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CADASTRAL MAPS: HISTORY – GEOGRAPHY - HISTORIOGRAPHY
Mapas Catastrales: Historia - Geografía - Historiografía

Roger J. P. Kain
School of Advanced Study, University of London
roger.kain@sas.ac.uk
ORCID ID: https://orcid.org/0000-0003-1971-7338

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Almost exactly thirty years ago I wrote that in very many parts of the world from the Middle Ages to the time of mass industrialisation in the nineteenth century, the control of land was the basis of political power. Cadastral surveys – maps and written registers of property ownership in both the countryside and the town – played an important role as tools for the consolidation and extension of this land-based power. Some of the earliest European property maps were embellished and decorated in the cartographic traditions of the time but as their number increased exponentially in the nineteenth century they become minimalist in their content and purely functional in nature and appearance. The essential role of a cadastral map is to serve as a record of property boundaries as surveyed on the ground. Parcel numbers on a map link the maps to written lists of property owners' names, together with the extent of parcels and, very often, an indication of land use or land value. Such maps and registers have functioned in many parts of the world as a definitive record of property ownership.

Cadastral – or property – maps are thus an important genre of maps and it is one that has benefitted from a rich historiography over many years. There are early, general summary surveys such as that by myself and Elizabeth Baigent (Kain and Baigent, 1992), by Mireille Touzery (2007) and by Florence Bourillon, Pierre Clergeot, and Nadine Vivier (2008). There are now a number of national surveys as exemplified by essays in the volumes of the University of Chicago Press, *History of Cartography*, notably Volume Four on the Enlightenment (Edney and Pedley, eds, 2019), in which Spanish academics have participated, such as Luis Urteaga, Francesc Nadal, Alicia Cámara, Concepción Camarero and Joan Capdevila, among others, and Volume Five on the Nineteenth Century (Kain, forthcoming 2027). Volume Five will contain nineteen essays on property maps and mapping in different parts of the world by a group of international scholars (Elizabeth Baigent, Luca Berardi, Beatriz Bueno, Peter Collier, Michael Conzen, Jeff Erbig, João Garcia, Zhaoqing Han, Roger Kain, John Manning, Luìs Miguel Moreira, Francesc Nadal, Ferjan Ormeling, and Chong Zong).

Across almost all the settled areas of the world, the nineteenth century was a critical period in property mapping – indeed it has been called 'the age of cadastral surveys'. That said, it is clear that some of the earliest known property maps were made in China more than 2,000 years ago in the process of resolving land disputes. Official cadastral maps to enable administrators to identify property owners and implement land taxation are known in the historical record in China from the twelfth century, and especially from the Qing Dynasty (1644-1912). In Japan, a national land survey was developed around 1582 and reorganised and formalised in the Edo period (1603-1868) for land assessment and taxation.

By contrast, in South Asia there is as yet no evidence of any systematic property mapping in either Ceylon (Sri Lanka) until it came under Dutch control or in Mughal India before British occupation. As far as is known, in Afghanistan all records of land were in written form until the mid-twentieth century. In the Middle East, written registers seem to have sufficed until the 1840s when administrative and legislative reforms introduced a Western form of private property and paved the way for property mapping from the

late 1850s, with the exception of the Arab provinces of the then eastern Ottoman Empire.

In Europe, property mapping in Great Britain is somewhat enigmatic. The overseas Empire of Great Britain was one of the most extensive theatres of property mapping in the world but at home, though there are many thousands of local property maps from the seventeenth through to the twentieth century, there is no national cadastre. In Britain, the land tax was collected with reference to local lists of landowners. The specific tax of tithe to support the established church was reformed in the mid 1840s with detailed, large-scale property maps at its heart but there was no appetite in the British government of the day to incur the additional cost of mapping those parts of the country unaffected by tithe commutation. It was an opportunity lost and Great Britain with its absence of a national land registry is something of an outlier in the settled world (Kain, Baigent and Fletcher, 2008).

Across the English Channel, tax reform was at the very heart of the French Revolution and for an equitable tax based on land, a mapped survey of the whole of France was considered essential. Napoleonic military advances also brought a French style of land reorganisation and mapping to other parts of Europe. In the Italian peninsula, Napoleonic influences integrated disparate provinces into a more unified state and reformed rights to private property, while the unification of the Kingdom of Italy was a further impetus to cadastral mapping in the latter part of the nineteenth century. In the Nordic countries of Norway, Sweden and Denmark one of the main drivers of cadastral mapping was land improvement by enclosure.

In most parts of western Europe, cadastral mapping was a separate genre of mapping, but in the German states and in Central and Eastern Europe there was a much closer relationship between cadastres and military and topographic mapping. Likewise, in southern Europe on the Iberian peninsula, mapped cadastres were fundamental tools used by the reformist governments in Portugal from the late eighteenth century and were closely related to military and topographic mapping works. Similarly, there was a close relationship between the general land registry and the national topographic map of Spain.

In the Americas, cadastral surveying and mapping were absolutely integral to programmes of land settlement, first by European colonial powers and then by independent nations. Everywhere, and not least in Canada, the marginalisation of indigenous peoples is recorded in property maps; maps which were essential before titles to land could be confirmed. In the United States, the principle of guaranteed private ownership of land was a foundation stone of its democracy and rendered property maps all but axiomatic. Land title had been a fundamental reason for the surveying and mapping of properties in the old colonies of Britain, France, Spain and Mexico. But the real challenge was the vast public domain of the United States which was opened up for settlement after independence. When liberal governments of the independent republics of Latin America instituted their land reforms in the nineteenth century, property mapping was also seen as an essential means of identifying unoccupied lands and to enable prospectuses to be produced for land auctions. As in North America, property maps of, for example, Argentina, Uruguay, Colombia and Chile were used to attract immigrants with the promise of land.

The government administrator of South Australia, Robert Richard Torrens, gave his name to the system in 1858 for recording land titles in a public register of holdings with deposited plans. His method was later adopted across the Australian continent and also further afield; Torrens' name appeared in far-away Brazil when in 1890 the *Registro Torrens* established a new procedure for land registration.

In South-East Asia, French-style cadastres were implemented in Indo-China and John Turnbull Thomson, Goverment Surveyor of the nascent Singapore colony introduced British style property mapping to Singapore – maps which were austere, unadorned but perfectly adequate for identifying parcel boundaries and linking those parcels by numbers to names in a property register. Figure 1 is an example of one such unprepossessing map – similar in appearance to many thousands of others from across the world in the nineteenth-century heyday of the cadastral map. This one made by Thomson himself is of the area now occupied by Singapore's National Botanic Garden. Thomson then moved to New Zealand where, as surveyor general after unification, he masterminded a system of property mapping that hybridized the rapid and inexpensive astronomical / geodesic methods of the United States Federal Land Survey with the slower, more expensive but very accurate major and minor triangulation employed by, for example, the Ordnance Survey of Great Britain for its large-scale topographic mapping.

In addition to establishing title to land as European settlers moved out into the new worlds of the Ameri-

FIGURE 1
PLAN OF TANGLIN DISTRICT NO.III SURVEYED BY J T THOMSON, GOVERNMENT SURVEYOR, SINGAPORE, 1 JANUARY 1844, SCALE OF 400 LINKS TO AN INCH. NATIONAL ARCHIVES OF SINGAPORE M2016_000140_1_SD. REPRODUCED BY PERMISSION OF SINGAPORE LAND AUTHORITY.

cas, Africa, South Asia and the Pacific, cadastral maps also played a role in the processes of land reclamation – of polder lands and heathlands and in the management of forest resources which were so important in pre-industrial times. That said, more land was probably surveyed and mapped for assessing, agreeing on and recording land taxes than for any other purpose. The Physiocratic movement which saw agricultural land as the sole source of real wealth was an important stimulus to cadastral mapping.

Within the history, geography and historiography of cadastral mapping briefly sketched above, scholars based in Spain have made very significant contributions. I note in particular the books by Juan Pro, 1992; José Ignacio Muro, Francesc Nadal, and Luis Urteaga 1996; Ignacio Durán Boo and Concepción Camarero Bullón, 2002; Francesc Nadal, Luis Urteaga and José Ignacio Muro, 2006; and Institut Cartogràfic de Catalunya, 2007). And now also from Spain we have this special issue of *Estudios Geográficos* containing papers on cadastral mapping in Spain but also in France, the Crimea, the Duchy of Milan, the Kingdom of Naples and Portugal. But this special issue's contents also take us out of the archives and libraries into the digital world. The many thousands of land-parcel-based cadastral maps with their many millions of mapped land parcels cry out for the techniques of digital humanities. I believe that this collection of essays has the potential to move the study of cadastral maps and registers into a new dimension by asking new questions in new ways and with new analytical techniques. It is a truly exciting prospect and I warmly commend the work of the contributors and the editors.

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