Chapter 6
When Web 2.0 Meets Public Participation GIS (PPGIS): VGI and Spaces of Participatory Mapping in China

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Abstract While existing studies provide important insights into power relations and spatial knowledge production impacted by volunteered geographic information (VGI), this chapter argues that more research is needed to investigate how these new geospatial technologies have constituted the actor's subjectivities and the politics of citizen participation. Drawing upon public participation GIS (PPGIS) studies, critical GIS research and critical social theory, this chapter examines the mutual and complex relationships between subject formation and geospatial technology development and their implications for spaces and politics of citizen participation in a variety of contexts. A case study in China is presented with three examples of VGI mapping drawn from ethnographic fieldwork. These VGI practices in China have constituted multiple "DigiPlaces," a notion proposed by Matt Zook and Mark Graham that is characterized by greater visibility with automatic production, increased individualism, and dynamism. Furthermore, these practices are simultaneously impacted by the complex process of subject constitution, informed by Mark Poster's notion of "the mode of information," marked by the proliferation of electronic communications that helps to constitute multiple subjectivities. In particular, coupling with rapid Internet and new communication technology developments, Chinese citizenship witnessed growing awareness of individual rights and more decentered self-identities compared to two decades ago. As such, new spaces of citizen participation are constructed by these VGI practices; however, significant challenges remain regarding the intersection of possibilities and existing economic and sociopolitical inequalities.

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6.1   Introduction

Online mapping is not new. But the recent emergence of a wide array of geovisualization technologies combined with Web 2.0 has in the past 5 years enabled greater user-generated spatial data creation and distribution and has drawn increasing attention from GIS scholars (cf. Elwood 2009; Goodchild 2007; Haklay et al. 2008; Sui 2008; Crampton 2009). Such spatial data provisions, referred to as *volunteered geographic information* (VGI) practices (Goodchild 2007) here[1] and carried out by those who usually do not have formal training in GIS or cartography, often incorporate multimedia representations, including photographs, texts, and sounds that are tagged with locational information (Elwood 2009). Research has started to examine the social and political impacts of VGI practices on citizen science and participatory democracy, as well as how these practices might constitute new forms of surveillance, exclusion, and intrusion into privacy (Elwood 2009, 2010).

In particular, there have been insightful studies investigating different types of VGI and how they overlap with and differ from traditional public participation GIS (PPGIS) practices (Miller 2006; Tulloch 2008; Boulton 2010). In this discussion, researchers have emphasized greater accessibility and user-friendliness of these technologies that might enable public participation through mapping. Meanwhile, existing power relations may also be reinforced and reconfigured in VGI production (Obermeyer 2007; Crutcher and Zook 2009). In addition, various forms of representation and constitution of community through VGI have been acknowledged (Tulloch 2007).

Nonetheless, as compared to many PPGIS practices that tend to revolve around goals of particular organizations or communities (Sieber 2006; Elwood and Ghose 2004), VGI production tends to be much more individualized and dynamic (Zook and Graham 2007). As such, some key questions remain regarding the intersection between VGI and PPGIS. In particular, how should we conceptualize the complex interrelations between the broader socioeconomic, political conditions (which may also be changing) and participatory VGI practices? For example, who is the participating "community" in the face of increasingly individualized VGI practices and possible "remote" participation enabled by the Internet and other information technologies? Are the sociopolitical meanings of "participation" in flux as a result? How might the purposes of participation and interests of various individuals and groups have been transformed by the wider availability of information technologies and locational information? What are the convergences and divergences of participatory VGI practices in different contexts that might shape and give new meanings to local data production and citizen participation?

This study is part of my ongoing project that seeks to contribute to the existing discussions regarding the abovementioned questions. Three streams of research frame my argument here. First, the PPGIS literature provides important insights into understanding how power relations are mediated through GIS usage and spatial knowledge

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[1] See Elwood (2010) for a summary of other terms such as neogeography, geoweb, map 2.0, etc.

production by citizen and grassroots groups. However, these discussions in PPGIS have been largely framed within the organizational context, which is not adequate for examining the more individualized VGI practices. Second, critical GIS research has addressed the issue of subject constitution complicated by geospatial technologies and pervasive computing. The mutual constitution between the social and the technological at the level of the body may give new meanings to forms of technology-mediated participation, community composition, and power relations in civic engagement. Third, I further draw upon Mark Poster's "the mode of information" from critical social theory in cultural studies and communications studies to situate these cultural shifts.

Through this synthesized framework, I provide an empirical investigation of participatory VGI practices in China, which are informed by the complex and dynamic subjectivity constitution and citizenship transition in increasingly urbanized and globalized China. I suggest that despite the lack of organized citizen participation on various issues, strong state control of spatial knowledge production, and Internet censorship in China, VGI practices open new spaces for civic engagement and citizens' contestation of official discourses in dynamic and subtle ways. At the same time, I argue that within this context, citizen participation, even through arguably "open" approaches such as VGI, is inherently limited to practices of "exercising micro-power and organizing without organization" that carry with them new forms of exclusion. As such, while there are significant differences regarding political context and democratic participation in China when compared to many Western polities, these Chinese VGI practices show some interesting shared traits of VGI elsewhere in the way they constitute self-identities and in their blending of virtual and physical spaces, which may also give new meanings to participation and the politics of spatial knowledge production.

In what follows, the second section discusses the theoretical background of this research. In the third section, I illustrate the dynamics of Chinese citizenship as an introduction to the socioeconomic and political conditions of the VGI practices in China. This is followed by a case study of three VGI examples in China in the fourth section. Finally, the last section provides conclusions and discussions.

6.2   Theoretical Background

6.2.1   VGI and PPGIS: Convergences and Divergences

A growing body of work has sought to examine the purposes of VGI production, values of such data generation, and associated technological transformation as well as social and political implications (Goodchild 2007, 2008; Haklay et al. 2008; Sui 2008; Elwood 2008, 2009, 2010). Overall, it is recognized that VGI authors are simultaneously data users and that VGI production is mobile, ubiquitous (Perkins 2008; Haklay et al. 2008), and often times collaborative in a manner similar to "wikification" (Sui 2008). In particular, the more decentralized mode of VGI data

provision comprised by the local data of lay persons has drawn significant attention from GIS scholars examining implications for citizen science and participatory democracy (Goodchild 2007; Tulloch 2007; Boulton 2010; Elwood 2010). A number of studies have addressed the overlap between VGI and PPGIS (Tulloch 2007, 2008; Miller 2006). Due to the scope of this study, I focus on VGI practices in which the data creators knowingly generate and share their data publicly, what I call "participatory VGI" practices.

The rich body of work in PPGIS derives from critiques of GIS in the early 1990s, which argued that GIS technologies embody a positivist epistemology and prioritize instrumental rationality over other forms of knowledge production. In response, significant efforts have emerged to broaden the accessibility of data and technology to citizens and grassroots groups. Researchers have investigated ways of integrating and representing local knowledge of marginalized groups using conventional GIS technologies or re-coding GIS into more user-centered packages (GIS/2) (cf. Sieber 2006; Craig et al. 2002). A key inquiry in the PPGIS literature is to examine in what ways spatial knowledge is produced, by whom, and how this process may shape power relations among different social groups (Sieber 2006; Tulloch 2007; Ghose 2007; Elwood 2009). PPGIS practices have contradictory outcomes, simultaneously empowering and disempowering with shifting boundaries of inclusions and exclusions (Weiner and Harris 2003; Elwood 2004; Ghose 2005). There are also discussions of possible spatial data abuse and invasion of personal privacy (Pickles 2004; Sui 2006). While there are analyses of power relations among individuals in PPGIS practices (e.g., Elwood 2004; Kyem 2004), existing discussions on social relations embedded in PPGIS have been largely focused on the roles of organizations and groups (Sieber 2000; Elwood and Ghose 2004; Tulloch 2007).

In line with efforts to expand technology accessibility in the PPGIS literature, a number of claims have been made to the effect that VGI can provide a new form of participatory mapping, which engages with a broader audience of lay persons through crowdsourcing, greater user-friendliness, and space and time flexibility (Miller 2006; Tulloch 2007, 2008; Kreutz 2010). Miller (2006) investigates the emergence of Google Maps mashups and their impacts on PPGIS. He emphasizes that the ease, speed, and high interactivity of online map usage along with the mashability of Google Maps have enabled a participating public. Such a mapping platform and the example of mashup creation responding to Hurricane Katrina underline the ideals of a user-centered GIS/2 (ibid). Kreutz (2010) discusses the issue of "maptivism," which can be seen as the explicit usage of VGI in activism. He suggests that these volunteered maps are powerful because they can provide a feel of connection, connect topics on complex issues, and trigger engagement.

Meanwhile, researchers have also identified several limitations of VGI practices as they may embed existing social inequality and introduce new forms of technical and social barriers for civic participation (Tulloch 2007; Crutcher and Zook 2009). Tulloch (2007) notes that while these online mapping applications are much less constrained geographically, they are more limited generationally. Crutcher and Zook (2009) examine in what ways existing social and economic inequalities are further intertwined with, and in turn reconfigure, the digital mapping landscape.

They particularly investigate the post-Katrina Google Earth to illustrate how race has shaped the way people use (or do not use) Google Earth. Kreutz (2010) also addresses the challenges in maptivism, including possible intrusion of privacy, embedded propaganda and discrimination, and lack of attention.

Tulloch (2008) provides an insightful examination of overlaps and distinctions between PPGIS and VGI. In particular, with respect to participation, a core issue of the overlap between PPGIS and VGI lies in the investigation by individuals of locations important to them. In the context of PPGIS, it is likely the case that individuals strive to utilize public datasets to participate in decision-making processes that impact the places they care about. In the case of VGI, it might be that individuals create their own datasets rather than using existing public datasets of their beloved places. In addition, VGI has a casual and entertaining side, which cannot fit easily within the existing PPGIS theorization of participation. Tulloch addresses two important distinctions between VGI and PPGIS. One is that technologies used in VGI are usually outside the conventional GIS software. Second, VGI is largely about mapping more than decision making, while PPGIS tends to focus on decisions and explicitly seeks social change through mapping. Associated with this second distinction is that VGI authors may create and share their data unknowingly, which can be a form of "(geo)slavery" (Obermeyer 2007). Yet the line of distinctions may not always be fixed, as VGI authors may acquire a more influential position in a policymaking process through data creation and sharing.

Several studies from critical GIS and critical cartography also examine the divergences between VGI and GIS practices (cf. Elwood 2010). In particular, burgeoning VGI practices indicate an emergence of spatial dataset infrastructure as "patchwork" (Goodchild 2007), which can result in a changing role for citizen and grassroots groups, who might move from being data petitioners to data providers (Elwood 2008; Perkins 2008; Dormann et al. 2006). Second, new private-sector actors such as advertisers embedded in these free online mapping tools may get increasingly involved (Zook and Graham 2007), while there are also significant efforts in providing open-source software (Haklay et al. 2008). Third, VGI may reinforce existing social inequalities, and it may also constitute new forms of exclusion and surveillance, such as the variable technical capacity to code with open application programming interfaces (APIs) and possible data abuse made possible by the availability of massive databases (Elwood 2010; Williams 2007).

6.2.2   *Subjectivities and DigiPlaces*

Some scholars from critical GIS have investigated new dimensions of subjectivities emerging from pervasive computing and geospatial technologies (Elwood 2010), such as the data-borg (Schuurman 2004), geocoded citizen (Wilson 2009), and digital self (Dodge and Kitchin 2007). For example, employing the notion of cyborg that points to the complex mutual constitution of human and machine (Haraway 1991), Schuurman (2004) suggests a variant of cyborg in the twenty-first century,

the data-borg, as the collection and usage of data on our bodies have become much more significant in everyday life. Noting parallel technology advancements that enable massive database constructions in GIS analysis, Schuurman calls for attention to an emerging new cyborg that is rich in data at the individual level (ibid). In particular, through the example of Virtual Coach, which collects athletes' logging of daily data to provide correspondent training schedule, Schuurman illustrates how these daily and long-term data collections can be an extension of the self. Such a self-reconfiguration opens up a variety of opportunities as well as risks. On the one hand, it is empowering for individuals who might adopt a more individually based training plan. On the other hand, it can be used by powerful conglomerations for population control and exploitation.

Kingsbury and Jones (2009) seek to go beyond a fear-hope dialectic often associated with critical studies of geospatial technology. They argue that Google Earth is too often seen as "an Apollonian entity composed of control, order, and calculation" (ibid, p.503). Underscored by this Apollonian view, discussions of this technology tend to be divided into two opposing views of fear and hope regarding its sociopolitical implications. For example, the authors point out that responses to the US Holocaust Memorial Museum initiative, which shows high-resolution images and photos of the crisis in Darfur, tend to fall in two opposing lines: applause for the efforts of educating a broader audience about the geographical context of the crisis or critiques of possible voyeuristic pleasure gained from viewing these images. Both perspectives are limiting. Rather, Google Earth is also a Dionysian entity that is uncertain, alluring, and frenzied. This Dionysian interpretation helps to better understand the multiple ways in which Google Earth is being used in different contexts, frequently reflected in the surfing of Google Earth's alluring and oftentimes bizarre images. This theorization also recognizes the "casual and entertaining side" of VGI (Tulloch 2008, p.165). Moreover, the authors suggest that the Apollonian involves a politics with a subjectivity that is sober, rational, calculated, and sincere, while the Dionysian involves a politics of the artist, anarchist, or hacker that may seem apolitical at first glance. But the Dionysian is also "the place where new ways of political and ethical thinking emerge" (Kingsbury and Jones 2009, p.509).

Gerlach (2010) also suggests that emerging Web 2.0 mapping practices go beyond the subject-object dualism in traditional cartography. He proposes a concept of "vernacular mappings" to describe the everydayness of mapping practices cultivated by, for example, OpenStreetMap. He argues that vernacular mapping consists of "a politics of the aesthetic whereby creative potential is valorized as a series of political interventions, but not necessarily in a subversive or angst-ridden manner" (ibid, p.166). Together, these studies underscore the increasingly ubiquitous nature of these VGI mapping practices, which embody a series of complicated self-expressions and porous boundaries between multiple subjectivities in spatial knowledge production and politics.

Zook and Graham (2007) examine the hybridization of the digital and the material in "daily lived geographies" (p.1323) through the notion of "DigiPlace," which is useful for exploring VGI practices and their implications for spatial knowledge production and representation. The authors argue that the algorithms embedded in and data used by Google Maps and Google Earth can significantly influence how

physical places are perceived and used. Recognizing that DigiPlace also shares the power of physical maps in shaping interactions and experiences with place, the authors suggest three important new characteristics of DigiPlace. First, *visibility* in DigiPlace is *automatically* produced and filtered by code dependent on an entity's online presence. Second, DigiPlace is highly *individualized* and defies static representations. Third, DigiPlace significantly increases the *dynamism* of digital cartographic visualization and is constantly evolving. The construction of DigiPlace thus points to the increasing blend of code and place. It is crucial to recognize that there are variable contexts and abilities implicated in creating the spaces of DigiPlace. Each user interacts differently with the different contexts, and these interactions in turn influence their cognition of physical places (ibid).

6.2.3 Mode of Information and Spatial Narratives

Employing a poststructuralist perspective, Poster (1990) seeks to analyze the intersections between the historical emergence of a decentered subject and the massive changes in new communications systems through the notion of "the mode of information." Poster designates three stages in the mode of information: face-to-face, orally mediated exchange, characterized by symbolic correspondences; written exchange, characterized by the representation of signs; and electronically mediated exchange, characterized by informational simulations. Each stage constitutes a particular form of subjectivity. In the oral stage, the self is constituted as a position of enunciation through its embeddedness in a totality of face-to-face relations. In the print stage, the self is constructed as an agent centered in rational/imaginary autonomy. In the electronic stage, the self is decentered, dispersed, and multiplied in continuous instability (ibid). These stages are not sequential but coterminous in the present. He further points out that electronically mediated exchange enables increased distance between addresser and addressee, which "allows a reconfiguration of the relation between emitter and receiver, between the message and its context, between the receiver/subject and representations of him or herself" (Poster 1990, p.14). Such configurations in turn influence and transform social relations among different institutions, communities, and individuals. Without doubt, many modern institutions and practices still dominate social space. Yet Poster maintains that the mode of information is an emergent phenomenon that affects small but important aspects of everyday life (ibid).

In particular, with the advent of the Internet, subject constitution occurs through the mechanism of *interactivity*. These interactive communications lead to the formation of "virtual community" and networks of social relations with characteristics that are new when compared to historical constructions of community. First, this form of electronic communication is associated with a certain fluidity of identity. Second, virtual and real communities *mirror* and *constitute* each other, such that participants code "virtual" reality through categories of "normal" reality (ibid, pp.191–192, emphasis added). Poster suggests that new media provide hopeful possibilities for resistance to modernity through complications of subjecthood that denaturalize the process of subject formation and put into question the interiority of the subject and

its coherence. However, these possibilities are not guaranteed by the diffusion of new media communication technologies. Indeed, information technologies can just as well provide totalitarian control rather than the decentralized, multiple "little narrativity" of postmodern culture (ibid, p.198).

As such, in resonance with Kingsbury and Jones's (2009) argument for a Dionysian view of Google Earth, the notion of the mode of information extends beyond the dualism of fear-hope that is so often taken up when one views electronic communications. Moreover, this notion "mode of information" stresses the role of multiple forms of media in shaping subjectivities and social relations, which I argue is an important addition for the discussion of VGI and PPGIS practices.

Media has indeed been considered to play an important role in knowledge production (Flew and Liu 2011). In particular, Habermas's (1989) notion of the "public sphere" characterized by dialogic conversations and facilitated by the mass media has been an important lens for understanding the emergence of liberal-capitalist institutions in Europe (Flew and Liu 2011). Recently, how public spheres and civic engagement have been shaped and constituted by Internet communications has been widely debated. A number of writers have discussed the potential of enabling a virtual public sphere (e.g., Rheingold 1994; Poster 1997). On the other hand, some have argued that the Internet mainly reinforces preexisting social relations between the state and society (e.g., Drezner 2005). Still some others have acknowledged the complex mixture of control and liberation tendencies of the Internet (e.g., Warf 2011). Meanwhile, geographers have examined GIS through the perspective of viewing it as a form of media (e.g., Sui and Goodchild 2003). Nonetheless, how the new media and VGI might have shaped subject formation and in turn impacted the meaning of political community and civic engagement has not been investigated, which this chapter seeks to explore through the case of China. In particular, it is important to take into account a broader context of Chinese citizenship in transition when investigating VGI and public participation in China.

6.3   Dynamics of Chinese Citizenship

Citizenship here refers to "a range of legal, political, social, and economic links between the state and members of society" (Goldman and Perry 2002, p. 3). In particular, citizenship is viewed as an instituted process (Woo 2002), which is fragmented, constantly formed and negotiated, and disrupted at multiple sites (Staeheli 2010). In the Maoist era (1949–1976), the notion of citizenship was filled with the rhetoric of class struggle, collectivism, and altruism, becoming "cultural templates for a Chinese 'socialist' subjectivity" (Keane 2001, p.3). In this discourse, individual rights are viewed as economic, social, and cultural benefits (Keane 2001). The view that framed rights as concessions rather than as entitlements has undergone some modifications in the post-Mao era (Goldman and Perry 2002). Keane (2001) observes that during the 1990s, economic governance (effective at mobilization of the individual) has superseded nationalism (characterized by mass mobilization) as

the major mechanism of social organization. Certain groups of intellectuals have begun to think of citizenship as the assertion of political and civil rights. Concrete actions in lawsuits, village elections, and entrepreneurial organizations have also been taken to exercise and expand these rights (Goldman and Perry 2002).

Meanwhile, the past decade also saw the state's increasing interests in constructing e-governance in China (Lin 2008). The stated goals of these state programs include facilitating e-commerce and increasing citizen participation. While many have argued that the latter may largely remain on paper (Lin and Ghose 2010), the e-governance discourse has fueled the state's efforts in building infrastructures for digital communications. Also, the economic reforms have significantly transformed China's media landscape, which has stimulated the need for the assessment of public opinion on issues that are directly related to the reform process. As such, the past decade witnessed a change of the role of public opinion in national policymaking that may go beyond state control (Yang 2009).

Most recently, observers argue that with the rapid growth of Internet users in China, the Internet has played a much bigger role for public opinion discussions (Gao 2009; Tai 2006), as the state remains tight control over the mass media (Yang 2009). No doubt that the Internet has been heavily regulated and censored in China (Yang 2009; MacKinnon 2010). However, as Yang (2009, p.45) notes, "[a]s power seeks domination, it incurs resistance." Many Chinese netizens have learned to use a range of strategies and technologies, such as using alternative proxies or VPN (virtual private network) services to circumvent the Internet censorship (MacKinnon 2010). China had 485 million Internet users in June 2011 (CNNIC 2011), rising from 22.5 million in 2000. The mobile telephone has become an important device for Internet access. However, there remain significant inequalities between urban regions and rural areas (CNNIC 2011; Michael and Zhou 2010). The Internet has transformed the arena of public opinion in Chinese society in at least three ways. First, it creates a new platform for Chinese Internet users to express their opinions online on many issues. Second, it generates "a steady, core cohort of opinion leaders" that constantly guides public opinion in cyberspace. Third, it allows an increasing number of Chinese Internet users to be exposed to other net users' opinions (Tai 2006, p.188). Associated with these transformations is greater awareness of individual rights and strong contestations against hegemonic and authoritarian governance (Yang 2009).

The changing citizenship can be reflected in various forms, including active online activism in China in the past decade (Yang 2009; Tai 2006).[2] Another such form is the phrase "onlookers to change China," which emerged in 2010. This phrase first appeared in an editorial opinion in Southern Weekend (Xiao 2010), known as a

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[2] Despite China's increasingly sophisticated censorship system, a number of studies contend that Chinese Internet users have engaged in numerous forms of activism (Yang 2009; Tai 2006). In this way, dynamic communities have emerged that can be mobilized by the Internet to act in various issues, such as mobilizing the public for environmental protection by Web-based environmental volunteer groups (Yang 2003) and organizing workers' strikes through the Internet and mobile technologies (Qiu 2009).

liberal newspaper in China. This editorial was widely cited, and the phrase "onlookers to change China" was then picked up quickly by many Chinese netizens.[3] Hu (2011) describes this as the "surrounding gaze," illustrating its historical root in modern Chinese literature and culture and its new meanings in the information age. The surrounding gaze from the "crowd" exerts strong pressure on those being watched. In particular, the recent emergence of social networking websites such as microblog sites (e.g., www.weibo.com) has been acknowledged to attract a much wider audience for hot topic discussions. The onlookers' gaze often takes the digital form of online posts regarding particular social issues that are then forwarded to circulate information widely on social networking sites and blogs. This form of participation may represent one of the bottom levels of citizen participation depicted by Arnstein (1969). But in some respects, the usage of these Internet sites can construct multiple DigiPlaces and, in some cases, form a multitude of public spheres. This evolving hybrid digital citizenship has important imprints on the emerging VGI practices in China, which are discussed below. The empirical investigation is built on document analysis and personal interviews with VGI practitioners by the author.

6.4 VGI Practices in China

On January 15, 2009, Ogle Earth posted an article that asked, "Is China opening up to neogeography?" (http://www.ogleearth.com/2009/01/is_china_openin.html). This post responded to the news that China has started to build up a Chinese version of "Google Earth." It pointed out an important issue regarding state control over spatial resources as well as the Internet censorship constraining the possibilities of VGI practices in China, despite a more open and relaxed attitude by China's leadership when it comes to mapping tools. Nonetheless, this article does not address the non-state practices in online mapping and geographic knowledge production. There have been active grass-roots efforts in generating VGI on a variety of issues including environmental protection, crisis mapping, and political contestation and resistance in China (Lin 2010). In the following, I discuss three examples of such participatory VGI practices to show in what ways VGI can reconfigure and create spaces of civic participation in China.

6.4.1 Map of Relief Support and Needs in the Sichuan Earthquake

One example of these practices is a Google Maps mashup map created on May 17, 2008, after the May 12 earthquake in Sichuan (Fig. 6.1). One creator of this map noted that the reason to create this map was that, previously, it was too complicated

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[3] For example, a search of this editorial opinion from Google site in China (www.google.com.hk) returned 328,000 results on July 31, 2011. The number of results increased to 648,000 on October 29, 2011.

Fig. 6.1 The map of relief support and needs in Sichuan earthquake (retrieved May 21, 2008)

to show such information in tabular form (Ding,[4] April 2010, personal communication). There were around 23 volunteers to help update this map (ibid). A post to announce the creation of this map and call for volunteers to submit any related data regarding the relief efforts was posted on Douban (www.douban.com), a popular social networking site in China. This post provided links to detailed instructions of how to make contributions to the map. In particular, a specific format of map data submission was identified as follows: location, time, verification (yes/no), and content. Information shown on the map eventually was from two major sources: one was the collection by volunteers from radio and TV reports and nongovernmental organizations on site, while the other was from the data directly announced by the government.

Ding has a background in human-computer interactions, and he considered using an IBM open-source package. But eventually, Google Maps was chosen, as "it was convenient and very user-friendly" (Ding, April 2010, personal communication). Ding noted that engineers from Google also collaborated in this project at a later stage. The left part of the map site provides information on the symbols used and a note on the sequence of the listed items. There are eight symbols, of which red exclamation marks are for trapped people, bottles and apples for water and food, green triangles for tents, baskets for a variety of other materials, trucks for vehicles, wrenches for engineers, and flags for volunteers. While the specific process of selecting these symbols is unknown, this use of symbology is more sophisticated than the two other examples.

There were 82,539 hits within a week after this map's creation, and it soon reached a million hits. Moreover, some NGOs on the site of disaster also used this

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[4] Pseudonyms are used for the interviewees.

Fig. 6.2 Map of violent evictions (retrieved January 19, 2012)

map to assist their relief efforts (Ding, April 2010, personal communication). It is also notable that this is a project that involved a large number of people in a very short period of time. As noted by Ding, this scale and the level of collaboration and coordination reflected in this map was quite rare at the time: "It is a range of different factors together that contributed to this map. The impact of this earthquake is really astonishing" (ibid).

Indeed, this Sichuan earthquake relief efforts map in part represents the outpouring of volunteer efforts in the aftermath of this earthquake. Meanwhile, this map has paralleled with the Hurricane Katrina map (Miller 2006), the crisis mapping of Haiti's earthquake in 2010, and many other crisis mapping activities around the world. While crisis mapping efforts have continued to evolve and grow worldwide, such crisis mapping efforts in China, based on evidence at hand, have not evolved into the relatively more stable mapping community noted in Meier (2011). Nonetheless, this Sichuan map marks one of the earliest efforts of relatively large scale collaborations of VGI provision in China. A most recent example of such a scale of collaboration is a map on violent evictions in China, which was generated in October 2010 and subsequently drew significant attention from the mainstream media (Fig. 6.2). Part of the goal of the violent eviction map is to dissuade people from purchasing houses connected to such evictions.

6.4.2 Map of China's Mining Accidents

The second example is a map titled "Map of China's Mining Accidents in 2010" (Fig. 6.3), created by Wang. This map is an example of mapping by an individual to address a particular social issue in China. The mapping was derived from Wang's

Fig. 6.3   Map of China's mining accidents in 2010 (retrieved January 19, 2012)

strong concern about the mining accidents in China. Wang created a mashup for each mining accident reported in the news. The major information in the description of each mashup includes the following fields: time of accident, location, cause, casualty, and media report source. Each color of the mashup indicates a particular range of casualties, with purple representing more than 20 deaths, red 10–20 deaths, green 5–10 deaths, and blue below 5.[5] The VGI author noted that, technically, it was easy for him to create a map like this. However, it was quite time consuming, especially in the beginning of this process. He read news during the daytime and usually searched related news when he had some spare time in the evening to see if any reported mining accident might have been missed. Another time-consuming issue is that sometimes it was difficult to obtain accurate coordinates using the address reported in the news. He noted that when Google Maps was zoomed in to the county level in China, it was in some cases hard to pin down the accurate location of a village or a county.

Wang first posted this map on his blogs in mid-January and kept updating his map to cover the accidents reported in 2010. He also posted a link on Twitter. The map soon received a significant number of hits after its creation. "Just a few days, there were about thousands of views" (Wang, July 2010, personal communication). Many viewers left comments responding to his blog posts or replied to his Twitter posts. Many were shocked to see the number of mining accidents and associated casualties; some thanked the VGI author for making this map. There were also a few errors that were pointed out by his Twitter followers (he had around 7,000 Twitter

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[5] Initially, this map used only one color for the symbols, along with description of the number of deaths in the pop-up window of each mashup. During my interview with the VGI author, I noted the possibility of using different colors to indicate different classes of values. This map in turn adopted the current set of legend.

Fig. 6.4 Map of sale/lease ratio (retrieved January 19, 2012)

followers at the time of this mapping practice). "Mostly they were shocked… [They said that the accidents were] as thick as huckleberries [in the map]" (ibid).

When Wang started to make this map, he had already created several similar maps in the recent past. His experience of creating Google Maps mashup maps can be traced back to the first one he made on impacts of environmental pollution in June 2009. In particular, the issue of "cancer villages" due to severe environmental pollution was first reported by *Phoenix Weekly*, a Hong Kong-based news magazine, and a Twitter user posted a tweet calling for a map on these villages. Wang volunteered to make the map. Since then, he made a few more maps, including one map for Greenpeace on water quality issues and another one on lead poisoning in China.

Wang noted that this way of mapping was meant to record ongoing events, especially problems that have emerged in the process of China's economic development. "It is something like my personal documentation of the history… While the sources are from the official reports, they won't compile such information in this way and provide it to the public" (Wang, July 2010, personal communication). As such, this map, along with other Google Maps applications he created, provides an important representation of his concerns about social problems. These online maps are the VGI author's spatial narratives. They were disseminated quickly through some major social networking sites, especially Twitter in this case.

6.4.3   Map of Sale/Rent Ratio

The third example is a map of the ratio of sale to lease price to illustrate the high housing price in urban China, which was created using unofficial data through crowdsourcing (Fig. 6.4). In this Google Maps representation, first created on February 26, 2010, there are five ranges of values for a point symbology. If the ratio

is below 20 to 1, it is marked as green, 20–30 to 1 as blue, 30–40 to 1 as purple, 40–50 to 1 as yellow, and above 50 to 1 as red.

Liang, the author of this map, is a photographer whose work has long focused on urban life and urbanization in China. He also used his blog and Twitter to broadcast this project. In one of his tweets on February 26, 2010, he wrote:

> Continue my survey of the ratio of sale to lease price in China on Twitter. I use google spreadsheets (you need to hop over the wall to see them) to collect data. The web address for data submission is […]. All materials collected will be integrated into a google map [map link…] All data are open to the public, @(another Twitter user) helps to tweet on this. (translation by author)

In another tweet soon followed, he noted:

> Continue to use Twitter to collect the information of the ratio of sale to lease price. I don't seek to gain comprehensive information; rather, I'm interested in knowing a handful of relevant information. It is the Twitter friends that make up the statistics bureau. Twitter friends from Hong Kong and Taiwan are welcome to participate. The web address [for the survey] is […] (you need to hop over the wall to see this); the web address for the result summary is […]. (translation by author)

These tweets are quite telling, not only in terms of how Liang collected the data, but in their use of metaphors that capture how Liang constructed the map. First, it is apparent that Liang used a range of available online venues to collect information to address a particular issue, which can be seen as a type of crowdsourcing. When asked later how he could ensure the quality of the submitted data, Liang said that he knew there would be lots of random information submitted and that he would judge the quality by himself. If there was something that was too ridiculous, he would not use that data (Liang, August 2010, personal communication). Second, there were several metaphors employed, such as the term "wall," which referred to a firewall installed by the state for Internet censorship. In particular, the term "Twitter friends" referred generally to a broad range of Twitter users, known and unknown to Liang. This term is also frequently used by other Twitter users in China. Because Twitter is blocked in China, it is recognized that discussions on Twitter by Chinese users are often more political compared to those of other users elsewhere. In this sense, these Chinese Twitter users form certain political communities on Twitter, which are fluid and have constantly changing boundaries. It is not uncommon to see online comments on many hotly debated social issues like "Twitter sightseeing group come here to witness this issue," requesting onlookers to show their concern. Third, the purpose of conducting this survey and making this map, as noted by Liang, is due to the lack of trust of the official data and an attempt to depict the pressure of urban life by the citizens themselves. As such, this map allows spatial narratives that represent resistance to the state, not only speaking against the official data source, but also questioning the burden citizens bear in the process of China's rapid urbanization (seen often to be stimulated by state-led land speculation).

This map was once open to the public for edits. However, there were some lines added such as lines between two random locations with a note suggesting how to get from one location to the other. In addition, the title of the map was changed to "Far East Map." These edits were noticed during the time of my fieldwork from July to August 2010. Liang was surprised to see these abovementioned edits, which

were obviously not related to the original theme of this map (Liang, August 2010, personal communication). Upon the most recent visit of this map's site, this map receives more than 53,000 hits and is not available for public editing, with the latest update marked on September 14, 2010. As such, this is at least an 8-month project with 64 records collected. It is not the first VGI map made by Liang. His first map was on locations of his exhibits, after which he made a few maps including one on a tour of photographing Chinese county governments' main office buildings, which involved 23 counties from 11 provinces. Explaining why he made these maps, Liang noted, "First, it's fun. Second, it's useful." Liang further described that mapping in this way was like "writing diaries on the map" (Liang, August 2010, personal communication).

In sum, there are several characteristics of these VGI constructions in the process of data collection and delivery, representation, and analysis. First, these maps are usually initiated by individuals, which may evolve into a collaborative project, remain an individual commitment, or continue as a dynamic mix of these two. Moreover, these VGI authors are quite savvy in using a variety of online venues to circulate their maps. In particular, social networking sites play an important role. Second, because of the topics covered in these VGI constructions, accuracy of locations does not seem to be a dominant concern in the mapping processes. The cartographic design may also be rudimentary. Yet the mapping is not a static process, and the authors may learn from their past experiences, reflected in the second example regarding the change of its legend. Third, the purposes behind these mapping constructions and associated analyses vary, ranging from personal interest in documenting daily practices to addressing broader social issues. Therefore, such VGI constructions engage participants from different backgrounds, each construction forming a loose and constantly changing community engaged in the use and development of these maps. However, the VGI authors being interviewed in this project (with a total number of 12 at the time of this writing) are all men, mostly in their 30s, who have used the Internet intensively.

Furthermore, the acknowledgment of "personal documentation of the history" and "writing diaries on the map" indicates that these mapping practices provide important spatial narratives for these VGI authors. That the attention to social and political issues through VGI mapping represents a gaze from the participants and map viewers underscored changing citizenship in China with greater awareness of political rights that are exercised and negotiated through contestations of and resistances to dominant state power. A VGI author may have more than one map created. As such, a VGI practitioner may navigate from a map of interested places to a map of environmental pollution sites in China, traversing the boundaries between private and public, personal and political. These practices act as a "mode of information" (Poster 1990) mediated by Web 2.0 and geospatial technologies, and they construct multiple DigiPlaces (Zook and Graham 2007) that are hybrid, interactive, and mobile. They can be seen as a form of micro-politics, which can be described as "organizing without organization" (Hu 2011).

Meanwhile, with these forms of dynamic inclusion addressed above, there are new forms of exclusion. First, while there has been a significant increase of the number of

netizens in China in the past decade, the issue of a digital divide remains a significant challenge, especially among the urban users and rural ones (e.g., Michael and Zhou 2010). Second, the examples cited here suggest that active VGI authors are overwhelmingly young and male, with a great deal of experience using the Internet. More research is needed on the demographic underpinnings regarding VGI practices.

6.5 Conclusion

While this case study by no means depicts the whole picture of VGI practices in China, the above analysis shows that a synthesized theoretical framework from PPGIS, critical GIS, and critical social theory helps to understand complex mapping practices and their sociopolitical implications situated in different contexts. VGI practices in China discussed here simultaneously share some traits with, and differ from, existing VGI practices in the West regarding spatial knowledge production and meanings of community, participation, and civic engagement. In particular, these VGI practices share the major characteristics of DigiPlaces, marked by increasing individualism, dynamism, and digitally generated visibility (Zook and Graham 2007). As shown in the above VGI examples, these online, interactive mapping practices are usually initiated by individuals. Subsequent mapping may be conducted by a singular individual or by a larger group of volunteers. These visualizations are usually prompted by these VGI authors' concerns for particular issues, rather than proposed from a particular organizational agenda. These mapping constructions evolve over time. As such, these VGI visualizations are highly dynamic.

These VGI practices create new participatory spaces but also new exclusions. Through these mapping practices and constructions of DigiPlaces, new participatory spaces are produced, transcending the virtual and the physical in a complex and nuanced way. The specific goals of setting up these maps may vary greatly depending on their particular content. Yet these practices all strive to utilize the power of visualization to broadcast a particular concern to a broader audience and to send a political message with these visualizations. These mapping platforms therefore provide new spaces for the VGI authors to express such concerns. These concerns are shared by a larger community, evident in relatively high total counts of hits for these VGI products. These practices do not stay digital only. Rather, they are actively constructed and reconstructed with actions in non-digital spaces, such as the relief efforts in the first example, or the violent eviction map attempting to persuade people from purchasing houses with history of evictions. It is difficult to measure the actual extent of impacts of such mapping in mobilizing a broader community. Nonetheless, such seemingly mundane actions of documenting, watching, and monitoring through visualization, which can be disseminated quite widely, are indicative of an important form of participation and engagement from the bottom and grassroots in China. On the other hand, multiple levels of exclusion emerge in these processes. Such mapping practices require little formal training in cartography or GIS. However, they still require a certain level of familiarity with the tool and with the online mapping

interface, as well as a certain level of time commitment on top of the existing digital divide regarding Internet access.

Moreover, the boundaries and composition of the "community" involved in these VGI practices have been influenced by the dynamic interplay between Web 2.0 technologies and political and social landscapes in China. On the one hand, these VGI practices change the traditional power relations of spatial data provision and representation, resulting in patchworks of spatial data provision (Goodchild 2008). Yet such spatial data productions in China might embody an additional, if not different, layer of political meanings when compared to other VGI practices such as OpenStreetMap. These multiple patchworks of spatial data productions in China constitute micro-power and a way of organizing without organization. In an environment of strong state control characterized by hegemony, such mapping practices by these "onlookers" are informed by and intersected with a changing citizenship identity that is also influenced by a mode of information (Poster 1990). To borrow James Scott's term, this mode of participation can be seen as a "weapon of the weak" (Scott 1987). In addition, these participatory VGI practices are also intersected with the entertaining side of mapping and playfulness of spatial narratives, constituting a mixture of the Apollonian and the Dionysian dimensions of politics. On the other hand, these participatory efforts are intersected by lines of class, age, and gender in the shifting social fabric in China in the context of urbanization and globalization.

More broadly, the dynamics of sociopolitical contexts in China that have shaped China's VGI practices might differ greatly from other societal contexts. But the complexities of DigiPlaces construction, intersected with Web 2.0 technologies, share some important traits with instances in the West, as noted above; these include increasing engagements at the individual level, exemplified in these VGI practices. If Habermas is right about the impact of mass communication media, which made the reception of media products a form of privatized appropriation, and in turn shaped the construction of public spheres and citizen participation (Thompson 1995), then what does it mean that through the new media of the Internet, and Web 2.0 in particular, spatial narratives constantly merge private traits into publicly available platforms and individual bodies into networks? How can these various modes of information come into play in constituting spatial knowledge production and civic engagement? It is through this perspective that perhaps PPGIS and VGI are deeply intertwined with respect to implications for spatial politics and, consequently, possible forms of technology-, data-, and media-mediated public participation in the so-called information age.

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