Cartographic Enclosure and Urban Cadastral Mapping in the Ethiopian Somali Capital

Rony Emmenegger, University of Basel (August 2020). Paper accepted by Cartographica

Abstract: Cadastral maps, which are designed as comprehensive systems for recording and surveying land relations, are critical for making society legible and governable. However, critical cartography scholarship suggests that exercising power through maps is not straightforward: It is dependent on how maps are created and used during the mapping process. This paper examines cadastral mapping in Jigjiga, a multi-ethnic city in the Ethiopian Somali frontier where state authority over land and people have long been contested among ethnic Somali residents. This paper follows the ruling government's renewed attempt to establish land control through spatial planning, based on document analysis and ethnographic fieldwork. It investigates how urban planners enclose the city's property landscape cartographically on land use maps, and how land surveyors used these maps to geo-reference property. It demonstrates the critical role of land governance experts in navigating the simplified map and a complex property landscape on the ground. Cadastral mapping is instrumental for state territorialization and land commodification, integrating ethnic Somali property into the sedentary logic of the state. Rather than providing an account of how property is rendered legible, this paper highlights the incomplete and open-ended character of cadastral mapping in the constitution of private property regimes.

Keywords: State, government, urban planning, critical cartography, cartographic enclosure, territory, cadaster, property,

Introduction

Cadastral mapping, as "one of the most common state mapping activities" (Harvey 2013, 825), is useful in attempting to establish land control by drawing boundaries and delimitating spaces over which state institutions claim authority (see also Biggs 1999; Farish 2009; Sack 1986). Cadastral mapping, from an administrative standpoint, depicts "a system of surveying and recording the boundaries" that clarifies ownership of landed property (Gregory 2011, 57; see also Mitchell 2002, 86). Policy-oriented literature highlights the following functions of cadastral mapping on land use planning and land formalization: It enables the efficient, fair and sustainable administration of "land tenure, land use, and land value" (Chekole, de Vries, and Shibeshi 2020, 1), which appears critical in light of urban sprawl, scarcity of land, and related struggles over land. Cadastral mapping plays an important role because it is a comprehensive land-record systems that allows for regulatory oversight and potentially reduces boundary disputes (Gregory 2011, 57). According to policy literature, for cadastral mapping to realize its full potential, it must function as an integral part of a larger cadaster "infrastructure" (Harvey 2013, 828) through which property is mapped, formalized, legalized, and taxed (Chekole, de Vries, and Shibeshi 2020; Pustelnyk 2019; Shirina and Parfenyukova 2021).

From a governmental perspective, cadastral mapping is critical to state formation and the consolidation of state-society relations through property creation. Scott famously highlighted that "a state cadastral map created to designate taxable-property-holders does not merely describe a system of land tenure; it creates such a system through its ability to give its categories the force of law" (Scott 1998, 3). Cadastral maps, in his opinion, are essential for "seeing like a state" and rendering society legible and governable. Cadastral maps appear here as "inscription devices" (Fogelman and Bassett 2017, 253) that create a new reality through the "simplification" of complex land relations on the map, enabling people to be governed through the governance of space. Scott's analysis has inspired a scholarly analysis of the role of cadastral maps in state efforts to make society and territory legible and governable, as well as the negotiations that it involves (Abubakari, Richter, and Zevenbergen 2020). In line with a scholarship documenting how cadastral mapping advances land enclosure, the making of property and territorialization (Blomley 1998; 2003; Hannah 2009; Harvey 2013; Mitchell 2002), authors have similarly highlighted the significance of cadastral mapping for "render[ing] land investible" (Li 2017; see also Fogelman and Bassett 2017; Martin 2019). Cadastral mapping, in these contexts, serves as a tool for ordering state-society-market relations, contributing to the territorialization and commodification of land and property.

Although cadastral maps are designed to secure clear and unambiguous property relations, exercising power through cadastral mapping is not straight forward: rather, its effectiveness as a tool for governing land relations depends on the ability and willingness of land governance experts to assert and enforce the system of categories. Martin (2019, 2) emphasizes that "cadastral maps are neither accurate nor precise", emphasizing the importance of land surveyors in navigating between abstract maps and complex land negotiations on the ground. Also Cowan's (2021) analysis of digital property governance systems highlights the dependence of digital surveying and land registries "upon a host of sociomaterial bureaucratic labours." It reveals that frequent inconsistencies between cadastral maps, documents, and property on the ground create conditions that necessitate flexibility and compromise in mapping practices. As he demonstrates, the inherent uncertainties in digital property systems make them vulnerable to manipulation, appropriation, or co-optation, particularly by private and public actors seeking to settle property claims in a flexible manner. This is also evident in Martin's (2019, 2) work, which demonstrates how "remote sensing technologies in land surveying and cadastral mapping has enabled the acceleration of legal and illegal land control and ownership by agrobusiness companies."

This paper examines the incumbent Somali People Democratic Party (SPDP) government's renewed attempt to establish land control in the city of Jigjiga, the capital of the Ethiopian Somali region – as part of an interrogation of the uncertainties in cadastral mapping. It studies the preparation of the government's new master plan for Jigjiga, including a number of land use maps that enclosed Jigjiga's property landscape cartographically. Mapping thus targeted urban land and especially agro-pastoralist land in the city's expansion area claimed by branches of the local Somali Jidwak clan family. These clans legitimize ownership in reference to histories of settlement (Cossins 1971), past land use and past legal entitlements granted by the Imperial government administering agro-pastoralist land in the Jigjiga plains under a system of indirect rule (Barnes 2000). In recent years, individual clan members have successfully claimed land

as belonging, laying individual claims to land though its enclosure, kinship-based and clientelist redistribution, and commodification on an emerging informal land market. While this property landscape has been predominantly regulated by customary and religious norms, its cartographic enclosure set conditions for territorializing property in new ways – unfolding as land surveyors could now geo-reference landed property in the grid of the government's land use proposal.

This paper analyses mapping activities and focuses on a transforming cadastral infrastructure in the study of property rights and state mapping programs. Based on document analysis and eight months of ethnographic fieldwork in Jigjiga between 2011 and 2013, it highlights discrepancies between land use maps and property landscapes, as well as the cartographic uncertainties that land surveyors must navigate for property mapping. It demonstrates how the government's land use plan creates conditions for possible future actions, structuring both the territorialization and commodification of ethnic Somali property in Jigjiga and its surrounding area, and advancing the integration of ethnic Somali property into the state's sedentary logic. On that basis, it contributes to a political understanding of cadastral mapping and its "incomplete and compromised character" (Cowan 2021, 444) in the constitution of private property regimes in Jigjiga under ethnic federal rule. This paper is structured as follows: Section 2 provides a brief overview of the critical cartography literature, recommending a "processual" understanding of cadastral mapping for the analysis that follows. Section 3 introduces the socio-political context in which recent cadastral mapping activities in Jigjiga have progressed. Sections 4 and 5 examine the development of land use plans, as well as the cartographic enclosure of urban and peri-urban space this entailed. Section 6 describes how land surveyors geo-reference plots in the land use plan at GIS interfaces and the flexible navigation this involved. Section 7 concludes the paper by discussing the importance of cadastral mapping in the interplay of territorialization and commodification of ethnic Somali property in Jigjiga.

Critical Cartography

Critical cartography challenges the notion of maps as a static representation of the world. Harley (1989) was a pioneer in deconstructing maps, inspiring a reading of maps as texts and in context (see also Harris 2015). Using post-structuralist thinking, Harley questioned the "scientific epistemology of the map as an objective form of knowledge" (Harley 1989, 1), arguing that maps are a type of power-knowledge that works in society. Harley's work revealed maps to be pervaded and imbued with power, implying that maps should be analyzed within the societal power relations in which they were produced as images of social order. Geographers would no longer be able to regard maps as simple visualizations created by mapmakers or as standalone communication device for potential users (Crampton 2001).

Harley pioneering work paved the way for the development of a critical human geography perspective (Crampton 2001, 238). On the one hand, this implied a call for a deeper engagement with activities that generate maps and internalize power relations (Harvey 2013, 827; see also Biggs 1999, 579; Blomley 1998, 579). Every map, as Harley (1989, 3) emphasizes, offers a specific way "of looking at the world": maps are only

possible outcomes of often contested and contingent processes of knowledge production. There is no such thing as “the best” map that most accurately represents geographical reality (Crampton 2001, 242), only selective representations (Farish 2009, 443). Recognizing the inherently selective nature of maps draws attention to their potential use in the pursuit of political interests and the promotion of hidden agendas – via “a second [hidden] text within the map” (Harley 1989, 10). Harley’s work, on the other hand, suggested an analysis of how power can be exercised through maps or how maps achieve their authoritative status as the visual representation of the “real world”. According to Harley (1989, 10-11), scientific cartography creates “scientific maps” as authoritative images that appear more accurate than non-scientific maps (Harley 1989; see also Wood and Fels 1986; Crampton 2001; Elden 2010, 11). Scientific instruments and techniques remove ambiguities from maps and reinforce a particular point of view on the world. In practice, we find a variety of methods for enforcing and reinforcing "scientific authenticity" (Wright 1942 in: Crampton 2001, 240).

Blomley (1998, 579) put it succinctly: “Maps reify”. However, the reification of maps is not simple, as it depends on a set of practices and performances in which they are created and used. Indeed, critical cartography scholars generally agree on the importance of maps in governing people and space. However, as Fogelman and Bassett (2017, 253) point out, scholars disagree on “how maps do this work.” For some, social ordering is the result of maps and their quality as inscription devices (Harley 1989), with maps acting as agents and artifacts that “enforce their vision through inscription” (Harvey 2013, 827) and “act … for the normalization of power relations” (Crampton 2001, 239). Such a “inscriptional perspective” is consistent with Scott's (1998) depiction of cadastral maps as instruments for the production of a new “reality” through abstraction and simplification, rather than representations of a tenure system (see also Martin 2019, 3). Others, on the other hand, have argued for a more “processual perspective,” which entails scrutinizing the complex ways mapping advances in practices and performances in site specific historical constellations (Kitchin and Dodge 2007; Fogelman and Bassett 2017). This processual perspective is consistent with the literature on political geography, which emphasizes the dynamic and complex interplay of spatial techniques with law and violence in the production of territory and its naturalization as spatial orders (Blomley 2003; Elden 2010).

The significance of a processual perspective for this study of cadastral mapping in Jigjiga is two-fold. First, it suggests investigating the actual process by which land use maps were created, as well as the authoritative rewriting of urban and peri-urban space that this entailed. Mapping here is significant as it allows for obscuring of power relations over land on the map as an ‘objective’ record and the reorganization of power over people as power over space (see also Mitchell 2002, 90-93). Second, it entails moving beyond an examination of how the ruling SPDP government's land use plan was implemented on the ground to an examination of the embodied, social, and technical practices and performances that accompanied land measurement, administration, and formalization via cadastral mapping. As illustrated in the following sections, these mapping practices and performances take place in a specific socio-political context in Jigjiga: a historically-saturated property landscape in which property relations have long been negotiated and contested, particularly among ethnic Somali residents.

Governing Property

This paper examines cadastral mapping in Jigjiga, a rapidly expanding multi-ethnic mid-size town located in Ethiopian Somali-inhabited eastern frontier. Jigjiga, founded as a military garrison by the Ethiopian army in the late nineteenth century (Eshete 2014), evolved as an enduring foothold of the Ethiopian state, where imperial expansion advanced through the settlement of northern highland administrators and soldiers (mainly Amhara) in the ethnically-distinct peripheries. Infrastructure building, land appropriation and agricultural extension accompanied this expansion and emerged as key fields for Somali integration into the Ethiopian state's sedentary logic (Barnes 2000; Eshete 2014). However, Ethiopian state institutions' attempts to govern property and territorialize state power were complicated by colonial competitions in the first half of the twentieth century, with Ethiopian rule competing with the Italians first and then with the British.[1] Land governance and territorial belonging evolved through a combination of racially and territorially defined forms of sovereign control as Ethiopian and European empire-building intersected in Jigjiga (Thompson 2020, 546). As a result, Jigjiga became a highly segregated multi-ethnic settlement, with the Ethiopian state only partially succeeding in making ethnic Somalis legible within an Imperial tenure system (Emmenegger 2020, 194).

Following decades of competition with European authorities in neighboring British Somaliland and Italian Somalia, Ethiopian sovereignty over Jigjiga was more firmly established after 1948. Jigjiga regained significance as an administrative post on the Ethiopian-Somali border and resurfaced as a site for renewed Somali integration efforts (Eshete 1991, 24). Nonetheless, land control of the Ethiopian state and the establishment of the Imperial tenure system remained limited in Jigjiga (Eshete 1988, 199). Following the fall of the Imperial regime, the Derg's socialist regime attempted to reestablish land control by issuing Proclamation No. 47/1975, which nationalized rural and urban land (PMAC 1975). The enforcement of the state's land ownership in Jigjiga was complicated by inter-ethnic tensions and an emerging inter-state conflict, culminating in the Ethiopian Somali war in 1977/78 (Tareke 2000). The war shattered property relations in Jigjiga by displacing the city's highland population first, and then the city's Somali population once the Ethiopian army reoccupied the town. Following the war, the Derg regime's approach to land and people advanced in the context of militarized rule, with land governance being integral to the marginalization and exclusion of ethnic Somalis (Emmenegger 2013). The fall of the Derg in 1991, and the subsequent establishment of ethnic federalism under the rule of the Ethiopian People's Revolutionary Democratic Front (EPRDF), signaled the start of a new era for ethnic Somalis in Ethiopia: In its constitution, the ethnic federal constitution recognized ethnic identity as a fundamental principle of state organization, political representation, and citizenship rights (FDRE 1995).

Jigjiga regained political significance within ethnic federal Ethiopia after 1994 as the capital of the Somali Regional State and the seat of the SPDP government – an EPRDF

[1] Jigjiga was under Italian administration from 1936 to 1941 and under British administration from 1941 to 1948 (see Barnes 2000).

affiliated ethnic-regional party governing the newly created Ethiopian Somali regional state. After the regime change, ethnic federalism created new conditions for land negotiations in Jigjiga, with the articulation of ethnic Somali identity now acting as a powerful mechanism in access and exclusion negotiations: Negotiations over access and exclusion intensified in the inner-city as many ethnic Somalis who had been displaced during the 1977/78 war returned to Jigjiga and sought property restitution for their 'original' property and belongings (Emmenegger 2013, 125). As the local administration had limited capacity at the time to consider restitution claims or sanction property rights, cases of property restitution were mostly resolved informally without the government's involvement, or remained unresolved and contested. At Jigjiga' outskirts, ethnic federalism created conditions for local customary authorities to reclaim agro-pastoralist land, transforming the issue of land ownership into a question of territorial belonging (Emmenegger 2020, 195, see also Barnes 2006). Jigjiga's property landscape thus fundamentally contradicts the legal "state ownership" that the EPRDF maintained following the regime change (FDRE 1995, Art. 40 § 3).

Land in Jigjiga has become a valuable commodity in recent decades as a result of ethnic Somali in-migration and a massive influx of trans-national capital. Since the year 2000, particularly agro-pastoralist land in Jigjiga has been enclosed and transformed into a valuable commodity in an emerging informal land market – where land transactions take place predominantly (Emmenegger 2020, 195; Mahamed 2014, 62). As a result of the city's historically unprecedented growth and increasing land scarcity, the ruling SPDP government began to address the city administration's weak administrative capacity (Mahamed 2014, 74), and to invest more heavily in land use governance, particularly through a series of institutional and policy reforms: it reorganized the city administration to increase capacity and facilitate regional interventions in urban affairs. It also introduced a land lease system (proclamation No. 721/2011), adjusting its legal frame to market requirement while maintaining the state's constitutionally defined land ownership. Furthermore, it invested in urban planning to ensure rational and orderly land use. In the absence of a comprehensive cadastral map, the corresponding land use plans served as a spatio-legal foundation for the formalization of property in the city, particularly in its expansion area. Thus, rational and efficient land use planning is critical for the governance of ethnic Somali property – or for governing people through the government of space.

Urban planning, as part of a modernizing project, also stands in the context of the government's ambition to "urbanize" an Ethiopian Somali territory as a basis for legitimizing its rule in the frontier – a frontier where the SPDP's claim to sovereign rule has been violently contested (Hagmann and Korf 2012). During the fieldwork, the SPDP government thus re-classified urban settlements throughout the region, commissioned the preparation of master plans for all higher-grade settlements, and re-established urban institutions for their implementation. Thus, the government's modernization project mobilized a mythical geography of cities and towns, as well as a promise for the future of Ethiopian Somali territory (see also Wood and Fels 1986). Jigjiga is strategically significant as the "model city" within such mythical geography as the capital of the Ethiopian Somali region and the SPDP's political and administrative center. Thus, urban planning in Jigjiga is one of the government's top priorities, with the goal of projecting an

orderly modern vision for its capital and establishing an orderly grid for the city's infrastructure development and modernity to unfold.

Land Use Mapping

Land use planning regained prominence following the regime change and Jigjiga's nomination as the capital of the Ethiopian Somali region within ethnic federal Ethiopia. This materialized in 1998, under the leadership of the federal government, with the preparation of a new master plan for the city by the National Urban Planning Institute (NUPI) in the Ethiopian capital Addis Ababa – which, according to municipal experts, had only limited consequences for land governance on the ground.

Attempts to plan Jigjiga's development have entered a new phase, with the ruling SPDP government ordering the preparation of a new Jigjiga master plan (SRS 2012, 8). The Jigjiga based regional Urban Work and Development Bureau hired a specialized urban planning consultant from the Ethiopian capital Addis Ababa for this purpose. In 2009, the planning process began with an inventory of existing land use and an assessment of the city's current situation and future demands. Four survey teams collected data, each in a specific field of interest (sociology, economy, geography), which was later translated into chapters in the written report. In parallel, the planning consultant used the previous structural plan's base map from 1996 and satellite images from 2009 to collect additional data on existing land use through pictures, surveys, observations, interviews, and group discussions. On that basis, planners submitted a first assessment report on the "existing land use" (2010) and for the "land use proposal" (2012) to the regional state government. In addition to these written reports, planners created a spatial representation of the existing and proposed land use, see Figure 1 and 2 – which are available as GIS databases with different layers for the existing and proposed land use. Throughout the planning process, the consultant arguably followed a "participatory" approach, which meant that tentative outcomes were regularly presented to stakeholders (elders, women, youths, religious leaders and business, as well as executive sub-district (*kebele*) committees) in various constellations. Urban planners completed the Jigjiga structural plan in 2012, providing a vision for the city's future development as well as a 10-year planning and land use proposal.

Land use planning in Jigjiga has primarily been a political project. As Crampton (2004, 42) argues, "data collection and analysis are not done in isolation from specific governmental goals and ends as a political question." Planning experts, for example, framed land administration in terms of "scarcity," calling for more efficient and rational land use and legitimizing state interventions. This framing corresponded to policy debates about the establishment of "good (land) governance" (Mahamed 2014, 23), which appeared to be required in the context of Jigjiga's rapid growth and expansion. However, it also rendered Jigjiga's property landscape legible, enclosing space for regulatory interventions cartographically. Simultaneously, the reshaping of Jigjiga's property landscape along these lines rendered land investible: this appeared significant in the context of the SPDP government's efforts to encourage urban investment and the realization of high-rise modernity in the inner city, where property rights had previously been "fuzzy" (Verdery 1997, 102). It also appeared significant because it established the

conditions for regulatory intervention in the thriving informal land market, particularly in the city's expansion area, where capital investment in land had progressed so far largely outside the government's control.

The larger political dimension of the SPDP's push for land in Jigjiga, however, was obscured on the map during the mapping process. The case, in fact, validates Mitchell's (2002, 92-93) argument that mapping and survey techniques create a gap between the map and "the real world" – the "image world" and the "object world" – in which the question of 'accuracy' is reduced to a question of correspondence between the two: during "participatory" meetings in the city's conference hall, invited participants paid close attention to the accuracy of the map, doing so in rather technical terms when contrasting the representation with a seemingly 'objective' reality on the ground. On the one hand, these discussions focused on the map's technical accuracy and the correspondence between the roads depicted on the map and those built on the ground. For example, participants complained that some "roads … are not well aligned", "are totally omitted" or "are narrow… than their actual size."[2] These objections openly questioned the prepared map's quality. It identifies limitations that, while in theory, can be overcome, can still occur in cadastral mapping due to financial or technical constraints encountered during the mapping process (see also Harvey 2013, 835). Nonetheless, the discussion highlights the difficulty of freezing a rapidly expanding transportation infrastructure on paper, implying that any road classification on the map will quickly become obsolete as roads are built.

Participatory meetings, on the other hand, revealed some more fundamental limitations in the map's ability to represent the property landscape. As several cases have demonstrated, it may be difficult to assign a specific land use class to a given urban plot. Participants, for example, disagreed on whether a plot of land should be classified as "administration" or "residence" in cases where government institutions rented houses. Meeting participants complained that "Some public service areas are marked as residential," or that "some structures are marked as Adm[-inistration] or public while …[they] are rented."[3] Following the regime change, a variety of government offices were established in rented buildings due to the increasing demand for infrastructure of an expanding administrative apparatus in the regional capital. While this ambiguous classification appears to be context specific, the discussions it sparked during the meetings demonstrate the difficulties of classifying land use when different actors simultaneously hold different rights over the same object of value – privately owned but used publicly in the cases discussed. Property, understood in relational terms as "a bundle of rights" (von Benda-Beckmann, von Benda-Beckmann, and Wiber 2006, 3), is difficult to represent on a single two-dimensional map because different rights entitle different access to land.

As it reveals, debates about the map's accuracy centered on the built urban settlement, ignoring Jigjiga's complex property landscape. As a result, participants ignored the dynamic and contested nature of Jigjiga's property landscape in the inner-city, where multiple claims to property often overlapped after waves of displacement and return in post-conflict Jigjiga. More importantly, participants remained silent on the obvious

[2] Jigjiga City Administration, meeting notes, 27 February 2011.
[3] Jigjiga City Administration, meeting notes, 27 February 2011.

contradiction between the state's de jure claim to land ownership and the de facto entanglement of land in a customary tenure system in the city's expansion area. Indeed, NUPI urban planners from 1998 classified urban settlements emerging on the city's outskirts as "illegal occupation" (NUPI 1998, 89) – but this was beyond the NUPI planning perimeter at the time. With the new master plan, urban planners extended the urban planning perimeter far beyond the confines of the built settlement, enclosing land cartographically as green fields representing "agricultural and vacant" land. As it reveals, during the mapping process, social relations in the Jigjiga property landscape were abstracted, detached, and inscribed on the map. While constitutional state-ownership of land in Ethiopia is often publicly disclosed in various arenas in Jigjiga – even by government officials – it was disregarded in the mapping process in favor of a map that provided a particular mode of "looking at the world" (Harley 1989, 3) and conditioned how land use was discussed.

Mapping the Future

The Jigjiga structural plan, as a planning tool, includes not only a map of existing land use patterns, but also a 10-year land use proposal. Prepared as a spatial representation and a GIS database, the structural plan draws on a classification system that distinguishes between different land use zones – which are colorfully distinct on maps and in their legends. The classification system implemented as a specific and selective way of "looking at the world" (Harley 1989, 3) resonated with national urban planning schemes and echoed those previously adopted by the Addis Ababa based NUPI mapping of Jigjiga in 1998. In effect, mapping subordinated the specificities of Jigjiga property landscape within the given framework of categories both in the first assessment report (2010) and the subsequent version in the final land use proposal (2012).

A look at how the land use proposal was created reveals some of the unique characteristics of maps. The actual mapping process begins after the first assessment report (2010) is completed. Inspired by "bold ideas to be considered in the preparation of the structure plan," urban planning experts prepared sketch maps of Jigjiga as concepts for a land use proposal. In one of these concepts, shown in Figure 3, urban planners layered a variety of categories as toponyms and colored fields on top of a satellite image that served as a base map. As an intermediary step at the computer, the resulting sketch map provided a first spatial arrangement and an outline of a functional city – socially, economically and ecologically. However, during the preparation of the final land use proposal, urban planners subordinated categories and renamed, rewrote, and reconstructed cartographic space. Urban planners, in particular, overwrote the features on the base map with the pre-given classification system, classifying space authoritatively according to general urban planning standards.

The legend illustrates the categories of the map's ontology (Schuurmann 2006, 733). It transformed from the initial concept, see Figure 3, to the final land use proposal, see Figure 2. It delves into the process of abstraction and how urban planners created a visual representation of local realities in detachment. As Figure 3 shows, the classification system remained nearly unchanged throughout this process, with the exception of the

category “future expansion”:[4] in the draft concept's legend, planners classified various fields on the urban outskirts as areas for Jigjiga's “future expansion.” They first recognized the spatio-temporal dynamics of urban growth by categorizing it and displaying it with arrows indicating the direction of expansion. However, in the draft concept, these ongoing dynamics were “cut”, to draw on Blomley’s (2010, 203) terminology, through a cartographic enclosure and the mapping of clearly bounded spaces – or territories. The severing of social networks and property relationships continued with the preparation of the final land use proposal, in which the arrows were removed and the fields were sub-divided into a grid and re-classified as “residence and mixed” land use zones.

The planning process culminated in the preparation of a proposed land use map, which projected an image of orderly land use patterns in Jigjiga and, in particular its future expansion area. In fact, also “The future” had first entered the system of knowledge as a spatialized category – in the form of fields classified for “future expansion”. However, “the future” was no longer listed as a category in the final proposal's legend. Rather, urban planners incorporated “the future” into the map itself, with the land use proposal serving as the ultimate embodiment of a well-ordered future. Land use mapping in Jigjiga thus documents how cartographic space is emptied from the complex historical layering that gives meaning to property landscapes on the ground (see also Blomley 1998, 598-599). This is especially significant because mapping Jigjiga's “future expansion” area and its cartographic capture worked specifically against the customary tenure system, which entangled property relations in the city's expansion area. The expansion of the urban planning perimeter and the redrawing of boundaries of the urban jurisdiction,[5] thus renders the hitherto “periphery of the town” (NUPI 1998, 89) legible, enclosing space cartographically as territory for state regulatory interventions.

Cadastral Mapping

In 2012, the regional state parliament approved the "Jigjiga city structural plan," which established a spatio-legal grid for Jigjiga city administration and cadastral mapping activities. This grid now established conditions for the state to govern property, establishing a relationship with ethnic Somalis on previously unreachable land. It created the conditions for a greater involvement of government institutions in the creation of property, particularly in the city's expansion area, which had previously been outside of urban jurisdiction. The land use plans, in particular, delineated specific zones in which property rights could now be granted in accordance with the government's vision for Jigjiga's spatial development. Nonetheless, as the following section will show, the spatio-legal grid did not simply reify a socio-spatial order in Jigjiga's property landscape. Rather, land relations changed primarily as a result of land surveyors navigating between

[4] The category “military base” marks an additional exception. Initially mapped and listed in the legend, it finally disappeared from the map and became merged as a sub-category classified among other “special functions” in the legend.

[5] The planning parameter was increased from 850.50 ha in the previous master plan (NUPI 1998, 89) to 9000ha in the current one (SRS 2012, 8).

the simplified map and a dynamic property landscape on the ground, as well as between the market and the state.

For ethnic Somalis who own land, the residential zones of the proposed land use map – sub-divided into "residence" and "mixed use" – became especially relevant and meaningful. During field research in 2011, when the structural plan was still in the works and not yet finalized or publicly accessible, the majority of Jigjiga landowners claimed their property was within the appropriate land use zone. Nonetheless, there was no comprehensive or accurate cadastral map for Jigjiga at the time, so the city administration's tax income from registered property remained limited and varied greatly from year to year. As a result, the registration of land holdings had been based on a system of land titles preserved and stored in the land registry archive of the city administration in the center of the town (Emmenegger 2020, 198). However, by 2012, the structural plan had established new requirements for land surveyors at city level to geo-reference urban plots within the formal grid of the GIS and the government's land use proposal. With the start-up of the structural plan as a GIS, a new type of urban expert emerged within city administration – experts who were specially trained and qualified to handle the newly introduced technology.

As a result, land surveyors have begun to accompany acknowledged and potential landowners to the site for property measurement.[6] At the site, this entailed using GPS devices to measure the coordinates of a plot's corners, which they initially listed on the paperwork required for property formalization with the Jigjiga city administration in 2012. A year later, the technological infrastructure had advanced to the point where these land surveyors could incorporate GPS coordinates into the GIS, geo-referencing land plots within the digital land use proposal; see Figure 4 and 5. Back at the office, the assignment of the measured plot to a specific land use zone could be unambiguous if it clearly fit within the boundaries of a residential zone. However, if the plot and zone boundaries clashed, the assignment could become difficult. This could happen if the GIS-integrated plot happened to overlap with a proposed road or a non-residential zone. In such cases, land surveyors had to make clear decisions, assigning plots on either side of the boundary. Indeed, land surveyors were frequently confronted with discrepancies between a "on-the-ground reality" observed at the site and its spatial representation in the GIS. Due to the measurement error of GPS devices, for example, it may be difficult to maintain the spatial characteristics of an urban plot in the GIS. While the average error of the GPS devices was arguably within a three-meter radius, the errors appeared to proliferate with the use of GPS Apps run by Smart Phones, which have become increasingly popular among urban experts and land surveyors in Jigjiga. Because it was not guaranteed that rectangular urban plots observed and measured at the site would appear in the same shape at the GIS interface, land surveyors had to adjust their measurements on a regular basis in order to unambiguously determine the plot size and its location within the proposed land use map.

Disparities between field boundaries on the map and their location on the ground sparked a popular debate about map accuracy and the geospatial technologies at work in Jigjiga.

[6] Before, this process used to be proceeded in a decentralized manner, meaning that government officials of the urban sub-district (*kebele*) as well as other witnesses confirmed the demarcation of the plots at the site

Urban engineers were well aware of the GPS measurement errors and were familiar with the discrepancies inscribed in the formal environment of the GIS due to their practical work and technical skills. It often included an awareness of the limited correspondence between the map and geographical features on the ground – which had already fueled a debate in a participatory meeting for the preparation of land use maps. It was urban engineers acting on behalf of the state who pointed out the inaccuracy of digital measurement technologies. In contrast, for urban dwellers especially those holding land, it appeared to be more important that an expert certified the location of the boundary by measuring it, rather than considering the technical accuracy within a digital system. Their ignorance was based on their faith in modern technology's ability to precisely locate an urban plot and establish property boundaries. Landholders widely portrayed GPS-based land representation as an effective means of preventing land disputes in the expansion area, where the enclosure of customary land had fueled conflicts in the past primarily among members of the same community equally claiming legitimate individual holding (Emmenegger 2020, 196).

Access to the GIS remained relatively exclusive. In 2013, it was only available at the city administration or the offices of a newly established private consultant offering services for a small fee. Approaching the former was a crucial step for landowners in order to have their property acknowledged and a legal ownership certificate prepared. Working through the latter could also be a precursor to achieving the same goal. Legal recognition would then necessitate the payment of property tax in order to secure the legal recognition of property rights through state authorities – with the result that any future transaction would now fall within the state’s regulatory framework. Indeed, the city administration's land registry archive revealed the growing importance of property formalization, with land files nearly doubling between mid-2007 and 2012, according to the registry books. Property formalization is significant because it is a direct result of the ruling government's renewed attempt to establish land control, as well as a response to land conflicts that have previously accompanied land enclosure. Land formalization in Jigjiga thus testifies that “landholders use inscription into state records to secure legal property rights” (Sanches-Talanquer 2020: 65) in a setting in which land ownership is contested. This entailed the registration and archival deposition of land certificates, which the government legally framed in accordance with its Land Lease Proclamation No. 721/2011 – a framing, however, that did not change the widely held perception of ownership among land holders as ultimately private.

At the same time, landowners and/or buyers consulted land surveyors from the city administration as well as the private consultant for geo-referencing property within the land use proposal. They did so not to formalize property, but rather to avoid future conflicts with the government’s structural plan for Jigjiga. This satisfied their informational needs, providing a foundation for making decisions in the urban land market without fear of government taxation or interference. A landowner, for example, decided to divide the plot in two after receiving such a pre-evaluation from a private land surveyor. This redrawing of boundaries was necessary because “there will be a road in the future,” as he argued. It enabled him to bring the property into line with the government's structural land use proposal, which became more and more of a requirement for the plot's sale on the urban land market. As it demonstrates, the map's inscription in Jigjiga's emerging property landscape is the result of more than just

governance experts enforcing a spatial grid: rather, it is the result of landholders ensuring that plots transacted informally in the future will be in line with the government's land use proposal. Both private consultants and municipal experts, who were equipped and skilled in the use of geospatial technologies, participated directly or indirectly in the commodification of land, “increasing the level of confidence (decreasing uncertainty) the buyers have in the informal land market“ (Mahamed 2014, 68).

Conclusion

This paper examines the ruling SPDP government’s recent attempt to expand land control in Jigjiga. It studied mapping as a process by following mapping activities that authoritatively rewrote Jigjiga's complex property landscape on land use maps, and through which space was cartographically enclosed as a territory for the state's regulatory interventions. These land use maps were given "the force of law" (Scott 1998, 3) with parliamentary approval in 2012, forming a spatio-legal grid for property administration and formalization. While there had previously been no comprehensive or accurate cadastral map for Jigjiga, the structural plan now allowed land surveyors to geo-reference urban plots within the grid, aligning property with the government’s land use proposal.

During the preparation of the new master plan in 2010-2012, urban planners sought to impose an orderly grid for property surveying and recording. However, the grid on the map did not simply reify as a new socio-spatial order in Jigjiga's property landscape. Rather, its enactment necessitated the work of land surveyors who used the plan to geo-reference property. Land surveyors were frequently confronted with mismatches between the 'reality' they observed on the ground and its spatial representation in the GIS while attempting to do so. Despite being aware of the imprecision of GPS technologies and the limited accuracy of the GIS database, they were able to adjust and navigate within the digital cadastral infrastructure to bring property in line with the map. These findings call into question the notion of maps as 'inscription devices' (see also Fogelman and Bassett 2017, 255), highlighting instead the incoherence between cadastral maps and property landscapes, as well as the cartographic uncertainties that condition the enactment of socio-spatial orders during the mapping process.

This paper further underlines the “incomplete and compromised character” (Cowan 2021, 444) of cadastral mapping in the constitution of private property regimes. Harvey (2013, 837) also drew attention to cadastral mapping discrepancies in his discussion of cadastral mapping in Poland. As he concludes, such disparities “fail to systematically disrupt” citizens' and administrators' interactions and activities. Also in Jigjiga, the limited accuracy of cartographic representations and the GIS does not fundamentally destabilize state-citizen relations during property mapping and making decisions: Land surveyors avoided overstating discrepancies in property mapping in order to meet the demands of both the structural plan and their clients – regardless of whether they operate in the formal or informal sphere. In effect, they keep the land use plan as a rational and seemingly coherent means of administration. For landholders, the potential incoherence of the mapping process remained obscured and beyond their interest, as embodied and technologically-inspired performance was primarily important for stabilizing property as

tangible objects and property on the ground to be seen by the state or transferred on the market.

Mapping property along these lines has been especially important in Jigjiga under ethnic federal rule for integrating ethnic Somalis into the state's sedentary logic. Land use planning is important for government because it allows power over people to be reorganized as power over space – or to govern people through the government of space. Land use mapping entailed the creation of a "governable space" aimed at the future and influencing people's governance in the present. The juxtaposition of an objective "existing" and "proposed" land use thus spans a teleological thread along which state government could unfold, uniting the state and ethnic Somali citizens in Jigjiga around a shared vision of an orderly future. As it demonstrates, the government of people through the government of space entails a temporal dimension (see also Li 2017), laying the groundwork for possible future actions. Cadastral mapping thus made it possible for new landowners to make their property legible within the plan's "proposed land use map" through legalization and formalization, thereby preventing conflicts and ensuring property stability in the future. In such cases, land use planning and cadastral mapping proved effective for state territorialization, particularly in the city's expansion area, by bringing land previously entangled in a customary regime within the reach of state institutions as property to be legalized, formalized, and taxed.

However, in a context in which the state's claim to authority over land has long been contested, the ruling SPDP government's attempt to territorialize state power remained incomplete (see also Thompson et al. 2021, 19). As demonstrated in this paper, cadastral mapping not only made property legible to the state, but also investible: Property mapping allowed private land owners to demarcate property as a tangible commodity of value on the urban land market. Geo-referencing such property within the government's land use proposal allowed for additional assurance that property boundaries would not conflict with the government's proposal in the future. While cadastral mapping provided security for land transactions on the market, it deliberately kept property beyond the government's reach in terms of legalization, formalization, and taxation. However, in such cases, the proposed land use map establishes conditions for possible future actions, effectively reifying a future spatio-legal order in the property landscape emerging in the city's expansion area. As it reveals, the integration of ethnic Somali property in Jigjiga is produced not only by state territorialization, but also by commodification processes (see also Korf et al. 2015). Operating within and across the formal and informal spheres, land surveyors with geospatial technologies and expertise play an important role as intermediaries in this co-production. They must thus navigate not only within a digital cadastral infrastructure, but also within contested relations over land and property, as well as between the market and the state.

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