Measuring Space and Fuzzy Boundaries: Examples from Chinese History

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parcel-level space

- corvee and grain tax assessment
- limited public works, irrigation, drainage
- assignment of tenant rights, enfeoffment

town-level space

- strongholds, both military and commercial
- intensive public works, fortifications, drainage
- town security and planning
- adjacent areas—residential, agricultural
- hinterland

political-level space

- political spheres of influence
- communication and financial network
- information gathering
- local law enforcement

perception of officially measured space
well-field land distribution and taxation
Eastern Han area measure
同 tong = 100 sq. li

里 li = about 0.5 km
1 sq. li = about 0.25 sq. km
100 sq. li = about 25 sq. km

井 jing = basic parcel unit
100 sq. li = 10,000 jing
1 jing = about 2,500 sq. meters
2,500 sq. m = about 0.6 acres

Southwest China Rice Terrace
Photo: Lou Dematteis (IFAD)

Eastern China Rice Field
Photo: Lyn Bishop (Zama)
"fish scale map" for tax purposes  鱼鳞图
Li Chunnian’s surveying methods (12th Century CE)

diagram: Lex Berman based on an illustration by Wang Deyi (1974)
do plans fit reality?

- plans don’t account for terrain
- we don’t know how parcels were actually measured in practice
- households and productive household members were more important in calculating tax than parcel size
- varying soil quality and productivity by area was not accounted for
town-level space
map of Anyang administrative seat  安陽
do plans fit reality?

- city plans often highly accurate, though stylized
- archaeological evidence can provide evidence for spatial extents
- information from city plans can be used to identify archaeological finds
- GIS technology is MOST appropriate for studying urban history
Anyang general area, grids of 10 square li 里
some boundaries follow natural features
some boundaries do not follow natural features
enclaves and exclaves
usually forced out of their original towns by war or natural disaster, the displaced persons establish new settlements with the same placenames as their abandoned towns. These often existed as quasi-independent enclaves within another jurisdiction, and yet with no status as a part of that jurisdiction. Sometimes, the population was eventually repatriated to their original settlements, other times they were eventually absorbed into the local jurisdiction.

The U.S. has a comparable phenomenon: placenames that settlers brought with them from Europe. So we find Chelsea, Cambridge, Berlin, Montpelier, Ulster, Bristol, Hanover, and the similar examples at every turn in the road.
each “li” 里  was made up of 110 household units
10 were leader’s households
100 were regular households
the 100 regular households were divided in 10 “jia” 甲
so that each “jia” represented 10 households

“li – jia” household registration 里甲
do plans fit reality?

- administrative areas were highly uncertain until the Ming (15th Century), at which point basic county boundaries could be depicted with some degree of supporting evidence.

- since the vast majority of historical areas cannot be depicted with accurate boundaries, we must account for uncertainty in GIS (which does is quite problematic).

- assuming that official administrative boundaries can be defined, we have not even begun to deal with the issue of nominal claims vs. actual control, indigenous peoples, and conflicting claims to territory.
CHGIS: China Historical GIS Project

website: www.fas.harvard.edu/~chgis