[GS-02-026] Mapping Spatial Justice for Marginal Societies

Abstract

Marginal populations are those populations that are often overlooked by government, dependent upon non-governmental aid, and lack access to basic resources such as water, food, shelter, and security. However, these groups are increasingly included in partnerships to map their resources (or lack thereof), develop basic applications in geospatial data collection, and devise innovative approaches to participatory mapping using geospatial technologies to address local and regional problems. Rapid technological changes and increased access to mobile geospatial tools enhance data creation efforts to map marginal populations and identify their needs. However, such mapping activities reveal fundamental inequities in collecting, disseminating, and visualizing spatial data. This chapter defines marginal populations and provides an overview of data needs, geospatial tools, and ethical obligations necessary for these partnerships.

Keywords: geospatial ethics, humanitarian geospatial data, marginal populations, participatory mapping, spatial justice, vulnerability

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Explanation

1. Definitions

Geospatial ethics: refers to practices and conduct in the collection, analysis, use, and visualization of geospatial data. Examples of practices refer to data accuracy and validation, quality assurance, and metadata. Conduct includes examples such as ethical approaches in working with communities, ensuring anonymity, and acquiring informed consent. that respect participants . The geospatial community has developed a number of best practices. An example can be found at the GIS Certification Institute Rules of Conduct.

Humanitarian geospatial data: collected in response to humanitarian events (e.g., natural and technological disasters, conflicts) for mapping of impacted regions and at-risk populations for first responders and long term planning to address critical needs.

Marginal populations: groups that are pushed to the edge of society where they are not allowed an active voice, identity, or place and lack access to avenues of power and representation. Marginalized groups include such groups as migrants, refugees, youth, minorities, women, people of different ethnic backgrounds, and people with low socio-economic status.

Participatory mapping: a method to collect geospatial data inclusive of community members and stakeholders reflecting local and regional needs for data and analysis related to resource management, local priorities, and urban planning. Participatory mapping is an approach for communities to have voice in issues related to empowerment, sovereignty, and cultural perspectives.

Spatial justice: the intersection of the environment and social justice that represents the consequential geography of places – the fair and equitable distribution in space of socially valued resources and the opportunities to use them (Soja 2010).

Vulnerability: an individual or group having a particular status that impacts their well-being making them susceptible to risk of harm where they are unable to safeguard themselves.

2. Introduction: GIS&T and Marginal Populations

A central tenet of geography examines the intersection of society and environment illuminating landscapes of power and inequity which can be termed spatial (in)justice. This entry to the Book of Knowledge examines how rapidly evolving and increasingly accessible GIS&T tools and applications influence efforts to map marginal populations. Marginal populations live in places with insufficient access to basic services, unsafe workplaces, and inadequate housing – places with spatial characteristics and extents that can be mapped to reveal inequitable landscapes. Importantly, these efforts have become more inclusive where marginal communities are part of the process for local empowerment, participation, and engagement. For example, Humanitarian OpenStreetMap Team (HOT) has launched the “Audacious Projects” asking “what if we could map one billion people currently missing from the world’s maps?” Similarly, the American Red Cross and Doctors without Borders partner with HOT to “put vulnerable people on the map” through Missing Maps projects. These activities exemplify the importance of geospatial data collection coupled with humanitarian action to advance community development and access to basic services. However, the use of GIS&T exposes a suite of ethical and procedural issues linked to the historical underpinnings of mapmaking and the situational power dynamics of spatial justice.

3. Who and Where are Marginal Populations?

Marginal populations embody the disparities in people’s living and environmental conditions – rooted in socio-political systems resulting in environmental injustice, economic marginalization, and political disenfranchisement (London, et al, 2011). There is no singular definition of marginal populations; they exist throughout the world, are place-specific, and embedded in the local historical context (Bose, 2017). They have common characteristics

that include those who are often overlooked by government, lack access to avenues of power and representation, are dependent upon non-governmental aid, and lack access to basic resources such as water, food, shelter, and security. Marginal populations are multifaceted including internally displaced people, refugees, indigenous peoples, minority ethnic groups, slum dwellers, migrants, urban and rural poor that make up a significant portion of the human population.

Marginal populations are groups that are displaced, dispossessed, and dynamically at-risk due to uncertainty and changing conditions. These populations live in regions such as informal areas of cities prone to disasters, rural and remote environments experiencing climate change, refugee camps that are the result of conflict, and the edges of protected conservation areas which were once their homelands. In urban areas, informal settlements have been relocated for city beautification and real estate development (Nygren and Wyessa 2018). Rural farmers have been ousted due to resource extraction (Urkidi and Walter 2011) and land investment or land-grabbing projects (Borras and Franco 2013). In 2020, people displaced by conflict includes nearly 13.1 million Syrian refugees, 2.2 million internally displaced people in South Sudan, and the forced exodus of over 742,000 Rohingya from Myanmar to Bangladesh (UNHCR Statistics, 2020). In 2016, approximately 24.2 million people were internally displaced by natural hazards and disasters (i.e., floods, earthquakes, tsunamis, tropical cyclones) (Internal Displacement Monitoring Center). In 2020, the coronavirus pandemic reveals marginalized people caught in situ. Multiple COVID-19 data dashboards from around the world juxtapose demographic information with social determinants of health to identify at-risk populations (e.g., Johns Hopkins Coronavirus Resource Center; Our World in Data – Coronavirus Pandemic).

Sustainable Development Goal (SDG) 1 aims to eradicate extreme poverty for all people everywhere. Poverty is particularly apparent in urban areas evidenced by the increasing number and extent of urban informal settlements (SDG 11, 2019). One in eight people or approximately one billion people live in informal settlements, or slums (UN Habitat, 2015-2016). Slums exemplify the urban informality of cities, referring to the lack of access to basic services, limited access to safe water or adequate sanitation, durable housing, public transportation, and dependable electricity (UN Habitat, 2015; Roy 2009). These places are most vulnerable to the vagaries of natural disasters, climate change, and conflict where access to services can be both limited and impacted due to such events.

4. Spatial Justice and Marginal Populations

Spatial justice addresses the maldistribution of the multiple harms and benefits that impact society's most vulnerable members. Soja states, "thinking spatially about justice can uncover significant new insights that extend our practical knowledge into more effective actions to achieve greater justice and democracy" (2010, 56). Marginal populations reveal conditions of vulnerability that underlie environmental and social injustices. Spatial injustice is the outcome of political and economic marginalization rooted in government policies, systemic racism, and social exclusion. Spatial justice linked to environmental injustice is one manifestation of inequity – but one that lends itself effectively to mapping and geospatial representation through maps.

Spatial justice addresses issues where access to adequate and appropriate data are

brokered by the very communities being examined. Spatial justice reflects the consequential geography of a place where geography is not just a backdrop of physical attributes or a set of place names, but refers to the social, political, and economic organization of places – spaces that are socially produced (Soja, 2010). The Design Studio for Social Intervention defines a framework of three thematic areas that while not specifically using mapping, each has a spatial aspect where geospatial data can contribute.

- Spatial Claims: Mapping spatial justice involves understanding how space is negotiated with respect to land tenure and ownership. For example, Pinfold (2015) describes efforts by informal communities in South Africa to demand adequate housing as a fundamental right. Community members map their neighborhoods to capture the building footprints enabling them to lay claim to their housing space. The informal settlement upgrade program created a mechanism for housing construction and improvements rather than relocation.
- Spatial Links: Mapping spatial justice is linked to whether people have access to critical public infrastructure and services. Shores, et. al. (2019) analyze access to basic services in the cities of Pokhara, Nepal and Douala, Cameroon. This research compares how unplanned urban development in different geographies contribute to intra-urban inequalities. Local communities collected data on distance to services to provide city government with information about those areas lacking services.
- Spatial Power: Mapping spatial justice examines conditions that affect people's ability to prosper and live. Vuksanovic-Macura (2012) map and enumerate poor informal Roma settlements in Serbia and issues related to access to housing. This study explores the relationship of under-represented groups to national and local authorities in addressing poverty and social exclusion. Without adequate data about the Roma population, this group of people remain invisible to decision makers as are their issues and needs.

This spatial justice framework provides an avenue of empowerment for marginal populations to create data and maps that describe the geospatial fabric of places they live. However, this approach is demanding in that marginal populations need access to training, resources, and partnerships to implement approaches embedded in geospatial technologies (Patel and Baptist, 2012; Panek and Sobotova, 2015). Such groups require local leadership and organization to promote their concerns compounded by demands to meet their everyday needs, such as access food and water (Rao, et al, 2019). Non-governmental organizations and international agencies play a role through providing support programs and funding opportunities for local initiatives (Nasser and Elsayed, 2017; World Bank).

5. Participatory Mapping: Data and Applications By and For Marginal Populations

Participatory mapping refers to an approach to community engagement using geospatial tools to map local communities using their spatial knowledge about place (Laituri, 2011). Participatory mapping is an approach that connects geospatial technologies, local knowledge, community development, and natural resource management of local resources. Methods include sketch mapping, interpretation of remotely sensed images, transect walks using global positioning systems or mobile applications, 3-D modeling, and digital cartography (Harris and Weiner, 2003). The results from these efforts have been termed counter mapping where bottom-up perspectives from local people is juxtaposed

with top-down perspectives of government agencies or industry (Sieber, 2006; Peluso, 1995). Participatory mapping is a process that may empower communities by representing community knowledge, cultural perspectives, and local issues through sharing their spatial stories (Laituri, 2002).

An emerging aspect of participatory mapping is collaborative efforts to collect data through mapathons – crowd sourcing geospatial data collection to enhance spatial representation of under-mapped places particularly focused on disaster response. Remote mapping of the Haitian earthquake in 2010 was a pivotal moment in recognizing the value and contribution of such efforts (Zook, et al, 2010). Driven by organizations such as the American Red Cross, Doctors without Borders, and Humanitarian OpenStreetMap, this approach aims to fill in the map for first responders and complements the open data movement.

The open data movement promotes freely available data to everyone where governments, organizations, and institution give complete access to data. This movement coupled with participatory mapping and geospatial applications contributes to efforts to improve data for humanitarian efforts with a specific emphasis on local data (Greenough and Nelson, 2019) (Figure 1). Geospatial open data efforts include data generation through collaborative mapping (e.g., mapathons) and provides information using free or low cost platforms for data sharing (e.g., OpenStreetMap). These data complement existing government and large non-governmental datasets (e.g., United Nations Environmental Program) filling in critical data gaps. The increase in the availability of remotely sensed, high resolution data (both satellite and drone imagery) has a significant impact on creating integrated data from multiple sources of under-mapped areas (e.g., Google Earth Engine). This has improved efforts to map the physical characteristics of slums (Kuffer, et al, 2016) where urban management agencies often pay inadequate attention to the needs of these areas operating outside the formal planning process (Charkraborty, et al, 2015). Developing methods for global slum monitoring are critical to track urban expansion, determine access to basic services, and monitor the SDG Goal 11 – Sustainable Cities and Communities.

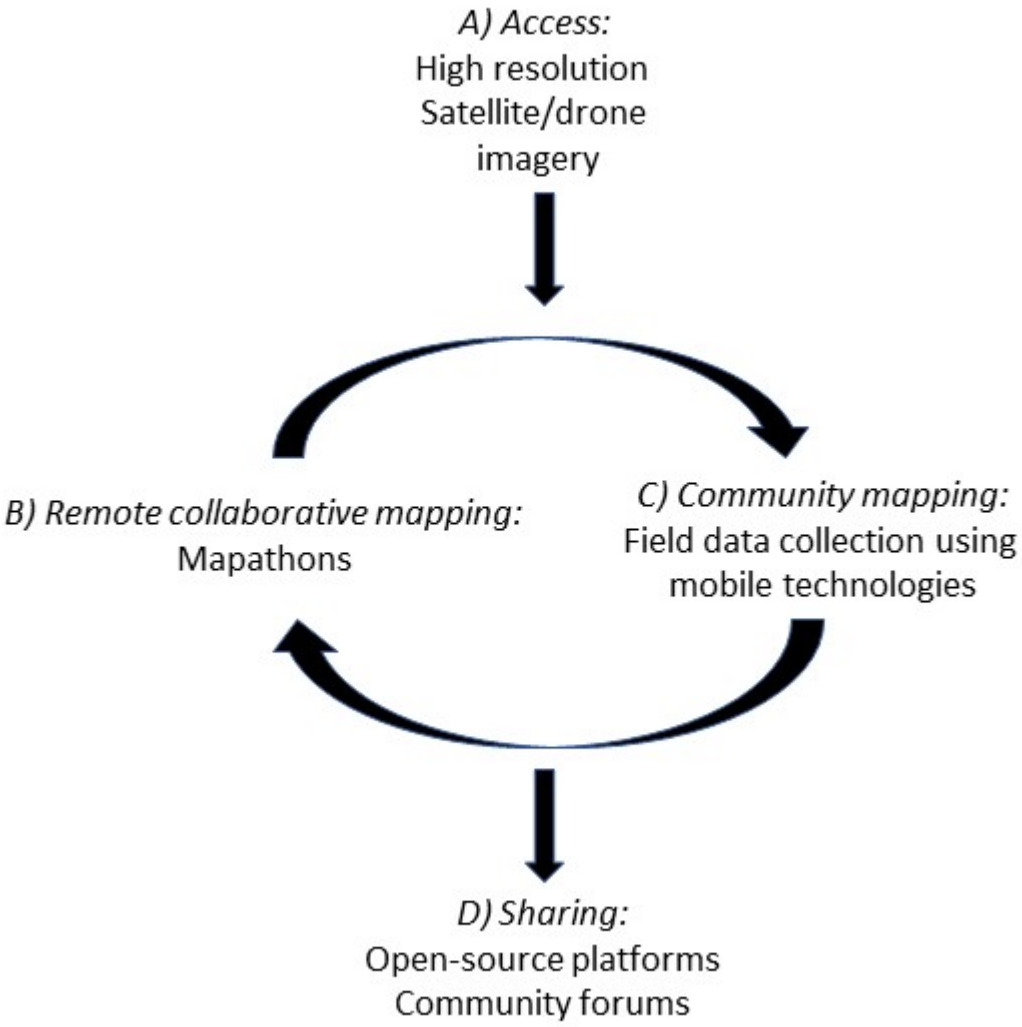

Figure 1. An example of a collaborative mapping process. A) Access to high resolution imagery of locations needing geospatial data. B) Remote mapping through mapathons for volunteers to digitize baseline geospatial objects. C) Local community mapping of baseline data and to provide attribute information of geospatial objects. D) Geospatial data are shared through open source platforms and with local communities. Source: author.

Capitalizing on web-based open geospatial technologies and a network of universities around the globe, Youthmappers focuses on promoting young leaders in their own countries to participate in mapping projects. In 2009 in Nairobi, Kenya, MapKibera was established to create a free, open digital map of the community – one of the largest urban slums in Africa. Open Reblock is an online tool that analyzes the spatial structure of informal city blocks to suggest reblocking solutions to identify better avenues to access basic services. Training for community-driven data collection in informal settlements facilitated by grassroots organizations, governmental agencies, and international organizations create relevant data to address local needs and give voice to marginal populations (Panek and Netek, 2019).

The coincidence of open source tools, web cartography, and the increasing accessibility to geospatial tools via hand-held devices presents a number of conundrums for the spatial

justice framework. Fundamental to using this suite of tools is the issue of access and equity where the digital divide continues to loom large in less developed countries and particularly within marginal communities. Computer, digital, and information literacy are needed across the spectrum of users to bridge this divide, adopt best practices, and train the next generation of geospatial professionals. The practice of remote mapping through platforms such as OSM coupled with high resolution satellite imagery enables the collection of critical baseline data around the world such as transportation networks, infrastructure, and building footprints. However, these data also need local input that provide place names of roadways or attributes of building type and function not identifiable from remotely sensed imagery.

6. Spatial Ethics for Marginal Populations: Whose Map for What Purpose?

Mapping spatial justice is situated within the larger context of justice that defines the consequential geography of places (Soja 2010). Spatial (in)justice reveals the distributional outcome of procedural justice - the socio-political, economic context of decision making; recognition justice – who gets a voice at the table and restorative justice – how do we fix things (Jenkins 2011). Defining and mapping marginal populations entail spatially-informed ethics (Dikec, 2001) where local voices claim their right to place wherever it might be – the slum, the rural hinterland, the informal settlement.

The relationship between GIS&T and marginal populations is contentious. The politics of spatial justice mapping reveals the landscape of power dynamics. The very practice of participatory mapping is an exercise in navigating spatial justice to ensure equitable relationships and addressing the distribution of agency that reflect power asymmetries between communities, practitioners, government agents, and researchers. Ownership of data, access to appropriate technology, sharing of visualizations are all aspects where equity comes into play. Ethical guidance and responsible relationships between technologists, development practitioners, government agencies, and communities are necessary to ensure that spatial injustice will be addressed.

What are spatially explicit ethics? Efforts to define geospatial ethics for GIS professionals include: the American Geographical Society EthicalGEO; URISA's GIS Code of Ethics; and the GIS Certification Institute's A GIS Code of Ethics. There are several resources for ethics focused on participatory mapping from international, non-governmental organizations: International Fund for Agricultural Development Good practices in participatory mapping; International Institute for Environment and Development Practical ethics for PGIS practitioners, facilitators, technology intermediaries and researchers; and the East West Center's Mapping Communities Ethics, Values, Practice. These codes of ethics address topics that include how to engage with communities, data collection practices, planning for data use and analysis, and issues related to data sharing and maintenance. The critical aspect of these codes are to ensure the appropriate use of data – inclusive of how it is collected, analyzed, and shared and where the participant communities have an integrated place in the research activity.

There is a rich literature on participatory mapping and research that identify the caveats and pitfalls of this approach. Critical to this body of knowledge is the role of agency with respect to community and researcher relationships where "extractive" research may

benefit the academic more than that host community (Kouritzin and Nakagawa, 2017; Bastica, et al, 2010). Additionally, communities may want to be mapped, but limit mapping due to issues with sensitive information such as sacred sites in indigenous communities (Laituri 2002). Finally, how data are created to inform cartographic visualizations depends upon the data collection tools and classification schemes that are developed. D'Ignazio and Klein (2020) describe the "paradox of exposure" where data and the algorithms that transform numbers into information can be both beneficial and harmful. The geographic dimensions of this interplay can be found in examples of maps of ethnic enclaves that may be constructed with inadequate consent, used for surveillance, and result in negative consequences for the local community such as displacement or removal (Berman, et al, 2018).

The intersection of geospatial science and social justice represent a pivotal moment in examining new ways of understanding cultural and political narratives manifested on the physical environment. At play are the historical power dynamics of map-making that reflect the Age of Discovery. Maps were used to identify opportunity while at the same time erasing entire societies; the term terra nullius was used to refer to "empty" territories in Australia and North America inhabited by indigenous people (Turnbull, 1989). The terrain of geospatial science and applications of spatial justice demands that we rethink the importance of the interconnectivity between the local and global as well as the past and the present. Efforts to intersect the anthropocentric and biocentric geospatial data to build integrated datasets across discordant spatial scales is a challenging endeavor. However, such datasets can illuminate distributional patterns that reflect the practices of unjust socio-political policies. Equity and access to geospatial tools, improving digital literacy, and equitable partnerships built on a spirit of collaboration and cooperation are needed in the 21st Century. Geography, in general and GIS&T, specifically are foundational to scientific exploration built upon transdisciplinary intersections where a plurality of values is recognized.

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