.org/10.1080/00087041.2016.1243863>

- a. Thompson evaluates the trend of Citizen Science (VGI, PPGIS) as it relates to governmental decision-making. Traditional roles of cartography were held by the elite, the advent of technology has disseminated that to the constituency, however, that does not necessarily mean that it has democratized the landscape. In a 'what gets measured gets done' environment, more groups are flocking to open data to assert their viewpoints. However, in many cases through secondary or proximal datasets. Through open sharing, a set of universal data standards, and

the acknowledgement of limitations of PPGIS, Thompson proposes that more government officials will more handily accept PPGIS datasets.

- b. Notably, Thompson argues that there are some cases where PPGIS and Citizen Science are strictly removed from the governmental decision-making process because of a *perceived* lack of data integrity, standards and the like. It will be encouraging to work with community leaders to ensure that this does not happen in this case.

Wood, J. (2005). "How green is my valley?" Desktop geographic information systems as a community-based participatory mapping tool. *Area*, 37(2), 159–170. <https://doi.org/10.1111/j.1475-4762.2005.00618.x>

- a. Wood's article centers around the concept of engaging with the community using GIS, rather than the common thread of PGIS as discussed in other articles in this list. Wood describes his research where he would embed within a community and engage with the local population to query spatial questions about their area that were previously outside of their skillset to analyze. Initially there was reluctance at GIS tools as they were overly technical and merely portals for data. As time wore on, Wood was able to generate excitement for GIS tools by educating some participants in GIS techniques. Usability, data visualization and active participation were key to his success. The local population began to employ these tools as a means of protecting their own interests or advancing policy agendas.
- b. Usability is one of the concepts that is addressed in this research. With this capstone project it is imperative that the resultant web-map experience be easy to use and intuitive, lest participants will simply ignore all the data that has been collected. It is not feasible to teach focus groups how to interact with a web map, rather we should ensure to use conventional techniques so as to minimize confusion with the resultant maps.