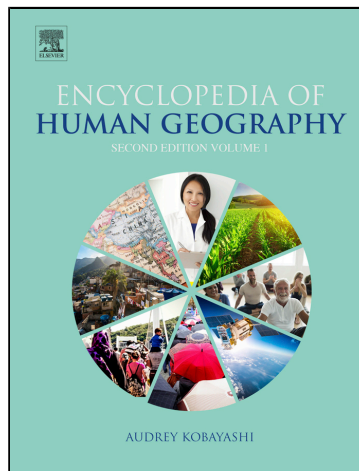


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Feminism, Geographic Information System, and Mapping

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Glossary

Cartographic visualization or geovisualization A set of techniques for representing spatial data for visual examination in a computerized environment.

Epistemology Part of social theory that establishes the relationship between the knower and the known or the subject and the object.

Feminist geography Part of human geography inspired by feminist scholarship and focused on representing adequately women's worlds and transforming research practice in accordance with principles of feminist scholarship.

GIS (Geographic information systems and science) Computer-based technology for storage, management, display, and analysis of spatial information and the science of representing and analyzing geographic objects and their properties within the computer environment.

Cartography has a long and respected history as the “art and science” of mapmaking because it provides a unique way to visually communicate and understand spatial information, relationships, and patterns. The shift toward digital data, most of which today incorporates geolocation, and advancements in computerized mapping have positioned GIS as an essential technology for analysis and visualization of spatial information. Furthermore, decentralization of mapping expertise from professional cartographers and GIS experts to different publics and activist movements has led to growing popular appreciation of maps and digital spatial representations. All along, proliferation of free, open source, and Internet-based spatial analytical and mapping tools has considerably accelerated these processes.

In the last two decades, participation of women in these male-dominated fields has also been growing, but it is feminist geographic scholarship that has made a profound impact on practices of cartography, GIS (Geographic Information Science and/or Systems), and geospatial technologies, from their first pioneering critiques that laid grounds to the emergence of critical and qualitative GIS scholarship to countering patriarchy and other intersecting social hierarchies to imagining worlds based on ethics of care and social justice. Because of these transformations, gender has become a vital dimension of geographic difference that is being mapped, while women researchers, as “mapping subjects” armed with GIS produce geographic knowledge that is critical of social oppression and supportive of geographies of justice and care. Meanwhile, the so-called “spatial turn” in social sciences and humanities has created conditions for the wide use and critical interrogation of spatial and cartographic metaphors by feminist scholars from other disciplines. These developments have resulted in fruitful intersections between feminism, geospatial technology, mapping, and cartography.

In addition to epistemological critiques of the role of cartography and GIS in production of power and authority (e.g., patriarchal, racial, colonial, state, surveillance, and military), feminist scholars brought into focus the contributions of women to these fields and laid ground for the analysis of spatial configurations of patriarchy, race, class, national belonging, and other dimensions of social difference. They also developed epistemologies for nonhierarchical representations of landscapes. Despite these advances, cartography and GIS remain predominantly male and masculinist disciplines, while the emerging technologies have gendered effects that can perpetuate patriarchy. It is important, therefore, for the feminist GIS scholars to keep their edge and push further the epistemological bounds of the technology toward nonhierarchical and progressive uses.

The contributions of women in cartography and GIS have been undervalued, but there is ongoing engagement of feminism with GIS and practices of mapping. This engagement includes critiques of mapping and vision, geospatial technologies, new spatial media, and Geoweb as gendered and masculinist; reclaiming the power of vision and mapping for creation of feminist cartographies; and the broader impacts of geospatial technologies on women's daily lives.

Women in Cartography and GIS

Geospatial technologies remain a male-dominated field that continues to limit women's entry and undervalues their contributions. History of women in cartography, in particular, is significant and important to recount. According to scholars Alison Hudson (a now retired head of the map division of the New York Public Library) and Mary Ritzlin women have long worked in the mapmaking trades in North America. Initially they were involved with printing (e.g., map engraving) or the map publishing businesses of their husbands, which they often ran after their husband's death. Because most women lacked training in mathematics necessary to construct maps and could travel only in their husband's company, becoming explorers or surveyors themselves was difficult (with notable exceptions of Mary Kingsley, Isabella Bird, and others). However, women have become prominent disseminators

of geographic knowledge as educators. For example, in the 19th Century they authored numerous geography books, atlases, and histories for students and general readership. An ongoing feminist history project that aims to recover women's contribution to cartography in North America has identified as many as 300 such women. Women's overall contribution is undervalued also because so few women have occupied highly skilled or leadership positions in either the cartographic professions or GIS. There are complex reasons for this situation that range from challenges upon entering the field to the observed gender differences in spatial cognition and map-reading skills attributed to socialization.

Although women are entering the GIS field in greater (although still small) numbers, they continue to face barriers that exist in the other science and information technology (IT) fields. While being trained in GIS, they are presented with masculinist model of teaching that intimidates female students who see themselves as "intruders" into the men's world of geospatial technologies. Women have more complicated and nonlinear career trajectories that often conflict with personal aspirations (e.g., family) that the masculinist workplaces tend to disregard. Yet, the very presence of women slowly transforms the profession and once participation achieves certain critical thresholds, changes would become more substantial.

Beyond the growing participation of women, feminism scholarship has open radically new ways to practice GIS, create maps, and produce knowledge. A growing number of geographers (both women and men) who are inspired by feminist epistemologies now use GIS in their research while feminist scholars outside geography use spatial and cartographic metaphors. Feminist researchers also examine how spatial information and related technologies change daily lives of women. The sections below discuss these developments.

Feminist Critiques of Cartography and GIS

Inspired by the critiques of Western science advanced by Donna Haraway and other theorists, feminist geographers examined the role of the masculine gaze in shaping modern geography and cartography. Gillian Rose argued that, as part of Western tradition, geographic fieldwork, especially in "new" lands, privileges sight and looking as a mode of observation. Visual observation of the landscape, whether assisted by modern technology such as surveying or remote sensing or not, maintains distance between the observer and the observed (the subject and the object) that positions a geographer as a detached, disembodied, and objective scientist. Nature and the unknown territory, meanwhile, have become associated with the feminine—both threatening and beautiful, to be tamed and adored, to be controlled and investigated. A male geographer, then, experienced the exploration of new territories or cities as a rigorous scientist, a conquering hero, and a pleasure-seeking admirer. For these reason, Rose explains, modern geographic examinations of the landscape, mainly produced by male geographers, not only express class or colonial power (as Marxist and postcolonial scholars would argue) but are also profoundly masculinist.

These considerations also reveal a particular connection between cartography and European imperialism. In the words of Alison Blunt and Gillian Rose, "Maps are central to colonial and postcolonial projects" as "graphic tools of colonization" serving to make sense of the colonized spaces that are perceived empty and without meaning. The power to inscribe colonized landscapes and people with meaning is the power to establish control. "Imperialist maps not only describe colonies: they also discipline them through the discursive grids of Western power/knowledge." This power was amplified by equating colonized landscapes with the feminine in imperial imaginations. Indigenous women symbolized the land and both women and the land became legitimate objects of colonization to be known, controlled, and "taken care of" by the "civilizing" European states.

Owing to the rapid integration with geospatial technologies, geolocation, and digital information (e.g., GPS, remote sensing, tracking devices, cell phones, digital databases, and the Internet), mapping has acquired even greater scientific authority and visual persuasion. It has also become clear that, together, these technologies not only can advance and democratize spatial knowledge, assist decision-making and public participation, and provide modern services but that they are also able to support hierarchies of race and gender, imperial ambition, capitalist exploitation, and pervasive surveillance. In this context, the claim by Donna Haraway that technological devices from microscopes to satellites enhance the masculinist nature of modern science by extending the limits of visual observation acquires particular relevance to GIS. As users access, display, and manipulate images of places, visual excitement of seeing the world in new ways is magnified by the sense of possession and control over spatial representations of people and territories that aligns GIS with masculinist mode of knowledge production. To some, the chasm between GIS "as is" and feminism is so deep that the technology could never become compatible with feminist scholarship.

Reclaiming GIS as a Research Tool for Feminist Geographies

Feminist geographers, however, have chosen the path of rethinking GIS instead of rejecting it entirely. Susan Hanson argued that, similar to quantitative methods, GIS should be used in feminist research and by researchers who understand these limitations. Nadine Schuurman and Gerry Pratt suggested that rather than distancing it as "other," feminist/critical and GIS scholars should develop mutual knowledge and "care for the subject" of GIS. Further, Nadine Schuurman and Mei-Po Kwan argued that Donna Haraway's point that technologies are not inherently masculinist but made so through their use should encourage feminists to reconstruct GIS-based visualization as a feminist method. In her "cyborg manifesto for GIS," Schuurman called for greater involvement of women in GIS. Sara McLafferty proposed to link the dynamic but separate worlds of GIS and feminist geography by combining reflexive feminist methodologies with layered GIS representation of the world. Marianna Pavlovskaya demonstrated

that contrary to common perceptions of GIS as a quantitative tool, its vast qualitative functionality makes it possible to employ its visual and analytical power in critical human and feminist geographic research.

These developments have bridged the fields of GIS and feminist geography so significantly that Sara McLafferty even noted the ongoing "feminization of GIS" in terms of its changing gendered composition and increasing affinity with feminist epistemologies. Overall, feminist critiques of GIS have prepared the ground for its use in feminist analyses of social difference and power that focus on hierarchies of gender, race, and class as well as identities, LGBTQ spaces, spaces of everyday life, and women's activism.

Feminist Cartographies

Feminist engagement with cartography and GIS can be traced to several locations. First, the new interest in cartography, space, and place has allowed feminist artists and scholars to gain new insights into social practices and experiences. The South Asian Muslim artist Zarina works with maps to create prints of borders she crossed and that divide people (e.g., between India and Pakistan). She also creates prints of places destroyed by war. In another instance, artist Ursula Biemann overlays satellite images with personal stories of women recruited into world sex trade to visualize "female geobodies"—hidden global flows of female bodies from South-East Asia and Eastern Europe to Europe and North America where these bodies are consumed. The Irish artist Kathy Prendergast maps female body in ways similar to how people map the land that invoke representations of Ireland as feminine in popular, nationalistic, and scientific discourses. While reminiscent of control and exploitation, her mappings suggest nonpatriarchal representations of both women and the land. Feminist artists also produce nonpossessive mappings of the male body. These creative approaches subvert the masculine nature of gaze, reinscribe mapping as nonhierarchical, and allow for reclaiming and reconstructing vision and cartography on feminist terms.

Second, feminist geographers have turned to mapping and cartography as a way to reveal gendered experiences at various scales. Traditionally, maps hide women's worlds behind general indicators but new feminist research (and new maps) makes their experiences visible while also highlighting the differences between experiences of women and men. To achieve this, feminist scholars excavate and combine spatial data and statistics in new ways as exemplified by the Penguin Atlas of Women in the World by Joni Seager. Similar to other world atlases, it provides a global overview of various socioeconomic indicators by country but in this case international statistics are compiled to show phenomena that specifically affect women including their equality, health, political involvement, domestic violence, lesbian rights, employment opportunity, body politics, and the other dimensions of their lives that vary from one country and world region to the next. Fig. 1 is an example of a map that shows the murders of women by intimate partners across the globe.

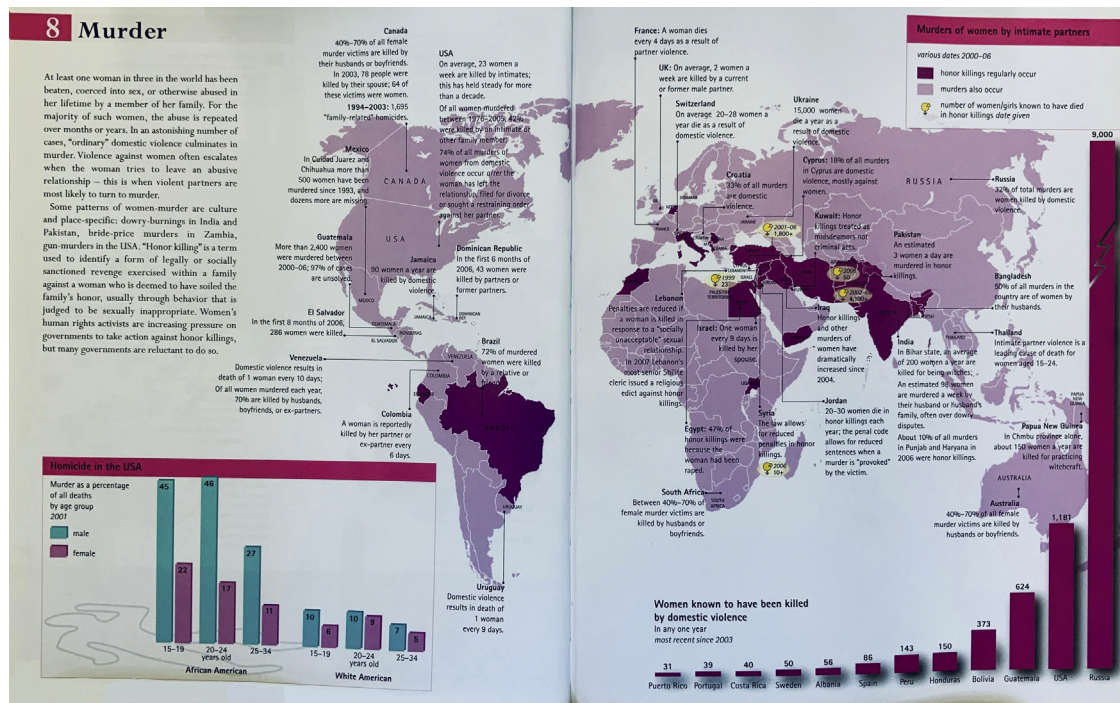


Figure 1 Unequal opportunities Source: Myriad Editions 2003 From The Penguin Atlas of Women in the World by Joni Seager www.MyriadEditions.com. Reprinted with permission.

In addition, scholars from other disciplines have started using GIS for analyses of gendered patterns, including research on health. They, for example, included distance as a factor in calculation of the effects of prenatal exposure to pollutants from the 9/11 disaster; modeled the distribution of HIV infection rates among rural pregnant women in a region of South Africa in relation to the geography of the local road network that supports male migration; and examined a relationship between access to childcare and women's labor force participation in the Netherlands. In this latter case, researchers found geographic availability of childcare to be highly uneven resulting in the situation that mothers living in areas with more daycare slots per 100 children were more likely to be employed. Visualizing these kinds of social landscapes would not be possible without either the computer-based spatial analysis or the theoretical insights of feminism and its commitment to gender equality.

Third, rethinking geospatial technologies on feminist terms has opened new research possibilities for both feminist geographic scholarship and GIS. In particular, analyzing and visualizing experiences of women required new spatial analytical methods and data types. For example, Mei-Po Kwan has modeled the movement in time-space by combining spatial layers of street networks and the location of urban opportunities with data from travel diaries completed by individual women. The resulting 3D visualizations of daily life paths of women made clear the gendered nature of access to urban opportunities as well as class and racial differences between women themselves.

Taking another approach, LaDonna Knigge and Megan Cope developed a method for grounded visualization when researching the role of urban community gardens. They combined grounded theory for analysis of qualitative data with rich spatial layers of information derived from different sources, including interviews and photographs. Marianna Pavlovskaya has also used GIS in combination with qualitative interviews that allowed for mapping the diverse economic practices of urban households that included, in addition to paid employment, the informal work for cash, unpaid domestic work, childcare, and exchanges of goods and services via social networks. Excluded from common analyses, it is these daily economic practices that have provided vital support for social reproduction in post-Soviet Moscow (Fig. 2). In yet another example, sketch maps of Philadelphia drawn by lesbian women reveal that they experience the capitalist spaces of consumption differently from gay men although queer tourism industry conflates these experiences and neglects those of women.

By creatively merging qualitative and other nonstandard spatial data with GIS, feminist geographers construct geographic stories that the official data sources do not and/or cannot tell. Once placed within the urban space, those crucial social practices and experiences become ontologically and politically important despite being made invisible by standard statistics. In this context, mapping social practices that constitute spaces of social transformation away from economic exploitation and social oppression—for example, mapping the solidarity economy that follows ethics of democracy, cooperation, inclusion, environmental sustainability, and care—becomes an important feminist ontological practice while GIS becomes a tool for enabling social transformation.

Furthermore, originally developed by black legal scholar Kimberlé Crenshaw, the concept of intersectionality argues that experiences of women are always mediated by race, class, sexuality, national belonging, culture, and other experiences makes it important for feminist scholars seeking to eliminate patriarchy to counter all forms of intersecting oppressions because they are both inseparable from being a woman and make the shared experience of patriarchy different to different groups of women. Some fruitful applications of GIS to this problematic have shown, for example, that the combined effects of patriarchy, race, and class

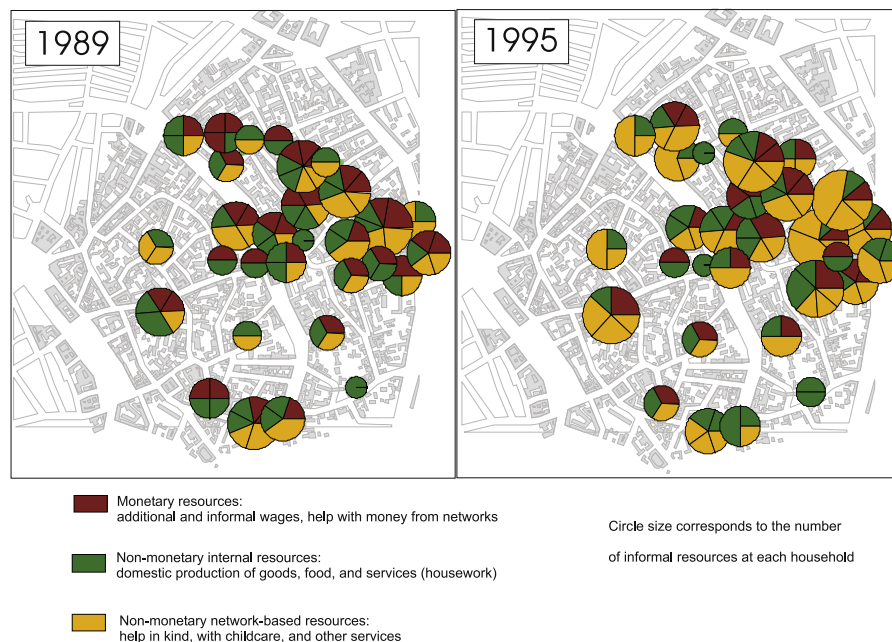


Figure 2 Informal resources and households, 1989–95. Source: Interview data. Pavlovskaya M. (2004) *Other Transitions: Multiple Economies of Moscow Households in the 1990s*. *Annals of the Association of American Geographers* 94 (2): 329–251 Reprinted with permission.

have particularly harmed women of color during the recent foreclosure crisis making geographies of “foreclosed women” a prominent spatial outcome of capitalist real estate market and predatory lending in African American communities. At the same time, GIS analyses and visualizations of spatial dimensions of intersections of different oppressions require more efforts by feminist geographers.

Finally, women’s activism has benefited from GIS in a number of ways. Internet-based mapping platforms can act as advocacy and counter-mapping tools by, for example, providing a means to create grass-roots testimonies to women’s conditions through crowdsourced maps. Maps of instances of sexual harassment or public spaces in which it is safe for lesbian and bisexual women to display affection advance social change by making powerful statements about patriarchal and heteronormative gendering of urban space. In these and other cases, feminist GIS researchers can work with women’s groups on shared research projects that advance their causes. In one such case, Sara McLafferty assisted a group of women from Long Island in mapping the distribution of breast cancer occurrences in their communities using data collected by women themselves. They sought to draw attention to the potential environmental causes of this disease and this project eventually helped secure government funding for further research.

Geospatial Technologies and Women’s Lives

Finally, feminist scholars have researched the effects of emerging geospatial technologies on women’s everyday lives that are increasingly integrated with the Geoweb and new spatial media. The Geoweb refers to evolution of the Internet into a source of geographic information and a tool for its spatial visualization and analysis while new spatial media comprise various mobile apps, social media that use geolocation, and location-based services. We are only beginning to learn the implications of these new technologies but their gendered nature is already clear.

These technologies change the way we work, as in the case of telecommuting, or look for work and these processes create new types of gendered employment while also reconfiguring boundaries between home and work. Daily social reproduction tasks such as shopping, household chores, childcare, and eldercare, which are typically done by women, also rapidly change. Through Geoweb, women establish and maintain social networks within and beyond local communities, often at the global scale, through which they exchange information about important for them matters such as, for example, prenatal care and do care work that maintains transnational family relationships including parenting.

It is important to note that geospatial technologies have uneven and controversial impacts on women. The intersections of class, gender, age, and race perpetuate the digital divide and prevent large groups of low-income, elderly, and women of color from accessing such technologies that contributes to their marginalization in terms of employment, consumption options, health outcomes, and political empowerment.

On the global scale, the Internet also enables sexual exploitation and trafficking of women and children from the Global South to Global North. In other cases, geolocation in mobile devices has already positioned the new spatial media as spaces of political and commercially driven surveillance that challenges the normative and legal bounds of privacy while also creating gendered impacts that follow the established patriarchal patterns. For example, women are more likely to be targeted by advertisers as consumers for their households or have their movements monitored by tracking devices installed by their partners.

Moreover, the supposedly neutral coding, mobile apps, and technologies for creation of geographic data, in fact express masculinist ideologies. In the popular mapping platform OpenStreetMap, men control spatial data creation and editing that makes them gatekeepers to local knowledge resulting in a higher proportion of places on the map that are of interest to men than of those that are used in everyday life by women (e.g., day care centers). In addition, certain social media apps that are designed by and for men who seek dating opportunities with women secretly violate privacy of women by visualizing their location and associated social media profiles.

Conclusion

In conclusion, the growing use of geospatial technologies among women, widening their access to digital mapping tools and spatial information has rapidly grown in the last two decades. In addition, the field has been, albeit slowly, transformed by feminist scholarship. GIS research now includes the experiences of women, people of color, the poor, and LGBTQ groups. Feminist academics, professionals, and all kinds of women use Geoweb and spatial media in their everyday working and private lives. Feminism has made important impacts by redefining and broadening the notion of mapping, GIS, and geospatial technologies and data that can be used within their contexts. It also pushed GIS to become a tool for social critique and transformation. At the same time, feminist GIS scholars should continue to counter the existing and emerging contours of patriarchy and other forms of oppression while also supporting all kinds of progressive struggles.

See Also: Critical Cartography; Critical Geographic Information System; Digital Feminism; Ethics. Geographic Information System; Feminism/Feminist Geography; Feminist Methodologies; Feminist Political Economy; Geographic Information System and Cartography. Geographic Information System; Public Participation. Geographic Information Science and Systems.

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