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Spatial Knowledge Management in Water Governance in Guarulhos, Brazil: Some Challenges and Lessons

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Three dominant discourses - water as an economic good, water as a social good, and water as a socio-environmental good - have set the water governance debate and struggles around the world. Depending on the specific geographic region, environmental conditions, and actors involved (public sector, private sector, academia, and civil society at large) and their coalitions, one of these discourses becomes more prominent in setting decisions and rights regarding water governance. A key component in framing, shaping, and legitimizing these discourses is knowledge management, including production, exchange, and utilization of knowledge. Due to the geographical nature of water issues combining environmental and socioeconomic dimensions, spatial knowledge and spatial knowledge management (SKM) become even more important in water governance.

The processes for producing, exchanging, and utilizing SKM relate to important debates such as the ones on the types of knowledge, substantive content or issues addressed, which actors and/or networks are involved (or excluded), ownership, power relations, and formats and platforms for better communication and dissemination to various audiences. The general assumption is that spatial knowledge, particularly if developed under a participatory mode, has the potential to inform policy, increase accountability, and promote social inclusion. Although this could be seen as a window of opportunity for improving water governance, there have been several challenges to incorporate SKM into working processes, trigger better dialogue among stakeholders, and improve policy design and implementation.

The experience of the city of Guarulhos, Brazil, highlights important accomplishments and some recurrent challenges regarding SKM and water governance. We look at three initiatives in the municipality: Water Basin Committee (CB), Municipal Geo Platform (GC) connected to planning and information technology (IT), and Participatory Budgeting (OP).

Guarulhos - City, Water Basin, and Municipal Administration

With 1.2 million inhabitants (2010) and a US$ 16.2 billion (2010) gross domestic product (GDP), Guarulhos is the second largest city in the state of Sao Paulo state its economy is placed as the 9th in the country. Guarulhos is part of the Sao Paulo Metropolitan Region (SPMR) with 19.7 million inhabitants and a GDP of US$ 305 billion. Due to its strategic location and transportation network, Guarulhos is high ranked within the state and national economy. Since the 1910s it has been characterized by an industrial park and has increasingly distinguished itself as an important logistic center. Guarulhos hosts the largest airport in

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the country and is cut by important highways connecting Sao Paulo to other states and regions. Despite its dynamism, Guarulhos remains very dependent on the city of Sao Paulo.

In relation to water governance, Guarulhos is part of the Alto Tiete Watershed Basin (Figure 1) drained by the Tiete river and its tributaries, with an overall area of 5,868 km^2 and a population of 21 million people, most of them living in urban agglomerations. As an outcome of the broader democratization process in the early 1980s, in Brazil water governance is formally structured by federal and state laws around water basin committee/sub-committees, as a means to bring together an environmentally-sound approach and a more local perspective with multiple actors participation. Due to the territorial extension, the socio-environmental diversity, and the complexity of issues and challenges for monitoring and managing the whole Alto Tiete Watershed Basin, this basin was subdivided into five subcommittees. One of such sub-committees is the Tiete-Cabeceiras (1,694 km^2), including nine municipalities, one of them Guarulhos. Those committees/sub-committees, including representatives from the public sector (state and municipalities), private sector and civil society at large (NGOs, social movement, professional associations) are one of the most important forums for participation, discussion and, to a certain extent, deliberation on water-related issues. Decisions and responsibilities on drinking water and sanitation at the municipal level are, to a great extent, dependent on the river basin level.

Since 2001, Guarulhos municipality has been governed by the Workers´ Party (PT), a center-left party that displaced center/center-right oligarchies in the city. PT´s agenda in Guarulhos has been strongly committed to social inclusion, citizen participation and accountability, including fighting corruption and transparency. This agenda brought a new vision to the city, seeing the city as a whole and giving more attention and voice to neglected areas. As a general rule, historically, those neglected areas are poorly covered

Figure 1: Alto Tiete Watershed and its Sub-watersheds
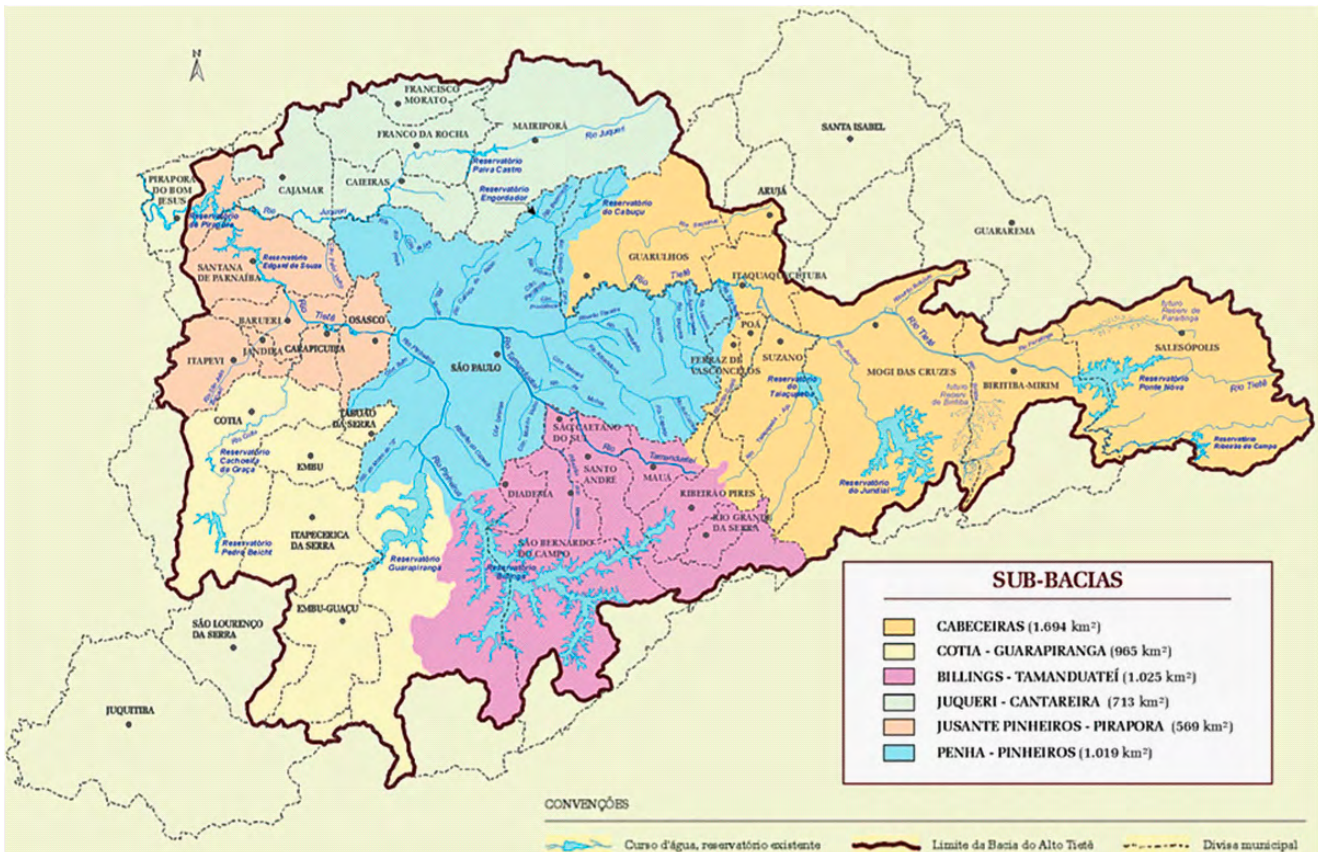
Source: 2002 Alto do Tiete Watershed Master Plan

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by public services, facilities and infrastructure, requiring more investments. This also holds for public water service and sanitation.

Spatial Knowledge Management Initiatives and Water Governance

In regards to SKM in water governance, four building blocks are needed: 1) spatialized information at various scales; 2) expert knowledge; 3) citizen knowledge; and 4) participation of citizens. Despite the advances in SKM in Guarulhos during the last two decades have been made, much is still needed. To highlight some challenges and lessons on SKM in water governance, we look at three initiatives in urban governance that have been supported by the local administration in Guarulhos: Water Basin Committee (CB), Municipal Geo Platform (GC), and the Participatory Budgeting (OP). We focus on what they provide, how they are linked (or not), and what they could learn from each other in building SKM in water governance. Three issues are examined: a) scale of analysis; b) types of knowledge, and c) actors and target audiences.

In regards to scale, the CB operates in an area including nine municipalities that is recognized as a legitimate unit for water governance, but not necessarily seen for other issues affecting the same group of municipalities. Boundaries adopted by other state departments do not coincide with water basin boundaries, representing a challenge for integrated management. But even if those boundaries were the same, managing nine municipalities rather than a single municipality necessarily means operating in a broader scale and less attention to details.

GC and OP operate at a finer scale, the municipality, but their approaches are quite different. The difference lies in the distinctive lenses through which each of these initiatives perceives the city. Planning/GC works at a broader scale and deals with the big processes underway. Even when zooming in, their scale of analysis is likely to stop at the nine regional planning units in which the municipality is subdivided. In contrast, OP is rooted in local participation and direct connections to citizens and works at a much finer scale. Guarulhos has been subdivided into 21 OP units, which is a territorial unit with several neighborhoods sharing common features or identity. Every second year, plenary sessions for the OP consultation process are organized in each of these units and include three major tasks: 1) reporting by the mayor and secretariat on accomplishments; 2) citizen open microphone for presenting investment proposals; and 3) voting on proposals and the OP unit representatives for the municipal OP council. OP officials interact with representatives of neighborhood associations, which in general have an even narrower territorial approach than the OP units and are very much concerned about very localized issues. For addressing scale issues in water basin governance, OP offers lessons on what can be gained from an explicit local approach and GC provides a middle-range view as it focuses on the municipality.

SKM (including spatial data production) related to water governance broadly speaking is a problem in Guarulhos. A recurrent complain at the CB is the lack of data and time series in general but even more at a scale that is adequate for local planning. This includes biophysical data (e.g. geology, hydrology, water pollution, etc.) as well as socioeconomic data (e.g. land use, urban expansion, etc.). This problem is even worse as water is to a large extent an issue not directly dealt by GC and OP in their working routines. The GC platform (see below) has very limited data and spatial data layers on water-related issues. Also, even if several neighborhoods in the periphery are exposed to water scarcity and flood risk, these issues do not emerge as demands for action and investments during the OP plenary sections (see below). Creating GIS data on water-related issues in the GC platform and integrating a dialogue on water in the PB sounds like a win-win situation for producing essential knowledge and integrating efforts and visions for water governance.

In regards to types of data, for the water basin (CB) and urban planning (CG), they have been structured and are based on expert and codified knowledge. Contextual-embedded knowledge such as sectoral information provided by professionals has also been part of

the mix. For the OP office, the picture is quite the opposite. Among the municipal departments, the OP is the one that most directly deals with various forms of community-based, social, political, and network levels of contextual-embedded knowledge.

CB does not have a data production unit but takes advantage of what is produced at the state and municipal level. In the case of Guarulhos, geospatial data production goes back to the mid 1990s, but really took off in 2004 when the Geographic Information System (GIS) division became part of the Department for Information Systems and Telecommunication, directly connected to the Mayor's Cabinet. The department became responsible for developing and implementing a geospatial infrastructure (data, tools, and protocols) for the municipality. Within this new framework, the WebGeo portal was launched in 2006 and since 2012 the Municipal Geo Platform (GeoCorporativo, GC), a comprehensive municipal-based information database to inform planning and policies, is being developed. The basic goals of this platform are to: 1) create a secure data environment; 2) minimize efforts and maximize results with data production; 3) improve data quality; 4) provide added-value geospatial products (maps, indicators, metrics); and 5) maintain an up-to-date municipal data warehouse. In general, the private sector has played a minor role in spatial data production in Guarulhos. Federal public data (e.g. demographic census, socioeconomic indicators) and local data provided by the municipality have been the major sources of data for the GC platform.

OP was incorporated into the Guarulhos municipal agenda in 2001 when the PT took office and since then, it has been an important tool for city development and management. The OP office mandate is to democratize municipal management with regards to setting priorities, allocating resources, and building co-management practices ensuring accountability and transparency. The OP mandate is fulfilled basically through citizen participation, which occurs predominantly through the plenary sections in each OP unit, OP municipal board, and long-term citizen education. Over the years, the municipality has closely worked with an independent grassroots educational center promoting citizen education through short-term training in various fields, neighborhood workshops, and community fieldwork days. These activities promote better understanding of the city at large and municipal administration routines and processes and are structured around contextual-embedded knowledge closer to less educated citizens.

Finally, actors and target audiences for the three initiatives are quite different, which pose some challenges for building synergies. The main actors in urban planning/GC are individuals with high levels of education and in several cases combining their work as public officials with teaching appointments in private university and training institutes in the region and consultancy for other center-left wing municipal administrations. Geo-referenced data/information production is known to be quite specialized, particularly if expected to meet scientific quality standards and be fully integrated into complex systems. Professionals in this field are in general more prepared and trained to work with other professionals, secondary data, and in-company environments, rather than with primary data collection and extensive field activity with a variety of protocols, informed consent forms, and interviews of various actors. This is also pretty much the case for the CB, as it has a wide representation of professionals from various fields. Community and social movement members have a sit on committees but are not as active as one would expect. Research on water basin committees has shown that differences in technical expertise, knowledge and codified language among committee members is much more discriminating than economic and political power. Also, the target audience for planning boards and water basin committees are high-level public bureaucracies and professionals chambers. Those expert groups have their specific jargon, analytical categories and communication codes, including abstract and codified knowledge.

The picture is quite the opposite for OP. Although quite knowledgeable and wise, many professionals working for the OP department have no higher education having gained their professional knowledge and expertise through life and on-the-job training. A significant proportion of professionals, if not all, have a social movement background, having been

(and in many cases still are) social activists in areas such as labor unions, education, and health. For those professionals, direct contact with constituencies, community plenary, and open forums are privileged means for knowledge and data production. For the audience, OP audience is external to the official municipal body formed by ordinary citizens with limited and, in many cases, almost no formal education. Geospatial and information technology requires some technical expertise that is not directly transferable and captured by lay audiences. It is interesting to note that the OP department has no GIS personnel, although it has a rich collection of community maps and sketches developed throughout the hundreds of community meetings and workshops it has conducted over the years. Not having GIS incorporated into the working environment and routine is not just a technical matter. It is also an issue involving the whole philosophy rooted in participatory process with face-to-face interaction, tacit knowledge, and spoken language.

Conclusions

Water-related issues and their governance is a complex matter. SKM has the potential to play an important role in paving the road for generating knowledge and informing policy. However, making SKM really integrated into daily routines or shaping administrative processes remains a challenge. An important dimension for an integrative approach is scale. Geographic units really matter and depending on the scale used, assessment and outcomes can be quite different. It is not surprising that so much contestation emerges around defining scale, unit of analysis, and boundaries, including spatial knowledge management (SKM). In the case of Guarulhos, the fact that CB, GC and OP operate at different scales and have different spatial perspectives is problematic, although not impossible to become integrated.

The OP has developed a process for bringing tacit and community-based knowledge into the forefront. This data is less codified and organized in a much less structured manner with defined protocols. Formatting and translating this type of knowledge in order to incorporate it into codified analytical knowledge platforms can become quite challenging, particularly if not planned from the outset. Also, OP has been successful in bringing technical departments to directly interact with citizens and translate technical jargon of projects under development to ordinary language accessible to less educated groups. This double move has improved communication among stakeholders as well as stimulated citizens and public officials to become more aware of different visions. Learning from the OP experience could inform CB and GC and be applicable for knowledge production and enlarging the conversation.

The CG initiative in Guarulhos has made significant progress in developing a local spatial knowledge platform covering various issues and topics. This type of abstract and codified knowledge is needed for water governance and having a more local and detailed look would be very useful for CB that operates in a larger area. Also, GC has accumulated lessons on its journey with ups and downs in establishing and improving dialogue across fields, sectors and departments, which could be applicable for CB. The caveat is that the GC platform would need to invest in water-related data explicitly and the OP in integrating a dialogue on water.

All this said, the case of Guarulhos on SKM in water governance examined through the three initiatives - CB, GC, and OP - shows that: 1) progress on water governance, even when intentional and explicit, takes time to mature; 2) integrative thinking, geographically and substantively speaking, is a difficult puzzle; 3) successful experiences in bridging knowledge gaps and bringing various audiences to engage in meaningful conversations around knowledge production in water issues is challenging; 4) these challenges hold true even when organizations and actors are very willing to experiment with more participatory processes. In a nutshell, a great deal of effort is needed to implement mechanisms and put structures in place for making SKM more widely used and an effective tool for water governance, including building a common platform and knowledge base for dialogue, exchange, and learning. This has to be seen as a process, and not as an outcome.